POPULATION GEOGRAPHY

CONTENT

CHINA ABANDONS ONE CHILD POLICY : A CRITICAL ANALYSIS

HARBANS SINGH
Montclair (NJ), USA

Abstract

The Chinese government, on October 29, 2015, announced the end of the one child policy. The new policy will be in effect as of January 1, 2016. What was the one child policy? What was its impact? What were the factors that lead to this drastic policy in the first place? What will replace this policy? Will the abandonment of the one child policy lead to higher population growth and reverse other demographic attributes related to this policy? These and other questions are the focus of analysis in this paper.

Historical Context

Cultural cohesion is pivotal for the longevity of a nation state. Cohesion makes it easier to build consensus to formulate and implement national policies. The Chinese developed instruments and institutions to promote cultural cohesion from the very early formative period of their civilization.

The Chinese cultural hearth developed in North Central China at the confluence of the Hwang and Wei rivers around 4000 years ago. This area has fertile soils of the Loess plains and is watered generously by rivers for irrigation. This location became desirable for the development of agriculture and the emergence of the center of the Chinese cultural hearth. Chinese cultural history is distinguished by dynastic rule. The Shang Dynasty (1600 B.C.-1050 B.C.) is considered as the beginning of Chinese civilization with a writing system, walled cities, bronze metal and horse drawn chariots. Their rule extended over a large territory surrounding the cultural hearth. China was ruled by sixteen major dynasties (Hammond, 2001). The last dynasty, the Qing or the Manchu, collapsed in 1911-12, and then Nationalists came to power. The Communist Party under the leadership of Mao Zedong defeated the Nationalists in 1949 and established communist rule over mainland China. The Nationalists fled to Taiwan and there they resurrected their government.

The configuration of modern China developed during the Han Dynasty (204 B.C-220 A.D.). Through conquest they brought most of Southern China under their control. They expanded the territories to the north to Korea and west to Central Asia. The renowned Silk Road emerged during this period to enhance trade and contact with the other developed regions of the world such as India, Persia, the Roman Empire and others. As a result, the Chinese cultural hearth became prosperous. Millet, a new crop from Central Asia, was introduced and increased the food supply in Northern China. Millet was cultivated on land which was unfit for wheat, the primary crop in Northern China. In addition to this territorial expansion, Confucian philosophy provided cultural cohesion and remained a distinguishing feature of Chinese culture throughout its history as well as in the contemporary Chinese society. Confucian

philosophy emphasizes a moral code of civic virtues for the smooth functioning of society. It centers on obligations and duties. Total obedience and respect for the elders - family patriarch, clan patriarch and all the way to the emperor - is at the core of Confucian philosophy. In return, the elders have an obligation to look after, safeguard and protect the interests of the persons below them. Another important element of Confucian philosophy is its emphasis to excel in education. As a result the literati class occupied the top of the social hierarchy.

During the Han period, the Chinese written language became standardized. This system is still in use today. The writing system is akin to hieroglyphs rather than to an alphabet. Even though spoken language is different in North and South China, the written language is understood in both regions. This provides a unifying element to the Chinese culture.

As a result of the cultural cohesion stemming from the Han Dynasty, the Chinese people call themselves the people of the Han. Han Chinese now comprises the largest ethnic group accounting for 92 percent of the population of China.

Population during Dynastic Periods

One of the legacies of Confucianism is the emergence of the cadre of administrators which were selected through a multiple step competitive examinations system from the local, provincial to the imperial level. The examination to select administrators came to be widely used during the Han Dynasty. This administrative set up remained a unifying factor throughout the two millennium of dynastic rule. The dynasties and their emperors had changed but the underlying administrative structure endured throughout, providing continuity. As a result of this administrative continuity, data on the number of households, size of households, size of land holdings, etc., were collected and maintained, and are comparable from one period to another.

Another factor that has to be taken into

account to estimate population in historical periods is the impact of disasters, such as, civil unrest, invasions, floods, drought and others, on population. Population growth, as a result, is not linear but rises and falls in relation to the disasters. Deng (2003) reports that between 246 B.C. to 1913 A.D. 16,495 disaster events occurred with an average of 7.6 events per year. Each disaster, after a lag period, lead to a dive in population numbers. In descending order, the disasters were: civil unrests 28 per cent, invasions 21 per cent, floods 17 per cent, droughts 16 per cent, other natural disasters 13 per cent, and other manmade disasters 5 per cent. The magnitude of theses disasters can be seen from two 20th century events. The occupation of China by Imperial Japan during the Second World War resulted in 10 million deaths. Widespread killings by the Japanese army in Nanjing city - the so-called rape of Nanjing - continues to be an emotional issue bedeviling the current relationship between China and Japan. The second example which resulted in 30 million deaths was the result of Chairman Mao's Great Leap Forward Program in 1956-58. This was an economic reform program to create self-supporting communes. The program resulted in a disastrous disruption of food production.

Between 2 A.D. and 1000 A.D. population estimates are available for 31 time periods at irregular intervals. During this period, population as high as 60 million was recorded in 2 A.D. and the lowest, 11.5 million, recorded in 626 A.D. The population rises and falls with no linear pattern because of disasters.

During the military campaign in Vietnam in 1012 A.D. the Song Dynasty obtained an early ripening variety of rice. This variety matures in sixty days and produces up to 3 crops a year in the same field. The increased food production led to a sustained growth of population until 1200 A.D. The population reached 120 million in 1110 A.D. Between 1200 A.D.-1700 A.D population reached a plateau of 50-60 million people. After 1700 A.D population grew rapidly from 56 million to 400 million in 1833 (Deng, 2003). At the collapse of the Manchu Dynasty in 1911, the population,

according to Deng, was estimated at 386 million. Other estimates put the population at 428 million. This rapid increase was due to the new crops of maize, potatoes and sweet potatoes introduced by the Europeans in the 18th century that resulted in additional food production.

Population in the 20th Century

China has been the most populous country in the world. The population in 1949, the year Chairman Mao and the Communist party took over China, was estimated at 542 million. In 1979, population reached a billion. In mid-2015, the population is estimated to reach 1.372 billion people. The population is expected to peak at 1.422 billion in 2030 and decline to 1.366 billion in 2050. In the 2020's India's population is expected to surpass China along with the distinction of being the most populous country in the world (Population Reference Bureau, 2015). One of the reasons for different estimates of population is the irregular interval of census taking by the communist regime. Census was taken in 1953, 1964 and 1982. In 1987, the government announced regular census taking after every ten years starting with the year 1990. The first census in 1953 reported a total population of 583 million.

Population Control Efforts

The Communist Party leadership was predisposed to the large population as a source of strength. But they soon realized that the rapidly rising population is an obstacle to economic growth. The government initiated and promoted a birth control program in August 1956. The program got nowhere during the tumultuous period of the Great Leap Forward (1956-58). In the 1960's the birth control program was re-emphasized. The program was successful in lowering fertility in urban areas. The fertility rate was cut in half between 1963-66. Population control took a back seat again because Chairman Mao unleashed the Cultural Revolution (1966-69) to silence his critics including politicians and intellectuals. They were sent to labor camps and to

reeducation in prison settings. This horrific period ended with Mao's death in 1976 (Xianlin, 2016). Until Mao's death, the leadership was reluctant to make a policy goal that to achieve economic growth and a higher standard of living it is necessary to slow population growth. A recommended program of two children in cities and three children in the rural countryside was launched in the mid 1970's.

One Child Policy

Deng Xiaoping, after Mao's death, emerged as the Supreme leader of China in 1978. Immediately, Chairman Deng set the policy goal of quadrupling per capita income by 2000. Per capita income is customarily calculated as dividing the gross national income by the total population. To achieve this ambitious increase in per capita income, a two pronged strategy is required. Rapid growth in gross national income to increase the economic pie must be coupled with control of population resulting in fewer people to share the pie.

To increase the gross national income, Chairman Deng instituted the economic reform of opening and liberalizing the Chinese economy. The principles of free markets were adopted. Foreign investments were encouraged, facilitated and welcomed. Exports were pushed as the central tenet of the new economy. The economic liberalization resulted in an extended period of unprecedented annual economic growth of 8 to 10 percent.

The other complementary part of raising the per capita income was to control population. A mandatory policy of one child was initiated in 1978. The policy was strictly enforced.

Enforcement of the One Child Policy

Carrots and sticks were used to implement the one child policy. Among the carrots or incentives was the social recognition from the Communist authorities to achieve the policy goal of one child. Also, there were tangible benefits for parents in terms of a longer parental leave,

allotment of housing, employment security, free education for the child, free medical care and higher retirement pensions. Preference was given to the child, as an adult, in higher education, employment, housing and other areas.

Just as the couples who had one child were recipients of generous economic benefits, the sticks or disincentives for couples having a second child were contrastingly harsh. A second child did not get any benefits. Parents had to pay for all the cost of education, medical care, housing and other benefits. Parents were fined for breaching the one child policy. Fines are equal to more than the yearly salary of both working parents. The government has collected more than 300 billion dollars in fines since 1980. Mothers were coerced to have abortions even during the last trimester of their pregnancy. A horrific picture is outlined in a recent book, "One Child: The Story of China's Most Radical Experiment," by Mei Fong (2016). The harsh treatment for breaching the one child policy was criticized as a violation of human rights by human rights activists (The Economist, 2012).

The Hukou system is an all-powerful mechanism of compliance for the One Child Policy. In a nutshell, it is a registration system. Every person upon registration is given a passport like booklet as an official identification. The Hukou connects all the government benefits, such as, employment, housing and medical care with the place of residence. The communist regime implemented the Hukou system in the 1950's to monitor and control the movement of people. Because one child is listed on parent's Hukou that child is eligible for the benefits. Additional children are alive but their existence is not recognized by the state. To register the second or the third child, parents have to pay a hefty fine as mentioned above. In this way the Hukou system is a powerful tool for compliance with the one child policy.

Also, the Hukou system has restricted the movement of people from rural to urban centers. As a result urban squatter settlements, so ubiquitous in all the countries of the developing world, are absent in Chinese cities. The

liberalization of the economy has created factory jobs and a construction boom that have attracted rural migrants to the coastal cities. These migrants do not have the urban Hukou, therefore, they are like illegal immigrants. Floating population is the term used for them. Their number ranges from 270 million to 300 million. They are often exploited and their rights are not protected (Gao and Smyth, 2010; Chen, 2011).

Who Is Affected?

The Han Chinese, that comprise 92 per cent of the population, are under the one child policy. The minorities are exempt from this policy. There are fifty-five recognized minorities in China. They are culturally very diverse.

As to compliance with the one child policy, rural and urban centers are treated somewhat differently. The policy is strictly enforced in cities. Exceptions are often granted in rural areas if the first child is a girl and a strong justification can be made for the second child.

Impact of the Policy

The one child policy has achieved its goal of rapid fertility decline. The birth rate has declined from 20 per 1000 persons in 1980 to 12 per 1000 persons in 2014. According to the 2010 Chinese census the total fertility rate, as measured by the number of children born to child-bearing females of age 15 to 45 years, was 1.18. The total fertility rate was lower in cities, 0.88 and higher in rural areas at 1.44. This is much lower than the replacement level fertility rate of 2.1. Prolonged replacement level fertility rate results in stabilization of population. Among the ethnic minorities only Uyghur has the highest total fertility rate of 2.04 a bit lower than the replacement level (Wikipedia, 2015).

A dire impact of the one child policy is on the sex ratio of newborns and their subsequent effect on the society. Preference for male children is embedded in Confucianism but the one child policy made things even worse. In the world as a

whole, there are 107 boys to 100 girls born. For the developed world there are 105 boys born for every 100 girls. In China this ratio is 118 boys for 100 girls born, according to the 2010 census. This ratio has risen since 2000 when it was 116 boys for 100 girls. For comparison, the identical figure for India is 112 boys for 100 girls born. Like China, in India too there is a strong preference for boys. South Korea which has a similar trajectory of economic growth and cultural similarity with a strong emphasis on Confucianism has a much lower figure of 107 boys for 100 girls born. China stands out with more boys than girls at birth.

From the perspective of total numbers in the age group 0-4 years, the 2010 census snapshot of China reported 41.06 million male children and 34.47 million female children. There are 6.59 million more boys in the 0-4 year age group. If China had the sex ratio of South Korea, the total number of females in the 0-4 year age group would be 38.38 million, a higher figure than the actual 34.47 million. There is a shortage of girls to the tune of 3.91 million in this age group. This shows the magnitude of missing girls in China - a million aborted female children a year. Realizing the distorted sex ratio, the Chinese government in 2003 outlawed providing parents the sex of the child before birth. But the 2010 census shows little impact on the sex ratio.

Analyzing age cohorts at the 2010 census, there are 6.6 million more male children than females of 0-4 years of age. For the 5-9 year age group there are 6.5 million more male children. And in the 10-14 year age group there are 5.6 million more male children. And in the 15-19 year age group there are 4.0 million more male children than females. As these age cohorts reach the marriageable age, males will face the stark reality of a shortage of brides with unforeseen consequences on the family and society. For females it will be a pleasant surprise to select from several suiters a most desirable husband. Some young men will never have the opportunity to marry and have a family. This is an unprecedented social development with far reaching consequences - a product of the one child policy.

What Is Next?

At the end of October 2015, China abandoned the one child policy (The New York Times, 2015). This policy has been replaced now by a policy allowing up to two children. The rational for this change is primarily economic. The cost related to the care of the growing aging population is one factor. The other factor is the anticipated shortage of labor force. Fewer and fewer young persons are entering the labor force. As a result, labor costs will rise and slow down the economy. The Chinese leadership has come to the conclusion that to have sustainable economic growth, consumer spending has to grow. This goal can only be achieved by changing the one child policy to a two child policy thus increasing the number of consumers and, thereby, increasing consumption.

Will the replacement of the one child policy with the two child policy change the demographic trajectory in China? All indications show that this policy change will have minimal effect. For example, in 2013, the government relaxed the policy and allowed two children if one parent had no siblings. Only 12 percent of the eligible couples sought permission to have a second child. The cost of raising a child and providing a good education requires a lot of money. Raising the second child is prohibitively expensive. High housing costs, savings for retirement, and maintaining a higher standard of living discourage parents from having a second child.

Urban population at the time of the announcement of the one child policy in 1978 was small (12.8 percent). In 2015 the urban population was 55 percent, a very impressive achievement. A large floating population is a potential urban population in waiting. High urbanization reinforces lower fertility. In addition, China now is the second largest economy in the world. Economic development also reinforces lower fertility.

The one child family has become the cultural norm. Parents realize the tangible benefits of a smaller family. All segments of Chinese

society, rural, urban and ethnic minorities, have achieved below replacement level fertility. The trend line of lower fertility will continue and seems irreversible.

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URBANIZATION IN PUNJAB (INDIA): 1911-1921

MEHAR SINGH GILL
Patiala, India

Abstract

After two decades of decline and one of sluggish growth of urban population since 1881, Punjab experienced a modest rate of urbanization during 1911-1921. Although this decade recorded lesser number and intensity of disease and that too in two or three years, yet the mortality rate was quite high owing to the devastating epidemic of influenza in 1918. Besides, outmigration to Canal Colonies in the western part of the pre-partition Punjab as well as heavy recruitment to army in the wake of the World War I also worked to slow down the pace of urbanization. The spatial pattern of urbanization was mainly chiseled out by agricultural prosperity due to canal irrigation as well as construction of new railway lines.

Generalities

The decade 1911-1921 was marked by a rapid development in the means of transport. Apart from the construction of many branch railway lines, the rail track from Ambala to Amritsar and further to Attari (and then to Lahore) was also doubled during this period (Census of India 1921, p. 79). Similarly, there was perceptible extension in metalled as well as un-metalled roads in the state.

Though the growth rate of Punjab's urban population during 1911-1921 was 6.92 per cent only, it stood in sharp contrast to the much lower growth rates recorded in the previous three decades. However, "part of the increase in urban population" in the area was due to a small "terminological change under which the headquarters" of native states had been "for the first time treated as towns in the census" (Census of India 1921, p. 10). It is noteworthy that the rate of population increase in rural areas (6.17 per cent) was also close to that in urban areas. The tempo of urbanization would have been still higher in the state but for the continuing out-migration to the Canal Colonies located in the western half of the pre-partition Punjab. In this way the decade marks a prelude to the ensuring long period of relatively

higher rate of urbanization in the state. The year 1921 has been rightly called the demographic divide in the state, as also in other parts of India.

Although this decade was healthier than the previous one, the pace of urban population growth in the state could not go further up due to frequent spread of diseases (Census of India 1921, pp. 58-60): mild plague (1911), perceptible incidence of smallpox (1912-13), plague (1915), malaria (1916), fever (1917), plague and epidemic of influenza (1918), and the epidemic of cholera and smallpox (1919). But the outbreak of plague in 1915, and influenza epidemic in 1918 were the most devastating in terms of loss of life. The influenza of 1918 proved to be the main killer disease which took a heavy toll of life as it "caused the largest number of deaths ever occurred in the Punjab in one year since any record of vital statistics has been maintained" (Census of India, 1921, p. 56). However, the period remained free from famines notwithstanding the fact that scarcity conditions occurred in 1913, 1916 and 1919 particularly in southeast part of the state.

Although there was only a little change in the definition of town at the 1921 census as

mentioned earlier, six towns were declassified at the 1921 census while three new towns were added to the list taking the total number of urban centres to 62 in 1921. The declassified towns along with their population in 1911 were as under: Garhshankar (4923), Miani (4870), Kalanaur (4606), Anandpur Sahib (4041), Dasuya (3597), and Khanna (3319). The new towns in 1921 were Moga (14145), Sultanwind (5572) and Amloh (1543).

Growth of Population

With the exception of Jains, all other religious communities recorded an increase in their population during 1911-1921 (Table 1). As per unadjusted growth figures given in column 4 of Table 1, the Hindus recorded the highest growth rate (11.52 per cent) followed by the Sikhs (7.71 per cent), the Christians (5.69 per cent) and the Muslims (3.58 per cent). The adjusted figures in column 5 reveal the same rank order of growth rates of various religious communities notwithstanding relatively high growth values obtained for each. Column 6 gives a more realistic picture of population growth as it excludes the population of the declassified as well as new towns from the population of 1911 and 1921 respectively. According to this column again the Hindus claimed the highest growth rate (12.08 per cent) followed by the Christians (6.29 per cent), the Muslims (5.58 per cent) and the Sikhs (3.22 per cent).

Relatively high growth rate of urban Hindus during this decade was attributable to distinct rise in rural-urban migration of this community, particularly its trading and commercial castes. This stepped up trend of their mobility to urban areas was connected with two factors: (i) the passing of the Land Alienation Act in 1900 that had forced the rural traders and money-lenders, who were almost all Hindus, to think about investing their capital in urban business avenues; and (ii) the brewing social tensions between these commercial and trading castes on the one hand and the agricultural population, who were mostly non-Hindus, on the other which had created a strong feeling of insecurity for the rural Hindus. Thus a significant number of the Hindus moved out from villages to urban centres mainly for participating in trade, industry and banking etc. Out-migration of the rural elite of the Hindus was bound to stimulate out-flow of many others belonging to that community as is usually the case when instigation for migration comes from ethnic strife.

Continuing notable outflow of the Sikhs to canal colonies in the western part of the pre-partition Punjab mainly accounted for relatively low growth rate of these people in urban areas. Besides, owing to the preference for recruitment of the Sikhs to the army (Kaur, 1979, p. 81) at the start of the World War I also contributed towards relatively low growth rate of this community.

The strengthening of the revivalist movement among the Hindus had reduced the pace

Table – 1
Punjab: Growth of Urban Population by Religion (1911-1921)

Population	Urban Population		Per cent growth		
	1911	1921	Unadjusted	Adjusted*	Adjusted**
1	2	3	4	5	6
Total	813224	869526	+5.92	+10.36	+7.67
Christians	8095	8556	+5.69	+8.77	+6.29
Hindus	305622	340839	+11.52	+14.85	+12.08
Jains	7927	7420	-6.40	-5.66	-5.77
Muslims	405071	419586	+3.58	+7.39	+5.58
Sikhs	86343	92996	+7.71	+10.05	+3.22
Others	166	129	-22.29	-22.29	-22.29

* excluding population of declassified towns.

** excluding population of declassified as well as new towns.

Table – 2
Punjab: Classification of Urban Centres by Growth Rate (1911-1921)

Growth rate (in percentage)	Number of Urban Centres					
	Total	**Christians**	**Hindus**	**Jains**	**Muslims**	**Sikhs**
40+	4	27	5	5	2	9
30-39.99	3	-	6	1	1	5
20-19.99	4	4	8	4	7	5
10-19.99	10	1	11	6	12	3
Below 10	21	1	16	7	18	12
Decrease	17	21	13	20	19	25
No urban population	-	5	-	16	-	-
New Towns	3	3	3	3	3	3
Total	**62**	**62**	**62**	**62**	**62**	**62**

of religious conversion from Hinduism to other religious folds, particularly Islam and Christianity. Consequently, the growth rate of these two religious groups was close to the natural growth of population.

As was the case with respect to growth rates of urban population, various religious communities also differed notably with regard to the number of urban centres in various growth categories (Table 2). In 11 urban centres, the general population increased by more than 20 per cent, while in 17 it suffered an actual decline. The corresponding figures for the Muslims were 10 and 19. It is important to note that the number of urban centres in the higher growth (above 20.00 per cent) category was much larger i.e. 19 in case of the Hindus as compared to only 10 in case of the Muslims.

Another point which emerges from Table 2 is that the distribution of urban centres as per growth rates formed a pyramid form in respect of the general population, the Hindus and also the Muslims. The pyramid type distribution was

marginally visible in case of the Sikhs, while it was altogether absent for the numerically less important religious communities, i.e. the Jains and the Christians. In other words, larger the population size of a group more pyramid like was the distribution of urban centres in regard of growth rates.

Change in Urban Sex Ratio

There was only a nominal change in urban sex ratio of Punjab during this decade (Table 3). The sex ratio of general urban population declined by five. The Hindus recorded the largest decline (-13) connected with relatively more male-selectivity in their rural-urban migration. There was only nominal change in female proportion among the Muslims and the Sikhs. On the other hand, the Christians continued with notable improvement (+165) in their sex ratio during this decennial period also. It was attributable to addition of new converts to this religious fold from amongst the Hindus who had a much higher sex

Table - 3
Punjab : Change in Urban Sex Ratio (1911-1921)

Population	Sex ratio		Change
	1911	**1921**	
Total	**740**	**735**	**-5**
Christians	489	654	+165
Hindus	719	706	-13
Jains	801	812	+11
Muslims	784	783	-1
Sikhs	645	642	-3

Table - 4
Punjab: Distribution of Urban Population by Size-class of Urban Centres
(1911 and 1921)

Size-Class	Number of Towns		Per cent of Urban Population		Per cent of Urban Centres	
	1911	1921	1911	1921	1911	1921
I	1	1	18.61	18.06	1.54	1.61
II	1	2	6.81	12.76	1.54	3.23
III	6	7	18.16	22.31	9.23	11.29
IV	11	13	23.65	19.52	16.92	20.97
V	29	27	24.60	22.24	44.62	43.55
VI	17	12	8.18	5.11	26.15	19.35
Total	**65**	**62**	**100.00**	**100.00**	**100.00**	**100.00**

ratio than that of the British Christians recently arrived from Britain.

Growth by Size-class[1] of Urban Centres

Keeping in tune with a relatively stepped up pace of urban population growth, a number of towns of Punjab registered an entry to higher size-class during this period. Class II gained Ludhiana town from Class III which in turn received Bathinda and Hoshiarpur from Class IV. Three urban centres namely Mukatsar, Sangrur and Patti moved up from Category V to IV. Thus, whereas the percentage share of towns in upper three categories (I, II and III) had gone up from 12.31 per cent to 16.13 per cent, the proportion of urban population in this group had improved from 43.58 to 53.13 per cent during 1911-1921 (Table 4). It is noteworthy that these changes in relative share of urban centres as well as urban population in

different size-categories were primarily related with changes in the number of towns through up-gradation and declassification between the two census years. As yet, the size of urban place had not emerged as the determining factor of urban growth as revealed by decrease in proportion of urban population in Class I, which included Amritsar city only, from 18.61 to 18.06 per cent during this period (Table 4).

Table 5 presents growth rate of urban population by size categories of urban centres. Unadjusted growth rates worked out from available census figures emphasize that inter-category variations in population increase were chiefly influenced by inclusion or exclusion of towns through their up-gradation or declassification during the period. Accordingly, the highest growth rate (100.46 per cent) of population was recorded in Class II which had gained Jalandhar town, while the highest decline in population (-33.2 per cent) was experienced in

Table - 5
Punjab: Growth of Urban Population by Size-class of Urban Centres (1911-1921)

Size-class	Unadjusted	Adjusted (with urban centres in category as in the base year)	Adjusted (as in column 3 minus new towns in 1921)	Adjusted (as in column 3 minus new towns in 1921 and declassified towns in 1911)
1	2	3	4	5
I	3.76	3.76	3.76	3.76
II	100.46	6.76	6.74	6.76
III	0.89	6.32	6.32	6.32
IV	14.92	21.46	11.89	11.89
V	-3.32	11.01	8.23	8.23
VI	-33.23	-28.56	-30.88	11.68
Total	**6.92**	**6.92**	**4.31**	**7.67**

Class VI which lost many towns both through declassification and up-gradation to higher Class in 1921.

If the towns are kept in the same category as in the base year, then the growth rates, as in column 3, come to be quite different from those in column 2 of Table 5. The highest population increase (21.46 per cent) was recorded in Class IV while Class VI occupied the lowest position (-28.56 per cent) in this regard attributable to its loss of towns both through up-gradation and declassification.

Growth rates given in column 5 could be called the most realistic as these have been obtained by keeping the towns in the same Class as in the base year as well as excluding the population of declassified and new towns. Significantly the lowest growth rate (3.76 per cent) was recorded by Class I, while the highest (11.89 per cent) was the experience of Class IV. It is important to note that growth rates in upper three Size - classes were relatively low as compared to those in the lower three Size-classes. Thus, the decade did not reveal any precise picture of size-growth relationship notwithstanding the fact that smaller towns (below 20,000) experienced relatively fast growth rates as compared to the bigger ones.

Population Growth by Religious Communities

The decade 1911-1921 witnessed a distinct fall in the percentage of Muslim urban population of Punjab (-1.56) from 49.81 to 48.25 per cent. By contrast, the proportion of the Hindus had gone up by 1.62 percentage point (Table 6). Other religious communities recorded only a nominal change in their proportions.

Though no precise relationship exists between Size-class of towns and change in proportion of religious communities, the following generalizations could be made in this regard: (i) in Class I and II, all religious communities, except the Muslims, had recorded increase in their respective proportions; and (ii) whereas the percentage share of the Muslims declined in all Size-classes of towns except Class VI, that of the Sikhs increased in all categories save Class VI.

Index of religious diversification for the total urban population of Punjab remained unchanged during the decade. The same was the case with regard to the only Class I urban centre of Amritsar. Size-classes II to V registered a marginal increase in the religious diversification index, while Class VI suffered a decline in this connection.

Spatial Patterns

The growth of urban population of Punjab during 1911-1921 was marked by significant spatial variations (Map 1). Though the state average of urban population increase was 6.92 per cent only, the growth rate of individual urban centres varied widely from 124.91 per cent in Barnala to (-) 24.78 per cent in Jalalabad.

Relatively high growth rate of urban population (above 20 per cent) was mostly found in the western half of Punjab (Map 1). This

Table - 6
Punjab: Change in Proportion of Religious Communities by Size - class of Urban Centres (1911-1921)

Size-class	Change in Percentage					Change in diversification index
	Christians	**Hindus**	**Jains**	**Muslims**	**Sikhs**	
I	+0.15	+2.46	+0.04	-2.84	+0.19	0.00
II	+0.56	+0.81	+0.45	-3.36	+1.51	+0.04
III	-0.35	+4.88	-0.43	-4.89	+0.81	+0.01
IV	-0.30	-0.41	-0.12	-0.57	+1.41	+0.01
V	+0.16	+1.88	-0.18	-2.30	+0.43	+0.01
VI	+0.56	-0.89	+0.06	+2.93	-2.66	-0.02
Total	**-0.02**	**+1.62**	**-0.12**	**-1.56**	**+0.08**	**0.00**

PUNJAB
Growth of Urban Population
1911-21

Percentage

40
30
20
10
0
d   20 Decrease
D
N   New Town

Persons

100,000
50,000
20,000
10,000

0   30
Km.
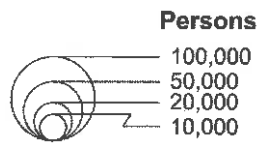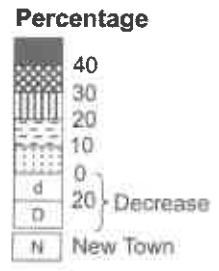
State Average: 5.92%

MAP 1

category included the towns of Amritsar Cantonment (124.91 per cent), Gurdaspur (42.54 per cent), Tarn Taran (40.56 per cent), Patti (30.70 per cent), Barnala (44.43 per cent), Bathinda (34.03 per cent), Kot Kapura (32.12 per cent), Fazilka (25.89 per cent), Firozpur (20.33 per cent), and Sultanpur Lodhi (25.40 per cent). Another town from this category was Hoshiarpur (21.96 per cent) located in eastern part of the state. Their high growth rates were attributable to several factors such as rail nodality (Bathinda), development of grain market and industries (Kotkapura and Fazilka), extension of rail line (Tarn Taran and Patti) and, shifting of resident population due to service/job requirements (Amritsar Cantonment, and Madhopur). In other words, urban growth rate was relatively high in the Firozpur-Bathinda area (Gosal, 1966, p. 12) and also in south Majha region. Both these tracts were marked by agricultural prosperity during this period. Many of "these towns were located in western Malwa region which had been experiencing a faster pace of urbanization ever since the introduction of the Sirhind canal irrigation in the 1880s" (Gill, 2015, p. 5).

However, it bears emphasis that, unlike that in the previous decade, western *Malwa* region failed to attain its pre-eminent position as an area of high growth of urban population in the state. The changed status of the region in this regard points out unmistakably that agricultural prosperity alone is not enough to sustain rapid increase in urban population for a long time.

Moderate growth (10-20 per cent) of urban population was recorded in 10 towns. Most of these urban places were in the central *Malwa* region which in terms of agricultural surplus occupied an intermediate position during the decade between canal irrigated western part and the agricultural scarcity-prone eastern part of this region.

Relatively low growth of urban population (0-10 per cent) was mainly recorded in south-eastern *Malwa* region, and central part of *Majha* tract. The low growth in eastern part of the state in general, and south-eastern *Malwa* in particular,

was attributable to high mortality from influenza epidemic along with the adverse effects of other diseases as well as scarcity conditions which occurred in 1913, 1916 and 1919.

Central *Majha's* low growth rate of urban population resulted from significant out-migration from both rural and urban areas to Chenab and Jhelum Canal Colonies. Besides, urban centres along the Satluj flood plain namely Rupnagar, Dharamkot, Zira and Khemkaran also come in this category of low urban growth due mainly to poor agricultural economy of these areas.

Out of the four large urban centres belonging to Class I and II, three experienced less than 10 per cent growth rate during the decade. Only Ludhiana town had come up with higher (17.46 per cent) growth rate connected mainly with its industrial attraction. Seventeen towns recorded a decline in their population during this decennial period. One-half of these towns were in the *Bist Doab* while 4 others were in the *Majha* region (Map 1). Apart from strong and widespread impact of the disastrous influenza in 1918, these areas also experienced heavy out-migration to the Chenab and Jhelum Canal Colonies now in Pakistan.

It follows that relatively high growth rate of urban population was not a characteristic feature of large tracts. Instead it was limited to widely spaced individual urban centres which enjoyed distinct location advantages over others at that time. On the other hand, relatively low growth or decline in urban population was found in distinctly large tracts of the state which owed to high mortality, particularly from influenza in 1918 and plague in 1915. Besides, out-migration to the Canal Colonies (now) in the Pakistani Punjab had also made its own impact in this regard.

Unlike the previous three decades, the period 1911-1921 experienced lesser degree of spatial correspondence between urban population growth rates of the Muslims and the Hindus (Maps 2 and 3). Compared with the general population as well as the Hindus, the growth rate the Muslims registered a sluggish pace of urbanization attributable to their lesser involvement in rural-

PUNJAB
**Growth of Urban Muslims
1911-21**

Percentage

40
30
20
10
0
d
20 } Decrease
D
N   New Town

Persons

100,000
50,000
20,000
10,000

0   30
Km.

State Average: 3.58%

MAP 2

PUNJAB
Growth of Urban Hindus
1911-21

Percentage

40
30
20
10
0
d   20 } Decrease
D
N   New Town

Persons

100,000
50,000
20,000
10,000

State Average: 11.52%

0   30
Km.
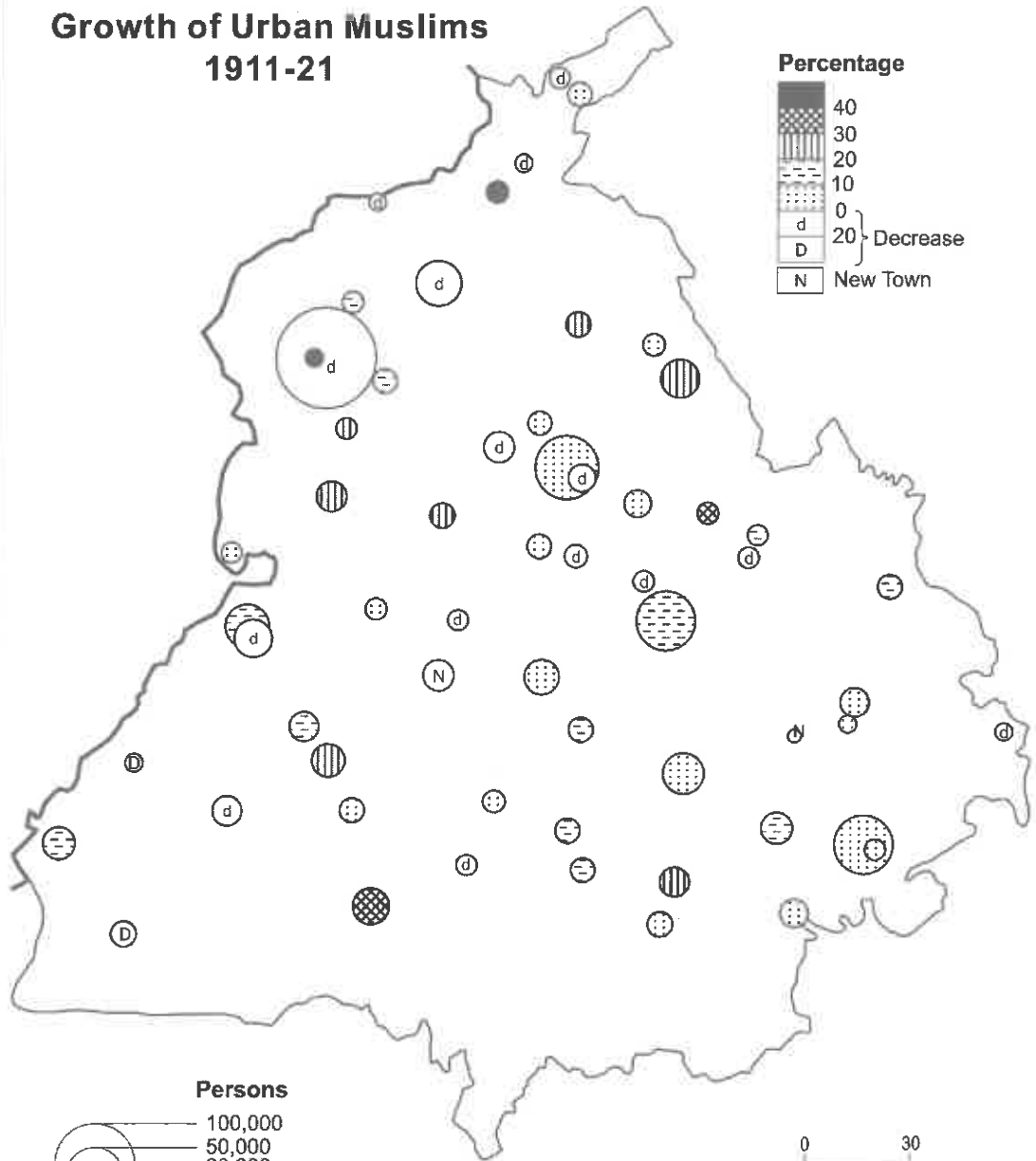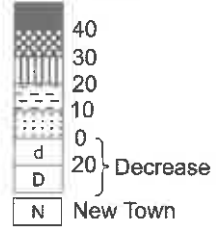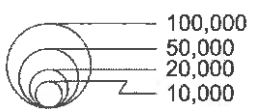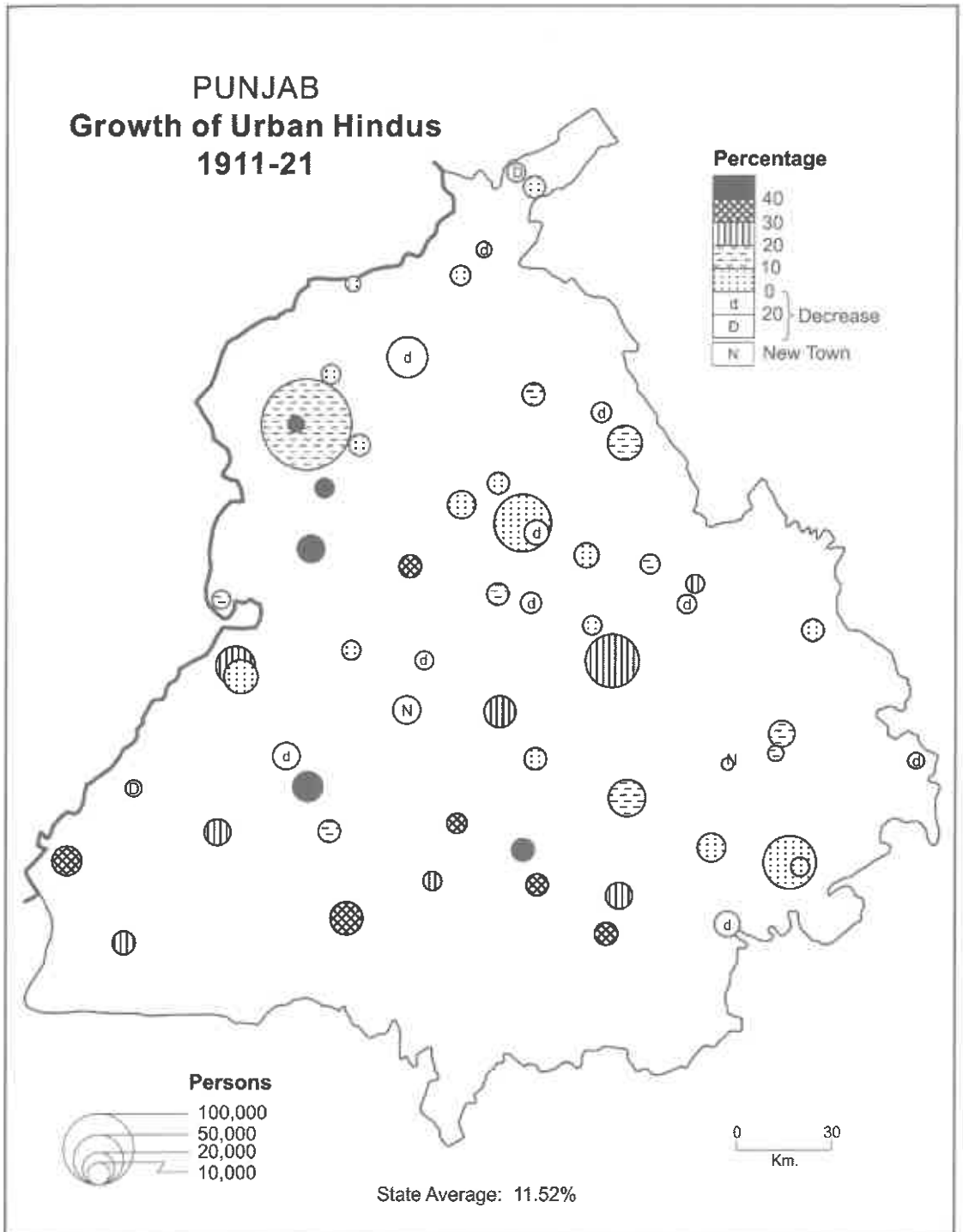
MAP 3

PUNJAB
Growth of Urban Sikhs
1911-21

Percentage

40
30
20
10
0
d
20 } Decrease
N   New Town

Persons

100,000
50,000
20,000
10,000

0   30
Km.
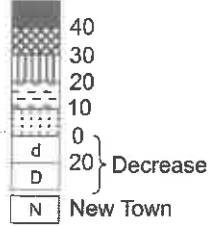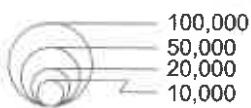
State Average: 7.71%

MAP 4

urban migration. Decline in Muslim population in a number of towns in the *Majha* tract and Firozpur district resulted from their significant outflow to the Chenab and Jhelum Canal Colonies. However, high mortality from influenza in 1918 was an equally important reason of their population decrease in the *Bist Doab* towns (Map 2).

In most of the towns located in the western two-thirds part of the *Malwa* region, the Hindus registered above 20 per cent growth rate during this decade. Their growth rate was particularly high in the flourishing *mandi* towns (Map 3). As mentioned above, consequent upon implementation of the Land Alienation Act passed in 1900 AD and the attendant social tensions between the Hindu moneylenders and non-Hindu agriculturists, a large number of these people had shifted to urban centres. North of the Satluj river the towns of Tarn Taran, Patti, Amritsar Cantt., and Sultanpur Lodhi also recorded high growth rate of the Hindus. It also bears emphasis that in the large urban centres of Amritsar, Jalandhar and Ludhiana, the growth of Hindu population was considerably higher than that of the Muslims.

As in the case of the Muslims, the low growth rate of Hinuds in part of the foot-hill tracts reflected poor agricultural conditions (Map 3). However, in central *Bist Doab* their low growth rate was indicative of stagnation of the urbanization process due both to influenza and to large scale rural out-migration to Canal Colonies in areas now in Pakistan.

The spatial pattern of growth of Punjab's urban Sikh population had its own distinctive feature during this period (Map 4). Despite Sikh out-migration to Canal Colonies, this community recorded quite high growth rates in the *Majha* tract, and the districts of Kapurthala, Jalandhar and Ludhiana stemming mainly from continuing conversions to their faith (Map 4). Areas north of Satluj river had much greater influence of the Sikhs religious organizations like the Chief *Khalsa Dewan*, and The *Singh Sabha* which were doing a lot of work for attracting more coverts to this fold.

Large parts of the Malwa region recorded a decline or only low growth in Sikh population

(Map 4). This was especially true of the southeastern part of the region which had experienced indifferent agricultural conditions for some years during this period. Besides, the Sikh religious movements had also much less influence in the area till that time.

With a state average growth rate of 5.69 per cent, the urban Christian population's growth rate was also characterized by notable regional variations. Besides, several towns recorded Christian population for the first time in 1921. The three cantonment towns at Amritsar, Jalandhar and Firozpur along with Khemkaran were the only urban centres with more than 5 per cent share of Christian population in 1911. With the exception of Amritsar cantonment the other three had registered a decline in Christian population during 1911-1921. Very high growth and a large decline of Christian population in many of the urban centres needs to be appreciated in terms of their very low population at the base year. Generally speaking growth rate of urban Christians and their proportion in population of towns in 1911 were inversely correlated.

The growth rate of urban Jains during 1911-1921 was (-) 6.40 per cent which brought down their share in the state's urban population from 0.97 to 0.85 per cent during this period. Like the Christian population, the Jains experienced wide differentials in inter-town growth rates. This was attributable to their very small base of population which was markedly influenced in terms of per cent growth rates even by an addition or subtraction of a few persons only. Their notable per cent increase was recorded in Barnala (200.00 per cent), Jaitu (333.33 per cent), Kotkapura (100.00 per cent), Tanda (108.00 per cent), and Jalandhar (31.25 per cent). Besides, in the towns of Kapurthala, Hoshiarpur, Sangrur, and Raikot, the growth rate of Jain population was between 20 and 30 per cent. They recorded a decrease in population in 20 out of the 62 towns in the state during 1911-1921.

Conclusion

Compared with the earlier three decades,

the period 1911-1921 came up with notably higher pace of urban population growth in Punjab which was chiefly attributable to the lesser intensity of killer diseases. The highest growth rate was experienced by the Hindus connected with notable rural-urban migration, especially of their trading and commercial castes, following the enactment of the Land Alienation Act in 1900 A.D., and the attendant social tension in rural Punjab at that time. In comparison the low growth of urban Sikhs stemmed mainly from their continuing significant out-flow to the Canal Colonies in the western part of the pre-partition Punjab as also from their large recruitment to the army in the wake of the World War I. The increase in population of the Muslims and the Christians was close to their natural growth rate.

The state experienced a nominal decline in urban sex ratio in case of various religious communities. The growth rate of urban population and change in sex ratio showed a strong inverse correlation with each other. Considerable improvement in the Christians' female proportion needs to be appreciated in the context of their very low sex ratio at the base year of the decade.

The growth rate of urban population revealed little connection with Size-classes of urban centres. However, if growth rates are calculated by excluding the declassified as well as the 'new' towns, then the growth rates of Size-classes IV, V and VI come to be higher than the upper three classes.

Punjab was characterized by striking regional variations in urban population growth during this period. Relatively rapid urban growth was mostly found in the western Malwa and southern Majha. It was connected with several factors such as agricultural prosperity, rail modality, development of gain markets, establishment of industries, and extension of rail lines. Conversely, low urban growth was typical of large parts of the more rainy eastern Malwa region which was ravaged by influenza, malaria and other seasonal fevers in several years during this period. Low urban growth in central Majha region was chiefly the result of large out-flow of people to the Canal Colonies in the pre-1947 west Punjab.

Thus, whereas high growth of urban population was mainly found in agriculturally prosperous areas as well as in towns with rail centrality, low urban growth took place in areas that experienced high mortality from influenza and other diseases in some years, as also from out-migration to the Canal Colonies in the western half of the pre-1947 Punjab. In nutshell, agricultural prosperity stemming mainly from canal irrigation, higher natural growth of population, and rail-road connectivity played a key role in determining the tempo as well as spatial pattern of urbanization in the state during 1911-1921.

Note

1. For census purposes in India, urban centres are divided into six Size-classes: I - 100,000 and above; II - 50,000 to 99,999; III - 20,000 to 49,999; IV - 10,000 19,999; V - 5000 to 9,999; VI - 5000 and below.

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MISSING FEMALES IN INDIA: CONCERNS AND CHALLENGES

NINA SINGH
Rohtak, India

Abstract

Census of India 2011 has made some startling revelations with the figures for the age-group 0-6 years showing an all-time low sex ratio. The inverted sex ratio at birth has also declined. Both pre- and post- birth conditions show strong daughter dispreference and discrimination against females. The 'missing female' syndrome in India persuades to ascertain the emerging patterns and identify and systematically address the locus of such asymmetry, which is the effort in this paper. Data were obtained from various sources including Census of India for 640 districts in India. The sex ratios skewed in favour of males coupled with dispersal of the phenomenon to rural and tribal areas over time and greater occurrence in the urbanised contexts should be a matter of serious concern. Moreover fertility decline has coupled with continuance of son preference putting limits to gender construction. All this throws up challenges for sustainable societal advancement and a call is made for strong corrective measures.

Key Words: India, Child Sex Ratio, Census of India, Dispreference, Discrimination

Background

The issue of gender imbalance has taken centre stage in development debates in India and has already drawn the attention of the political apparatus at the highest level that led to the identification of hundred gender critical districts/cities for special efforts. The criteria for the identification of such districts was a sex ratio of less than 900; female literacy rate less than 30 per cent; and female work participation rate less than 20 per cent.

An important aspect of gender imbalance, the declining child sex ratios (CSRs in the 0-6 age group) in the country has aroused widespread concern seen across a variety of constituencies including scholars, activists, human rights advocates, and civil society members. Extensive literature available on the subject attributes this phenomenon of rapid "masculinisation"—the increasing proportion of males in its population—of sex ratios through various dispersed practices such as sex detection and selectively aborting female foetuses, "fatal neglect", abandonment or sale of infant girls/female children, female infanticide, son-targeted fertility behavior based on the "stopping rule", where the sex composition of children already born determines the subsequent fertility behavior of women (Perwez, Jeffery and Jeffery, 2012; Basu and De Jong, 2010; McDonald, 1973; Keyfitz, 1968; Sheps, 1963; Goodman, 1961; Weiler, 1959). Moreover, the fertility control practices entail a lower probability of having a son with reduced number of children. In such a society with strong son preference and unfavourable social status for females, when sex and number of children are in conflict, people turn to sex-selective abortion to ensure at least one son.

Empirical evidence to the fact that while the small family norm has become quite acceptable, son preference persists is provided by the last National Family Health Survey (NFHS) conducted during 2005-06. The finding was that nearly a quarter of women would prefer more sons than daughters but hardly any would desire more daughters than sons. Further, an in-depth analysis of the NFHS data have shown that when the couple wants to limit the family size to two or three children only, if the first child is a daughter, the probability of determining the sex of the second child and aborting the foetus if it is of a girl, is quite high.

Another study had observed that a girl child was 40 per cent more likely to die in the first year of her life, and 61 per cent more likely between the 1st and 5th year in the past decade (Navaneetham and Dharmalingam, 2011, p. 16). Earlier, Drèze and Sen (2002, p. 233) had found that bulk of excess female mortality in childhood occurs among the older (1-4 age group) children. All this suggests preferential treatment of boys and neglect of female children. As a natural corollary the age groups beyond that of female infanticide are more crucial for understanding the implications of daughter disadvantage and neglect.

Largely, the "missing women" - females who would be alive in the absence of sex discrimination - is the result of a combination of prenatal sex selection and postnatal excess mortality (Bongaarts and Guilmoto, 2015, p. 242) contributing to the recent rise in the number of missing females in many countries including India. This trend reflects the adverse impact of gender (WHO, 2011). Women are missing in their millions–aborted, killed neglected to death. It is no exaggeration to call this gendercide.

India had nearly 35.7 million more men than women of all ages in 2011; the number having increased from 3.4 million in 1901 and 9.9 million in 1951. Moreover, in only two decades since 1991 the number of boys more than girls in the age-group 0-6 years had increased from 1.1 million to 6.9 million in 2011.

Additionally the country has lowered its total fertility rate to 2.4 in 2011 with varying response across regions. The child population in the 0-6 year's age-group had declined by 4.8 per cent points from 17.9 per cent in 1991 to 13.1 per cent in 1991.

Such a demographic profile will necessarily have far-reaching social consequences for both men and women. This scenario of 'missing females' in India persuades to pose certain questions? Is this condition confined to some areas or has dispersed to newer areas over time? Is there a limit to construction of gender with declining fertility? What are its social implications, concerns and challenges? This paper intends to focus on the pattern and emerging trends in sex ratios at a disaggregated level and address some concerns and challenges of the deteriorating child sex ratios.

Globally, sex ratios are calculated as the number of males for every 100 females. Sex Ratio at Birth (SRB) is thus measured as the number of boys born for every 100 girls born. It has long been observed that as a natural phenomenon, more boys are born than girls. The international equivalent of a normal SRB lies in the range 104-106 boys born for every 100 girls born. Alternately, calculated as the number of girls born for every 1000 boys born, the normal sex ratio at birth (SRB) is usually in the range 943-962 (desirable range is 950 or more girls per 1000 boys). The latter practice is followed in India.

Over time, with higher male mortality, this imbalance is expected to even out for higher age groups. However, early discriminatory behaviour such as gender-biased sex selection before birth or neglect of girls after birth artificially skews SRB as well as child sex ratio (CSR) in favour of boys. The 'sex ratio at birth' is a more accurate and robust indicator of the extent of prenatal sex selection and the practice of gender biased sex selection. CSR is the result of interplay of sex ratio at birth and sex selective post birth mortality. Sex selective migration does not affect it. The overall sex ratio further adds on to itself the extent of maternal mortality and sex-selective migration.

We may explore the leads to the adverse sex ratio through SRB and CSR.

Unpacking Discrimination: Analysis of SRB and CSR trends

An idea of girls missing at birth can be obtained by comparing observed with normal sex ratio at birth. SRB in India for the period 2011-2013 (data available as a three year moving average from the Sample Registration System) was 909, while the internationally observed normal SRB is 952 (or more) girls born per 1,000 boys. Accordingly, it is estimated that approximately six hundred thousand girls are missed annually in India since 2001.This is roughly 1,600 girls a day. Table 1 depicts a varying pattern of Sex Ratio at Birth and Child Sex Ratio (age group 0-4) for bigger states and union territories in India.

On the contrary, notwithstanding regional variations, it has been observed for the country as a whole that the females who are able to survive live longer as is evident in the sex ratio of 49+ years age group, wherein the overall sex ratio is 990; 1006 for rural areas and 956 for urban areas.

Kumar and Sathyanarayana (2012) have highlighted the discrimination through an analysis of 'Implied Sex Ratio at Birth' (ISRB) trends. The ISRB for India computed with 'reverse survival'

Table - 1
Sex Ratio at Birth and Child Sex Ratio (age group 0-4) in India: 2011-13

India & Bigger States/Union territory	Sex Ratio at Birth			Child sex ratio (age group 0-4)		
	Total	Rural	Urban	Total	Rural	Urban
	2011-13	2011-13	2011-13	2011-13	2011-13	2011-13
India	**909**	**910**	**906**	**909**	**911**	**902**
Andhra Pradesh	916	912	928	933	948	901
Assam	920	922	906	923	918	965
Bihar	911	912	894	916	919	876
Chhattisgarh	970	977	927	1004	1014	948
Delhi	887	894	886	891	898	889
Gujarat	911	925	884	888	899	869
Haryana	864	867	855	835	831	846
Himachal Pradesh	943	946	902	950	954	903
Jammu & Kashmir	902	903	894	881	881	883
Jharkhand	913	923	854	916	919	899
Karnataka	958	966	942	941	955	914
Kerala	966	961	983	957	956	960
Madhya Pradesh	920	918	929	932	942	889
Maharashtra	902	892	916	898	884	923
Odisha	956	960	928	944	945	939
Punjab	867	861	878	866	848	898
Rajasthan	893	898	874	874	873	880
Tamil Nadu	927	932	921	935	933	939
Uttar Pradesh	878	877	887	868	868	866
West Bengal	943	939	962	963	965	955

Source :Government of India. 2013. SRS Statistical Report. Ministry of Home Affairs. Office of Registrar General and Census Commissioner, India.

Table - 2
Child Sex Ratio (0-6 years) in India: 1991-2011

Census	Total	Rural	Urban
1991	945	948	935
2001	927	933	906
2011	919	923	905

Source: Census, India, Office of Registrar
General of India

Table – 3
India : The Regional Divide in Child Sex Ratio (0-6 years)

North India	2011	South India	2011	East India	2011
Punjab	846	Tamil Nadu	946	Mizoram	971
Haryana	834	Kerala	959	Meghalaya	970
Chandigarh*	867	Karnataka	943	Arunachal Pradesh	960
NCT of Delhi*	866	Andhra Pradesh	943	Assam	957

*Union Territories
Source: Census of India. 2011. Primary Census Abstract, India Series 1,
Registrar General & Census Commissioner, India.

Table – 4
Districts by Ranges of Child Sex Ratio in India: 2001* & 2011

Child Sex Ratio	2001			2011		
	Number of districts	% to total	cumulative %	Number of districts	% to total	cumulative %
Below 800	18	2.81	-	6	0.94	-
800-849	36	5.63	8.44	40	6.25	7.19
850-899	71	11.09	19.53	128	20.00	27.19
900-950	227	35.47	54.00	269	42.03	69.22
Above 950	288	45.00	100	197	30.78	100

* Adjusted to 2011

demographic technique using the 0-6 age group in 2011 was estimated to be 923 girls born for every 1000 boys born and has declined from 935 in 2001 (Kumar and Sathyanarayana, 2012). The range of decline varied between 33 points in Uttarakhand and 3 points in Tamil Nadu. Similarly, district-level estimates of ISRB indicate that about a quarter of the districts in India (161) are characterized by less than 900 ISRB. Also nearly two-thirds of the districts (63 per cent) constituting 70 percent of the population of the country have shown a decline in implied sex ratio at birth.

Along with the low and declining ISRB and its lateral spread, there has been an alarming and consistent decline in the child sex ratio (0-6 age group) in India from 976 in 1961 through 927 in 2001 to an all-time low of 919 in 2011. Though, the CSR in rural India (923) is 18 points higher than

INDIA
Pattern and Change in Child Sex Ratio
(age group 0-6 years)

(Data by districts)

Districts		females/1000 males in 2011
46		Below 850
131		850 - 900
266		901 - 950 (National average - 919)
197		Above 950

Change (in points)
during 2001-2011

203		Increase
430		Decrease
6		No change

DNA - Data not available

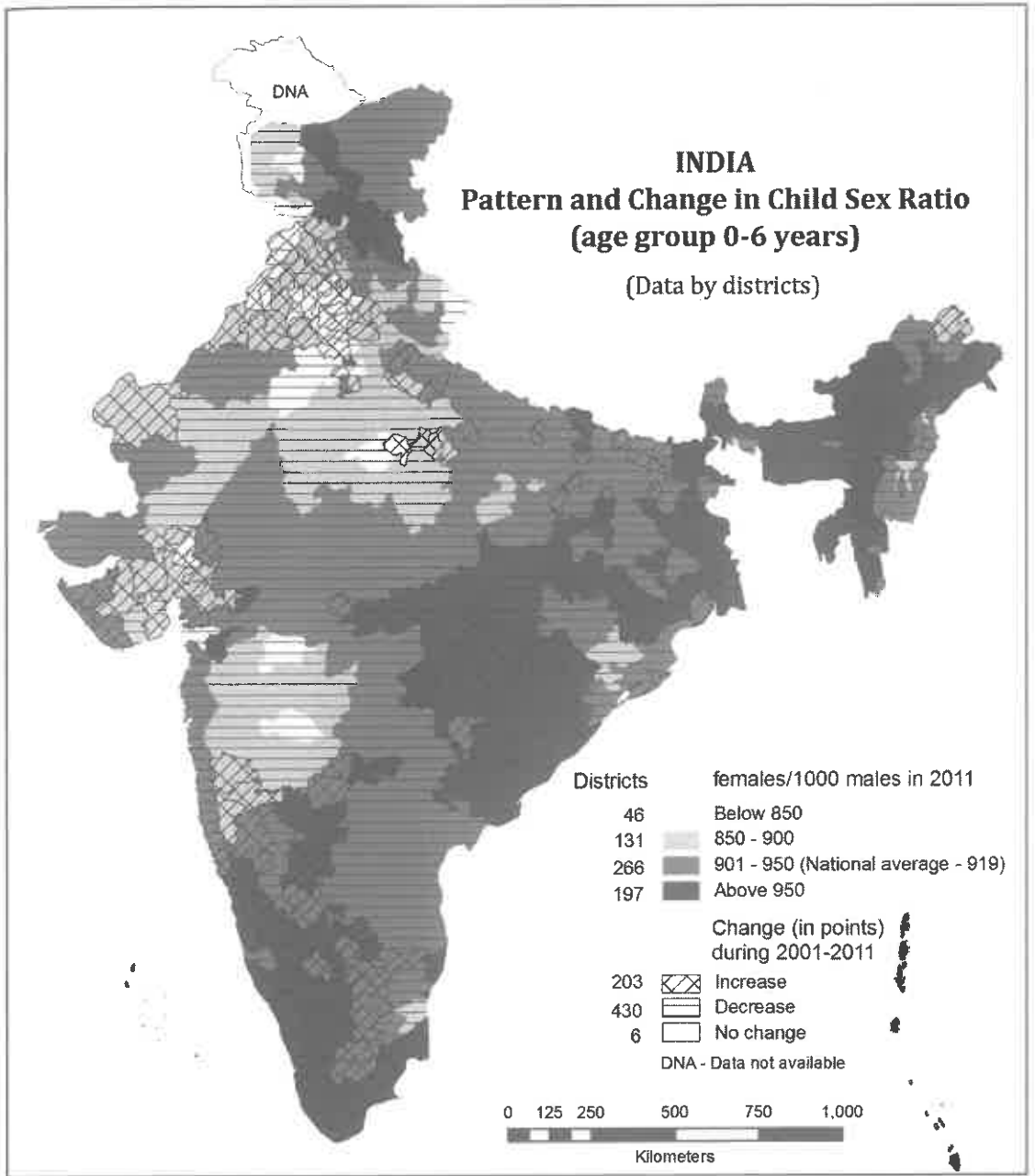0   125   250   500   750   1,000
Kilometers

Fig. 1

that of urban India (905), the more rapid fall in the ratio in rural areas during 2001-2011 than in urban areas (Table 2) is a worrying trend.

Disconcertingly, the CSR has fallen in 27 states and union territories. Despite improvement in some areas it still remains less than 850 in Haryana, Punjab and some parts of Maharashtra and below 900 in Gujarat and NCT of Delhi (UT). A clear north-south and north- east divide can be observed (Table 3).

At a disaggregated level, it is observed that 430 districts comprising about two-thirds of total districts reveal a decline in CSR during 2001-2011. In 284 districts the decline is more than ten points. Only 203 districts have registered an increase and seven districts report no change. The number of districts with CSR more than the norm of 950 has declined drastically from 288 in 2001 to 197 in 2011. Likewise a large number of districts have been added in the category of less than 900 CSR: the number increasing from 125 in 2001 to 173 in 2011. Ministry of Women and Child Development has undertaken beti bachao beti padhao initiative to ensure survival, protection and empowerment of the girl child in these districts. The scheme addresses the issue of decline in CSR through a mass campaign and multi-sectoral action. On a positive note, the proportion of districts with less than 850 CSR has also declined (Table 4).

The Census data has revealed that while the old pattern of dismal CSR is almost stagnant or show some improvement although remaining far below the norm, there are newer areas where SRB and CSRs are falling with alarming alacrity. The decline pointing to both pre- and post-birth discrimination that started as an urban phenomenon in the 1990s has now penetrated and spread into rural and tribal areas as well (Kumar and Sathyanarayana, 2012). The spread of declining trend to new areas is a disconcerting feature in 2011 (Figure 1) and would further reduce the number of females in the coming decades leading to far reaching consequences for the future generations.

This kind of situation raises a number of concerns and challenges.

Concerns

The rationale for the gendered 'choice' of children comes from the 'small family norm' which has come to be associated with late modernity. Earlier, couples could not intervene in the reproductive outcomes. In an environment with strong 'son preference', couples would continue to bear children until they got the desired numbers of male babies. Now that technology makes it possible to select the sex of unborn babies, desirable sex composition of children can be achieved without going into multiple pregnancies. The ideal composition is that of one son and one daughter – most families would stop at that. However, if the first offspring is male baby, families do not feel the need for the second child, be it a boy or a girl, *albeit* more so for girls.

Much has been said about the enabling environment and empowerment of women in terms of education, employment and financial independence and the interface of these parameters with autonomy and decision-making as well as their being equal partners in the development processes. And yet scores of studies have clearly shown that women's education or employment status do not automatically translate in their agency and freedom of choices. The concept of 'choice' itself is rather contrived – the so-called choice can be a matter of prolonged social conditioning and socializing process whereby women themselves follow the age-old 'preference' for sons (Raju, 2006). Prenatal sex selection appears therefore to be an effective response to a latent demand for sons, especially among women who want both to limit their offspring and to ensure the birth of a male descendant. It is apprehended that once the total fertility rate in the state has declined to below replacement levels, it could mean an increase in the proportion of childless women or that of couples with only one child. With relatively higher levels of education and access to technology, it is possible that such couples would want to ensure that the one child they have is male.

And this could result in an increase in sex-selective abortions. The "family squeeze" (more families having fewer children registered by the reduced fertility rates) does raise the possibility of enhanced gender bias.

Contributory factors also include the continued practice of dowry, unequal inheritance rights for women, and the high socio-religious status accorded to male relatives as compared to females in the context of various rituals. The low status and value accorded to girls and women in Indian society is the product of social norms anchored in patrilineal traditions. Despite recent changes in legislation male inheritance is still prevalent and daughters are still seen as a burden by the family. These socio-cultural norms continue to constrain the considerable policy and programmatic efforts that have been made to improve the status of women and girls and promote their rights.

While the causes and practices leading to son preference and hence a low female sex ratio have been well researched, not many studies have paid attention to the manner in which this is affecting other social processes and patterns. The low sex ratio has led to 'buying of girls for marriage'. The sex ratios in the neighbourhood of 800 for Haryana and Punjab, for example, imply that there are only four women available for every five men. Simply, this means that one of every five men will not have a local girl to marry. A very strong positive correlation ($r = + 0.83$) and more so for rural areas ($r = +0.86$) exists between proportion of unmarried males above 35+ years of age and low sex ratio. A number of questions can be raised. How will communities handle the worsening shortage? What are the 'social' implications of this shortage for both men and women? Will more men be forced to remain bachelors?

Impact of the low sex ratio can also be seen on marriage practices. 'Across-region' marriages are prevalent. The need for women, for productive and reproductive purposes, is being addressed through unconventional marriages that are uniting rural, illiterate Indians across boundaries of region,

language, religion and even caste. Uttar Pradesh, Haryana, Punjab and Rajasthan are marrying women from West Bengal, Assam, Bihar, Andhra Pradesh and Tamil Nadu. These unusual marriages are a consequence of a combination of factors: adverse sex ratio, acute poverty and the desire of parents to escape dowry.

The average Indian marriage, especially in rural areas, is still perceived as governed by traditional rules of caste and community. These are rules of endogamy (marriage within one's own caste group although outside one's own *gotra* – clan), hierarchy (bride givers are inferior to bride-takers) and hypergamy (the woman must marry up, both socially and economically). The rule of caste endogamy is shared all over India. However, within the caste, isogamous (spouses of equal status) or hypergamous (spouses of unequal status) marriages may occur. In many parts of the North, village exogamy is another rule, making it imperative for spouses to be from different villages. Dowry, since it has become near universal in the country, can be considered as another rule. According to high caste customs, an honourable marriage is one accompanied by dowry and not by bride price - groom pays a sum of money to the bride's parents (Kaur, 2004).

Declining sex ratios are also expected to have serious consequences for women's rights: the pressure to give birth to sons may result in women accessing illegal services, or expose them to violence, divorce and abandonment if they give birth to a girl. Implications for the girl child include severe neglect in all aspects of well-being through the life cycle, perpetuating intergenerational cycles of inequality. Skewed sex ratios may also lead to trafficking of girls and women to address imbalances in areas with excess male populations as is already evident in some states of the country.

Women themselves have internalised the patriarchal values to such an extent that even when they say that daughters take better care of parents in old age or are more emotionally attached to the mothers, their statements sound hollow because more sons than daughters are desired. The need is to aim at consciousness raising in both the parents

about the value of daughters and understanding the cultural factors that undervalue girls. We have focused too much on implementation of the PC/PNDT Act and too little on finding ways to bringing about attitudinal changes so that daughters are valued. Policies must attack the cultural bias against women that is the root of the problem. Changing ingrained attitudes about the value of women is a tough, but a necessary assignment.

Challenges Ahead

Widespread availability and use of prenatal diagnostic techniques for sex determination led to PNDT (Pre-Natal diagnostic Techniques (Regulation and Prevention of misuse) Act in 1994 banning their use for determining the sex of foetus or revealing it to the parents. The Act was amended and made more stringent in 2003 by allowing appropriate authorities even at the district level to take legal action against the use of sex selection technique by any person at any place.

The further decline in child sex ratio, in spite of 15 years of ban on sex determination test, makes us sombre with realization that social legislation serves a purpose only up to a point or that fear of punishment does not always act as a deterrent. Viewing the sex ratio as an individual or medical issue and suggesting medical or legal interventions to end the practice reflect poor understanding. While strict implementation of the law will help reduce female foeticide and infanticide, it will not eliminate the problems. Simply exhorting the general population and the medical profession to desist from such practice without attempting to change patriarchy will prove futile. It is time we understand and address the cultural and social factors that undervalue girls. The prevalent patriarchal framework needs to be acknowledged as causal, interrogated and laid bare. Bringing about behavioural change is a tough but a necessary assignment.

Legally, the right to inherit land with full proprietary rights to its disposal by a woman in her capacity as a daughter, sister, wife and widow lately amended in 2005 came to exist under the 1956 Act. These rights go against the customary norms of patrilineal society like that of Haryana, Punjab, Uttar Pradesh, and Rajasthan where the land of the village is taken to belong to the male descendants of ancestors, who originally settled and worked on it. Land is ordinarily not to be alienated outside this group. This means basically that daughters and sisters who are potential introducers of fresh blood and new descent lines through their husbands are to be kept from exercising their inheritance rights. This is clearly evidenced in the emphasis placed and even violence inflicted upon the compulsory observance of village and territorial exogamy and caste endogamy in marriage alliances. The introduction of a rank outsider into the family who can and may claim the property on behalf of his wife is forcibly and violently stopped. As an outsider, he remains outside the influence of the family and caste/community rules and ethics which ensure a patrilineal inheritance. Similarly, the location of a married daughter within the natal village also spells danger for patrilineal inheritance as it facilitates and could lead to assumption of land inherited by her. The widespread phenomenon of "honour killings" is directly related to the breaches in these customary norms, among other things.

Reasons for the growing menace of dowry are again partly related to the patrilineal insistence upon an alternative settlement of a girl's claims/right to property. Despite the enactment of law of inheritance in favour of girl-child also, dowry is given with the tacit understanding of the denial of inheritance right. The son's advantage and the daughter's disadvantage are seen as enduring and permanent. Indeed, the legal possibility of and claims of her inheritance rights meant that the violence is perpetrated on females in their infancy or in the womb itself to eliminate the root cause of property going to her. Such low female figures effectively negate the progressive fallout of the inheritance enablement law on the female population.

Multipronged advocacy strategies that aim

to make a dent in the prevailing practice of sex selection have been devised. Efforts have been underway to use all modes of communication, to educate and inform a range of stakeholders and all those whose opinions matter on the trends in child sex ratio, on the likely consequences of the deficit of girls and women and appealing to the sense of justice and basic rights of all–men and women. These multipronged efforts have indeed kept the issue alive. Media through its programmes is continuously highlighting the issue of neglect of girl child. A number of states have taken up the issue and highlighted the deteriorating situation in their own regions and have come up with novel approaches such as making school children taking an oath that they will not practise female selective abortion. Taking 'selfies with only girl child' is a new trend. Despite the Act and the widespread campaign promoting 'save the girl child' messages, decline in child sex ratio has continued leading to a concern that neither the implementation of the Act nor the campaign messages have been very effective.

Son preference is deeply rooted in our culture, and the need to have at least one son is especially strong for religious, cultural and practical reasons. Filial support of elders, continuation of the family line as patriarch and son's role in providing support in old age are some of reasons leading to persistence of son preference. The fact that parents in general and in rural areas in particular rely on sons rather on daughters for elderly care is perhaps due to the traditionally patrilocal culture, wherein daughters are expected to provide care for their in-laws. A son provides parents with two (his bride and himself) viable sources of support in old age. Would these cultural biases put a limit on gender construction?

Indian planning relevant to women has changed its thrust from welfare to development to empowerment and further to gender equity and equality. Interestingly, each change seems to have been informed by the contemporary discourses as they were emerging in international gender and development debates. The Plans did not attempt to critically identify and systematically address the

locus of such asymmetry as existed in India. The approach is seen more as practical action and praxis oriented, giving women "a place within existing structures and paradigms, rather than confront[ing] gendered inequities more directly" (Cornwell, 2003, p. 1326; Erwe´r, 2003). What is required is a systemic change for which there is a need to understand the locational specificities of gendered space and spatiality of experiences. For instance, although there is a decline in child sex ratio across areas in India, it is more so in parts of northern India where the social space exhibits 'hard' patriarchal structure. The state of Haryana demonstrates that its economic success stories have not translated into social advancement. Its economic prosperity is in fact commensurate with rising sons and setting daughters or 'missing women' phenomenon (Singh, 2012, p. 12).

Further, women do not comprise homogenous categories; they belong to diverse castes, classes, communities, economic groups, and are located within a range of geographic and development zones. Consequently, some groups are more vulnerable than others. Mapping and addressing the specific deprivations that arise from these multiple locations is essential for the success of planned interventions. Thus apart from the general programme interventions, special targeted interventions catering to the differential needs of these groups is required to be undertaken.

Finally, despite the implementation of decentralisation in the country for nearly three decades, it is hard to get direct estimates on important demographic parameters at the district level in the country. There is therefore a need to improve administrative data systems related to vital rates, age specific fertility and mortality rates at disaggregated level so that quality data is available on a regular and continuous basis. SRB and its comparison with CSR would enable an overall picture of prenatal sex-selection and post-birth discrimination in districts of the country. Such information is needed continuously not only for prioritising action and evolving area-specific plans but also for tracking progress in these indicators.

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INTERGENERATIONAL OCCUPATIONAL MOBILITY AMONG ARTISAN/SERVICE CASTES IN RURAL HARYANA

MANJU JANGRA and M. S. JAGLAN
Kurukshetra, India

Abstract

Intergenerational occupational mobility refers to changes in occupational status that occur between different generations. It eventually pertains to adoption of a new occupation or livelihood of same economic status or upward and downward occupational movement with respect to the earlier economic status. Intergeneration occupational mobility of a socially cohesive group such as a caste or caste groups is a surrogate indicator of their economic betterment or deprivation in the course of development of the society. The present study aims at analyzing the intergenerational shift in the occupational pattern of socially backward artisan and service castes in Haryana. It aims at assessing the pattern and dynamics of intergenerational occupational change among artisan/service castes in the state. It is based on primary data collected through a survey of 500 households of five artisan/service castes. The study reveals that artisan/service castes in Haryana have experienced large-scale occupational transformation over the last three generations, roughly a period of about half a century. A large section of these castes has abandoned their traditional occupation and have become dependent on casual labour to earn their livelihood. It indicates no upward mobility or improvement in the occupational status and economic conditions of these castes. But the educated section of the socially backward artisan/service caste is on the path of upward economic mobility. One-fourth of the head of households belonging to these communities have joined services and other self-employed vocations.

Introduction

Caste system in India is a system of stratified social hierarchy. Derived from the *varna* system which represented one of the earliest divisions of labour in Indian society, it is closely linked to occupation particularly in the socially and economically deprived communities (Gang, *et al.,* 2012). Occupation is at once determinant of social status as income and property ownership is often related to this. In the traditional caste system every occupation is rated and ranked on the ritual scale and assigned to a given caste which transmits it from generation to generation (Abraham and Subramanian, 1974). Occupational change has been largely understood as a change in the activities of the members of a society to earn their livelihood. The change is observed by the increase and decrease in the distribution of these activities in the socio-economic structure of a society (Desai, 1981). In a society where occupations and positions are fixed and set at birth, and transmitted from father to child through rigid schemes with little room for innovation and fulfillment at either

the individual or collective level, occupational mobility becomes an index of change in the societal and economic status of an individual or a caste (Bourdieu, *et al.,* 2006). This is particularly true in case of socially deprived castes pursuing traditional trades of artisanship or services in the rural society under *jajmani* system.

Intergenerational (across generations) occupational mobility refers to changes in occupational status that occur between different generations, i.e. grandfather, father and son or family members of one generation and the next. Inter-generational mobility is viewed as the difference between father's status and son's eventual status. Occupational mobility eventually refers to adoption of a new occupation or livelihood of same economic status or upward and downward occupational movement with respect to earlier economic status. It shows the ability of a person or persons to move up or down the hierarchal structure of social stratification (Chakravarty, 2013). Furthermore, intergenerational occupational mobility signifies the extent to which families are successful in transferring these existing social and economic advantages to future generations, thereby perpetuating the rigidity of the social structure (Richard, *et al.,* 1990). Bardhan (2010) opines that compared to other countries the opportunities of upward socio-economic mobility are quite restricted in India. Hnatkovska (Hnatkovska *et al.,*2013) finds no difference in intergeneration occupational mobility in different castes in India. But, there are different trends reported in intergenerational occupational shift in different communities. It has been pointed out by many scholars through their studies that intergenerational occupational mobility is more among the higher castes (Majumdar, 2010; Dube and Thorat, 2012). Social scientists have also observed class differences in occupational mobility where low skilled and low paid workers tend to remain in the same occupation (Motiram and Singh, 2012; Azam, 2015). It is also opined that occupational mobility has been quite restricted

despite there being heterogeneity of people following varied occupations within all castes (Weber, 1958).

In Haryana socially backward castes have traditionally contributed in the self-sufficient village economy as artisans and service providers under the aegis of *jajmani* system. But this functional relationship was disrupted with the initiation of Green Revolution in mid-1960s which led to transformation of the agrarian economy. It also marked the transition of rural agricultural technology which became an economic challenge for the artisans. The new situation led to a decline in the regular income of artisan castes (Sharma, 1961). Growth of manufacturing and service sectors during the following decades and economic liberalization since 1990s have further transformed the economy of the state. This in turn has had indelible impact on the livelihood and occupation of the artisan and service castes as they abandoned their traditional occupation such as artisanship and were sucked into the agricultural sector as labourers and tenants. Beside this, socially backward communities have also undergone educational transformation as a result of affirmative action and policy of the Government in terms of reservation quota in educational institutes and jobs. This has lead to raising the aspiration level of the young generation in these communities which is not interested in following their traditional occupation or work as casual labour, an occupation adopted by their parents in the wake of diffusion of new agricultural technology.

Objectives

The present study aims at analyzing the pattern of intergenerational occupational shift in the socially backward artisan and service castes in the state of Haryana. The study has been carried out to meet the following specific objectives:

1.   To assess the pattern and dynamics of intergenerational occupational change among artisan/service castes in Haryana.

Fig. 1

2.   To examine inter-caste and inter-region (between agriculturally developed and less developed) variations in the intergeneration occupational shift among artisan/service castes.

Framework of the Study

The present study pertains to the changes in the occupation of five main artisan/service castes of Haryana, namely, *Khati* (carpenter), *Sunar* (goldsmith), *Nai* (barber), *Kumhar* (potter) and *Lohar* (ironsmith). The intergeneration change in the occupation of these socially and economically backward communities of the state has been studied across three generations i.e. grandfather, father and self (respondent). It is a primary data based study where sample households have been drawn from two districts representing the comparatively agriculturally developed area (Kurukshetra district) and less developed area (Bhiwani district) (Fig.1). These two selected districts do not merely represent two different typologies of rural development, it is also suggested that the mean values of the two districts also portray the broader scenario of occupational pattern of selected artisan/service castes in the rural landscape of the state.

Data Base and Methodology

The present study is based on data collected through canvassing a household questionnaire in the sample villages of Kurukshetra (agriculturally developed) and Bhiwani (less developed) districts of Haryana during the period May 2012 to November 2012. Since the artisan/service castes provided supporting services in the traditional agricultural economy, they are found in small number in the villages. Hence, purposive sampling has been done from various villages to draw a sample of 50 households of each artisan caste/service from each of the two selected districts. Primary data have been collected from 500 households of five artisan/service castes (*Khati, Sunar, Nai, Kumhar* and *Lohar*).

Kurukshetra and Bhiwani districts taken as sample districts represent two different levels of agricultural development in the state, high and low respectively (Sindhu and Jaglan, 2007). The five castes selected for the study are numerically dominant among the socially backward artisan/service castes in the state. Information has been collected from the respondents on several household characteristics as well as detailed information on occupation of their present and past generations. Hence, for each of the artisan/service caste a sample of 100 households has been drawn and the total sample households for the selected five castes are 500 (250 households from each district).

The discussion based on analysis of data has been presented at two levels (i) the general pattern among all the castes, and (ii) the pattern of intergeneration occupational shift among the five selected artisan/service castes.

General Pattern among Artisan Castes

Table 1 depicts the pattern of intergeneration occupational shift among households belonging to all artisan/service castes. It is evident from the table that in the grandfather generation the highest proportion (84 percent) of sample households belonging to these castes were engaged in their traditional occupations. But in the next generation, i.e. father, the dependence of these castes on their traditional occupation declined significantly to 55 percent. The dependence on traditional occupation was slightly higher in agriculturally less developed district i.e. Bhiwani (58.00 percent) as compared to developed Kurukshetra district (51.60 percent). In the present generation only 30 percent households earn their living through traditional occupations, and there is no difference between agriculturally developed and less developed area in this regard.

The study reveals that over the generations the artisan/service castes have adopted casual labour as their main occupation. The table shows that in grandfather generation only 10 percent

Table - 1
Rural Haryana: Pattern of Intergeneration Occupational Shift among
Households belonging to all Artisan/Service Castes

District/Occupation	Grandfather	Father	Respondent
Agriculture			
Bhiwani	7(2.80)	13(5.20)	7(2.80)
Kurukshetra	5(2.00)	5(2.00)	4(1.60)
Total	**12(2.40)**	**18(3.60)**	**11(2.20)**
TraditionalOccupation/ Artisanship/Service			
Bhiwani	210(84.00)	145(58.00)	74(29.60)
Kurukshetra	210(84.00)	129(51.60)	74(29.60)
Total	**420(84.00)**	**274(54.80)**	**148(29.60)**
Casual labour			
Bhiwani	22(8.80)	64(25.60)	104(41.60)
Kurukshetra	30(12.00)	79(31.60)	110(44.60)
Total	**52(10.40)**	**143(28.60)**	**214(42.80)**
Services			
Bhiwani	10(4.00)	18(7.20)	34(13.60)
Kurukshetra	3(1.20)	18(7.20)	31(12.40)
Total	**13(2.60)**	**36(7.20)**	**65(13.00)**
Others			
Bhiwani	1(0.40)	10(4.00)	31(12.40)
Kurukshetra	2(0.80)	20(8.00)	31(12.40)
Total	**3(1.20)**	**30(6.00)**	**62(12.40)**
Bhiwani	250(100.00)	250(100.00)	250(100.00)
Kurukshetra	250(100.00)	250(100.00)	250(100.00)
Total	**500(100.00)**	**500(100.00)**	**500(100.00)**

(Figures in parenthesis are percentage of total)

households of these castes were dependent on casual labour for their livelihood. In Kurukshetra district these castes had a higher (12.00 percent) share as compared to Bhiwani district (8.80 percent). In the next generation (father) 29 percent households were having casual labour as their main occupation. Again in the agriculturally developed district, i.e. Kurukshetra, the dependence on casual labour was more (31.60 percent) in comparison to the less developed district of Bhiwani (25.60 percent). It was expected as agriculturally developed areas provided better opportunity as farm labour. In the present generation the highest proportion of sample households belonging to artisan/service castes (42.80 percent) are dependent on casual labour for earning their living with no significance difference between two districts.

There is also a considerable shift in occupation of persons belonging to these castes across the generations towards other occupations too. Service sector has accommodated a good

number of educated people belonging to artisan/service castes. In the grandfather generation only 3 percent households derived their living from the service sector. In father's generation the share of this sector in the livelihood of artisan community increased to 7 percent with no difference between agriculturally developed and less developed area. In the present generation 13 percent households of these castes are engaged in service sector.

A very small proportion of artisan/service castes have been directly dependent on agriculture for earning their living. It is evident from the fact that in grandfather generation there were only 2 percent households dependent on agriculture, with no significant difference between the two districts. In the father generation also only 3.6 percent households derived their living from agriculture which must be mostly in the form of tenants. When we compare both districts, it is found that Bhiwani district (agriculturally less developed) had a higher (5.20 percent) proportion of households engaged in agriculture than the agriculturally developed district of Kurukshetra (2.00 percent). In the present generation again only 2.2 percent households belonging to artisan/service castes are engaged in agriculture with no significant difference between the sample districts.

The category of 'other occupations' includes petty business, tailoring, knitting, weaving etc. Table 1 shows that in grandfather generation only one percent households were engaged in other economically gainful activities. In the father generation the proportion of such households increased to 6 percent and Kurukshetra district had a higher value (8.00 percent) as compared to Bhiwani district (3.60 percent). In the present generation 12.40 percent households belonging to artisan castes are engaged in other activities with no difference between the two sample districts. This trend suggests that a small section of artisan/service caste people, who probably have better skill or education level, are diversifying away from their traditional occupation and manual labour.

Khati Caste

Table 2 shows the changes in the occupational structure over the generations among the households belonging to *Khati* caste. It is evident that in the grandfather generation an overwhelming proportion, four out of five (80 per cent) households belonging to this caste, were engaged in their traditional occupation as a service caste. A comparison of both districts shows that Kurukshetra district (agriculturally developed) had a slightly higher (84.00 percent) proportion of households engaged in traditional occupation than agriculturally less developed district of Bhiwani (76.00 percent). In the next generation, i.e. father, the dependence of *Khati* caste households on their traditional occupation declined substantially to 43 percent people having artisanship as their main occupation. Interestingly, during this phase the dependence of *Khati* caste on the traditional occupation was more in the agriculturally less developed area (54 percent) as compared to developed area (32 percent). This may be attributed to the fast diffusion of new agricultural technology which had an adverse impact on the agricultural tools and implements being manufactured by this service caste. At the present generation only 23 percent households belonging to this caste earn their living pursuing their traditional occupation. The difference between the samples drawn from two districts is only marginal (two per cent) as modern agricultural technology and mechanization has diffused in all parts of the state including agriculturally less developed regions.

Table 2 also shows that over the generations the wages earned through casual labour have become the main source of livelihood of this community. In the grandfather generation only 15 percent households were having casual labour as their main occupation. Bhiwani district had a slightly higher (18.00 percent) share as compared to Kurukshetra district (12.00 percent). During the period of next generation (father) there were 32 percent households having casual labour as their main occupation. But in the case of Kurukshetra

Table - 2
Rural Haryana: Pattern of Intergeneration Occupational Shift among
Households belonging to *Khati* Caste

District/ Occupation	Grandfather	Father	Respondent
Agriculture			
Bhiwani	1(2.00)	7(14.00)	3(6.00)
Kurukshetra	0(0.00)	2(4.00)	2(4.00)
Total	**1(1.00)**	**9(9.00)**	**5(5.00)**
Traditional Occupation/ Artisanship/Service			
Bhiwani	38(76.00)	27(54.00)	11(22.00)
Kurukshetra	42(84.00)	16(32.00)	12(24.00)
Total	**80(80.00)**	**43(43.00)**	**23(23.00)**
Casual labour			
Bhiwani	9(18.00)	14(28.00)	22(44.00)
Kurukshetra	6(12.00)	18(36.00)	22(44.00)
Total	**15(15.00)**	**32(32.00)**	**44(44.00)**
Services			
Bhiwani	2(4.00)	2(4.00)	9(18.00)
Kurukshetra	0(0.00)	9(18.00)	10(20.00)
Total	**2(2.00)**	**11(11.00)**	**19(19.00)**
Others			
Bhiwani	0(0.00)	0(0.00)	5(10.00)
Kurukshetra	2(4.00)	5(10.00)	4(8.00)
Total	**2(2.00)**	**5(5.00)**	**9(9.00)**
Bhiwani	50(100.00)	50(100.00)	50(100.00)
Kurukshetra	50(100.00)	50(100.00)	50(100.00)
Total	**100(100.00)**	**100(100.00)**	**100(100.00)**

(Figures in parenthesis are percentage of total)

district the dependence on casual labour was more (36 percent) in comparison to Bhiwani district (26 percent) because of the differences in level of agricultural development at that point of time. Agriculturally developed regions offered more opportunity of employment as casual labour than agriculturally less developed areas. Currently casual labour is the dominant occupation of households belonging to *Khati* caste since the highest proportion of respondents of present generation (44 percent) is dependent on casual labour for earning their living with no difference between the sample households of Kurukshetra and Bhiwani districts. Thus most of the *Khati* caste households have registered a shift in occupation from artisanship to casual/agricultural labour over the three generations.

There is also a noteworthy shift in occupation of people belong to this caste across the generations in terms of their engagement in service sector. In the grandfather generation only 2 percent households derived their livings from the service

sector. But the share of this sector in the livelihood of this community increased to 11 percent with a wide gap between agriculturally developed (18 per cent) and less developed areas (4 per cent) during the father generation. Up to the father generation there was no perceptible intergeneration shift in occupation of this community in Bhiwani district. At present service sector is the third largest livelihood provider to this community (19 percent) with only a marginal difference between the two districts. It could be attributed to increasing accessibility to education and narrowing regional gap in educational attainment.

Khati community has not been much dependent directly on agriculture for earning the living. Table 2 shows that during grandfather generation merely 1 percent households were dependent on agriculture. However, during father generation 9 percent households derived their living from agriculture which probably was mostly in the form of tenants. Initially as agricultural development took place through 1970s and 1990s, it lured the landless people to tenancy particularly in Bhiwani district where land was easily available for share cropping because of the comparatively large size of land holdings. But in the present generation only 5 percent respondents belonging to *Khati* caste are engaged in land cultivation. This may be attributed to the onset of reverse tenancy in the state whereby large landowners themselves have started leasing agricultural land from marginal and small farmers to increase the size of their operational land holdings.

"Other" occupations include petty business, tailoring, knitting, weaving etc. In grandfather generation only 2 percent *Khati* caste households, all from Kurukshetra district, were engaged in other occupations. In father generation the proportion of such households increased to 5 percent and all of them belonged to Kurukshetra district. In the present generation 9 percent households belonging to this community are engaged in other activities, with a higher proportion (10 per cent) in Bhiwani as compared to Kurukshetra district (8 per cent). This suggests that

there is not much vocational diversification in this community.

Sunar Caste

Table 3 depicts the intergeneration shift in occupational pattern of households belonging to *Sunar* caste. In the grandfather generation, an overwhelming proportion of households (89 percent) belonging to this caste was engaged in their traditional occupation. Bhiwani district (agriculturally less developed) had a higher (94.00 percent) proportion of households engaged in traditional occupation than the agriculturally developed Kurukshetra district (84.00 percent). But in the next generation, i.e. father, the dependence of *Sunar* caste households on their traditional occupation declined drastically to 56 per cent. The dependence on traditional occupation was more in agriculturally developed area (64.00 percent) as compared to less developed area (48.00 percent). In the present generation there are 48 percent households who earn their livelihood pursuing their traditional occupation. It needs to be noted that, among the selected five artisan/service castes, the *Sunars* continue to pursue their traditional occupation in largest strength.

Table 3 also shows that over the period the dependence of *Sunar* caste households on casual labour as a source of living has increased. In the grandfather generation only 9 percent households were dependent on casual labour. Kurukshetra district had a much higher (16.00 percent) share in this regard as compared to Bhiwani district (2 per cent). In the next generation (father) 31 percent households had casual labour as their main occupation with only a marginal difference (2 per cent) in this regard between the samples drawn from two districts. At present 35 percent household are dependent on casual labour for earning their living with merely 2 percent difference between the two areas.

In the grandfather generation only 2 percent households of this caste derived their living from

Table - 3
Rural Haryana: Pattern of Intergeneration Occupational Shift among
Households belonging to *Sunar* Caste

District/ Occupation	Grandfather	Father	Respondent
Agriculture			
Bhiwani	0(0.00)	0(0.00)	0(0.00)
Kurukshetra	0(0.00)	0(0.00)	0(0.00)
Total	**0(0.00)**	**0(0.00)**	**0(0.00)**
Traditional Occupation/ Artisanship/Service			
Bhiwani	47(94.00)	24(48.00)	22(44.00)
Kurukshetra	42(84.00)	32(64.00)	26(52.00)
Total	**89(89.00)**	**56(56.00)**	**48(48.00)**
Casual labour			
Bhiwani	1(2.00)	16(32.00)	18(36.00)
Kurukshetra	8(16.00)	15(30.00)	17(34.00)
Total	**9(9.00)**	**31(31.00)**	**35(35.00)**
Services			
Bhiwani	2(4.00)	5(10.00)	3(6.00)
Kurukshetra	0(0.00)	0(0.00)	2(4.00)
Total	**2(4.00)**	**5(10.00)**	**5(5.00)**
Others			
Bhiwani	0(0.00)	5(10.00)	7(14.00)
Kurukshetra	0(0.00)	3(6.00)	5(10.00)
Total	**0(0.00)**	**8(8.00)**	**12(12.00)**
Bhiwani	50(100.00)	50(100.00)	50(100.00)
Kurukshetra	50(100.00)	50(100.00)	50(100.00)
Total	**100(100.00)**	**100(100.00)**	**100(100.00)**

(Figures in parenthesis are percentage of total)

the service sector. In the father generation the share of the households dependent on services for livelihood increased to 5 percent and all of them belonged to agriculturally less developed district (Bhiwani). At present also only 5 percent households are deriving their livelihood from service sector with a 2 percent difference between the two districts.

The "other" occupations include petty business, tailoring, knitting, weaving etc. In grandfather generation there was not a single household engaged in this category. In father generation the proportion of households engaged in other occupations was 8 per cent with 2 per cent difference between the two areas. In the present generation the proportion of such households is 12 percent while the difference between two districts has increased to four per cent. This indicates a tendency for occupational diversification in this community.

Table - 4
Rural Haryana: Pattern of Intergeneration Occupational Shift among
Households belonging to *Nai* Caste

District / Occupation	Grandfather	Father	Respondent
Agriculture			
Bhiwani	5(10.00)	5(10.00)	2(4.00)
Kurukshetra	0(0.00)	0(0.00)	0(0.00)
Total	**5(5.00)**	**5(5.00)**	**2(2.00)**
Traditional Occupation/ Artisanship/Service			
Bhiwani	40(80.00)	26(52.00)	16(32.00)
Kurukshetra	44(88.00)	32(64.00)	22(44.00)
Total	**84(84.00)**	**58(58.00)**	**38(38.00)**
Casual labour			
Bhiwani	0(0.00)	7(14.00)	16(32.00)
Kurukshetra	3(6.00)	11(22.00)	22(44.00)
Total	**3(3.00)**	**18(18.00)**	**38(38.00)**
Services			
Bhiwani	4(8.00)	9(18.00)	11(22.00)
Kurukshetra	3(6.00)	2(4.00)	3(6.00)
Total	**7(7.00)**	**11(11.00)**	**14(14.00)**
Others			
Bhiwani	1(2.00)	3(6.00)	5(10.00)
Kurukshetra	0(0.00)	5(10.00)	3(6.00)
Total	**1(1.00)**	**8(8.00)**	**8(8.00)**
Bhiwani	50(100.00)	50(100.00)	50(100.00)
Kurukshetra	50(100.00)	50(100.00)	50(100.00)
Total	**100(100.00)**	**100(100.00)**	**100(100.00)**

(Figures in parenthesis are percentage of total)

Nai *Caste*

Table 4 depicts the intergeneration occupational shift in households belonging to *Nai* caste. It shows that in the grandfather generation 84 percent households belonging to this caste were engaged in their traditional occupation as service caste. Among the two sample districts Kurukshetra (agriculturally developed) had a higher proportion (88 per cent)as compared to the agriculturally less developed district of Bhiwani (80 per cent). But in the next generation, i.e. father, the dependence of households of this caste on traditional occupation declined to 58 percent. The dependence on traditional occupation was more in agriculturally developed area (64.00 percent) as compared to less developed area (52.00 percent). In the present generation only 38 percent *Nai* households earn their living pursuing their traditional occupation.

Table 4 also shows that over the generations casual labour has emerged as the main source of

living for this community. In the grandfather generation only 3 percent households were dependent on casual labour for their livelihood and all of them belonged to Kurukshetra district. In the next generation (father) this value increased to 18 percent with a higher proportion in Kurukshetra (22.00 percent) in comparison to Bhiwani district (14.00 percent). In the present generation a large proportion of households (38.00 percent) are dependent on casual labour for earning their living with 8 percent difference between the agriculturally developed and less developed areas.

Another significant intergenerational shift in occupation in this caste has been in favour of services. In the grandfather generation 7 percent households derived their living from the service sector. The share of service as an occupation of this community increased to 11 percent with a wide gap between agriculturally less developed (18 per cent) and developed areas (4 per cent) during father generation. At present 14 percent *Nai* caste households are dependent on service sector. In Bhiwani district service sector is the third largest (22.00 percent) livelihood provider to this community.

Table 4 shows that in grandfather generation 5 percent households were dependent on agriculture and all of them belonged to Bhiwani district. Easy availability of land for cultivation may be the reason for this. In the next (father) generation the same pattern of engagement in agriculture continued. At present only 2 percent households, all in Bhiwani district, depend on agriculture.

In grandfather generation only one percent households (belonging to Bhiwani district) were engaged in "other" occupations. In the father generation the proportion of such households increased to 8 percent with a higher concentration of such households in Kurukshetra. The proportion is the same at present also but Kurukshetra district (agriculturally developed) has a lower proportion (6.00 percent) of households engaged in other occupations than less developed district of Bhiwani (10.00 percent).

Kumhar Caste

Table 5 depicts the intergeneration occupational shift among households belonging to *Kumhar* caste. In the grandfather generation 81 percent households belonging to this caste were engaged in their traditional occupation. Kurukshetra district (agriculturally developed) had a higher proportion (84.00 percent) of households engaged in traditional occupation than agriculturally less developed district of Bhiwani (78.00 percent). But in the next generation, i.e. father, the dependence of *Kumhar* caste households on their traditional occupation declined to 53 percent households having artisanship as their main occupation with a difference of only 2 per cent between the samples drawn from the two districts. In the present scenario only 16 percent households earn their livelihood pursuing their traditional occupation. The suggests that the present generation in comparison to the two earlier generations has a more diversified occupational pattern.

Over the period of time casual labour has emerged as the first ranking source of livelihood for *Kumhar* community. In the grandfather generation only 13 percent households were dependent on casual labour. Bhiwani district had a higher (18.00 percent) share as compared to Kurukshetra district (8.00 percent). In the next generation (father) this value increased to 37 percent households belonging to this caste having casual labour as their main occupation. In the present generation majority of sample households (53.00 percent) are dependent on casual labour for earning their living. There has also been a consistent increase in the share of this occupation, with 10 percentage point difference, between agriculturally developed and less developed areas. It is evident that *Kumhar* caste households have experienced a marked shift in occupation from artisanship to casual labour over the three generations.

Only 2 per cent households of this community, all in Bhiwani district, in grandfather generation, derived their living from service

Table - 5
Rural Haryana: Pattern of Intergeneration Occupational Shift among
Households belonging to *Kumhar* Caste

District/ Occupation	Grandfather	Father	Respondent
Agriculture			
Bhiwani	0(0.00)	0(0.00)	0(0.00)
Kurukshetra	4(8.00)	0(0.00)	0(0.00)
Total	**4(4.00)**	**0(0.00)**	**0(0.00)**
Traditional Occupation/ Artisanship/Service			
Bhiwani	39(78.00)	27(54.00)	7(14.00)
Kurukshetra	42(84.00)	26(52.00)	9(18.00)
Total	**81(81.00)**	**53(53.00)**	**16(16.00)**
Casual labour			
Bhiwani	9(18.00)	21(42.00)	29(58.00)
Kurukshetra	4(8.00)	16(32.00)	24(48.00)
Total	**13(13.00)**	**37(37.00)**	**53(53.00)**
Services			
Bhiwani	2(4.00)	1(2.00)	6(12.00)
Kurukshetra	0(0.00)	2(4.00)	2(4.00)
Total	**2(2.00)**	**3(3.00)**	**8(8.00)**
Others			
Bhiwani	0(0.00)	1(2.00)	8(16.00)
Kurukshetra	0(0.00)	6(12.00)	15(30.00)
Total	**0(0.00)**	**7(7.00)**	**23(22.00)**
Bhiwani	50(100.00)	50(100.00)	50(100.00)
Kurukshetra	50(100.00)	50(100.00)	50(100.00)
Total	**100(100.00)**	**100(100.00)**	**100(100.00)**

(Figures in parenthesis are percentage of total)

sector. The scenario was not much different in the next (father) generation (3 per cent) with a higher proportion (4 per cent) in Kurukshetra . At present 8 percent households have service as their main occupation. In Bhiwani district there is larger proportion of households (12 percent) engaged in services as compared to Kurukshetra (2 per cent).

Kumhar community has not been much dependent on agriculture for earning the living. In grandfather generation only 4 percent households were directly dependent on agriculture and all of

them belonged to Kurukshetra district. In the father and present generation there is no sample household dependent on agriculture.

"Other" occupations include petty business, tailoring, knitting, weaving etc. There was no household of this community engaged in other occupations in grandfather generation. In the next (father) generation 7 percent households (12 per cent in Kurukshetra and 2 per cent in Bhiwani districts) were engaged in other occupations. In the present generation the proportion of total *Kumhar*

Table - 6
Rural Haryana: Pattern of Intergeneration Occupational Shift among
Households belonging to *Lohar* Caste

District/ Occupation	Grandfather	Father	Respondent
Agriculture			
Bhiwani	1(2.00)	1(2.00)	2(4.00)
Kurukshetra	1(2.00)	2(4.00)	2(4.00)
Total	**2(2.00)**	**3(3.00)**	**4(4.00)**
Traditional Occupation/ Artisanship/Service			
Bhiwani	46(92.00)	41(82.00)	18(36.00)
Kurukshetra	40(80.00)	23(46.00)	5(10.00)
Total	**86(86.00)**	**64(64.00)**	**23(23.00)**
Casual labour			
Bhiwani	3(6.00)	6(12.00)	19(38.00)
Kurukshetra	9(18.00)	19(38.00)	25(50.00)
Total	**12(12.00)**	**25(25.00)**	**44(44.00)**
Services			
Bhiwani	0(0.00)	1(2.00)	5(10.00)
Kurukshetra	0(0.00)	5(10.00)	14(28.00)
Total	**0(0.00)**	**6(6.00)**	**19(19.00)**
Others			
Bhiwani	0(0.00)	1(2.00)	6(12.00)
Kurukshetra	0(0.00)	1(2.00)	4(8.00)
Total	**0(0.00)**	**2(2.00)**	**10(10.00)**
Bhiwani	50(100.00)	50(100.00)	50(100.00)
Kurukshetra	50(100.00)	50(100.00)	50(100.00)
Total	**100(100.00)**	**100(100.00)**	**100(100.00)**

(Figures in parenthesis are percentage of total)

households has increased to 23 percent. Kurukshetra district (agriculturally developed) has a higher proportion of households engaged in others occupations (30.00 percent) as compared to the agriculturally less developed Bhiwani district (16.00 percent). Overall, at present the *Kumhar* community has a quite diversified occupational pattern.

Lohar Caste

Table 6 shows that among households belonging to *Lohar* caste in grandfather generation, 86 percent were engaged in their traditional occupation as an artisan caste. When we compare both districts, it is found that Bhiwani district (agriculturally less developed) had a higher (92.00 percent) proportion of households engaged in traditional occupation than agriculturally developed district of Kurukshetra (80.00 percent).

But in the next generation, i.e. father, the dependence of *Lohar* caste households on their traditional occupation declined to 64 percent. Interestingly, the dependence on the traditional occupation was much more in agriculturally less developed area (82.00 percent) as compared to developed area (46.00 percent). In the present scenario there are only 23 percent *Lohar* households who earn their living pursuing their traditional occupation. Again agriculturally developed area has a very low proportion of households of this community (10 percent) engaged in traditional occupation as compared to less developed area (36 percent). The decline in the comparative values in the two districts suggests that the availability of modern agricultural implements in the agriculturally developed areas have replaced the traditional agricultural tools made by *Lohars*. Hence, they have mostly abandoned their traditional occupation.

The study reveals that over the generations casual labour has emerged as the main source of livelihood of this community. In the grandfather generation there were only 12 percent households of this community dependent on casual labour. Kurukshetra district had a higher proportion (18 per cent) of such households as compared to Bhiwani district (6.00 percent). In the next generation (father) 25 percent households had casual labour as their main occupation with a considerable gap between agriculturally developed (38 per cent) and less developed (12 per cent) area. In the present generation largest proportion of samples households (44.00 percent) of this community depend on casual labour for earning their living. In Kurukshetra district, the dependence of this caste on casual labour was 50.00 percent in comparison to 38.00 percent in Bhiwani district where a large number of households belonging to this community continue pursuing their traditional occupation.

There was no household dependent on service sector in grandfather generation. But in the next (father) generation 6 percent households, mainly from Kurukshetra (10 per cent)   derived their

living from service sector. The share of this sector in the livelihood of *Lohar* community has increased to 19 percent in the present scenario with a continuing wide gap between agriculturally developed (28 percent) and less developed area (10 percent). At present the service sector is third largest livelihood provider to this community.

In the grandfather generation only 2 percent households were dependent on agriculture. In next generations too there was not a significant increase in participation of this community in agriculture (3 per cent). In the present generation there are only 4 percent households engaged in agricultural activities.

In the grandfather generation there was not a single household engaged in "other" occupations. In the father generation only 2 percent ˙ households were engaged in other occupations with no difference between the two districts. But at present there are 10 percent households belonging to this community engaged in other activities with a big gap between agriculturally developed (8 per cent) and less developed areas (12 per cent).

Conclusions

Intergeneration occupational mobility of a socially cohesive group such as a caste or a caste groups is a surrogate indicator of the economic betterment or deprivation in the due course of development of the society at large. This also applies in the case of socially backward artisan/service castes of Haryana.   The present study reveals that from the generation of grandfather to grandson (present) the dependence of these castes on their traditional occupation has declined drastically, i.e. 84 percent to 30 percent. *Kumhar, Khati* and *Lohar* castes in particular have experienced a large scale shift away from their traditional occupation. It may be attributed to diffusion of modern agricultural technology and implements owing to which traditional agricultural implements made by *Khati* and *Lohar* castes lost their significance. Similarly traditional

pottery manufactured by *Kumhar* caste households lost its economic significance as vessels (containers and pots) manufactured by the modern industry came into the market. But in the case of *Sunar* caste about half of the households have reported to pursue their traditional occupation.

Following the spurt of agricultural development and hike in wage rates over the period, artisan/service castes in Haryana have adopted casual labour as their main occupation. At present the largest proportion of sample households belonging to artisan/service castes (about 43 per cent) have casual labour as their main occupation. In grandfather generation only about 10 percent households of these castes were dependent on casual labour for their livelihood. In the next generation (father) this proportion increased to about 29 percent households having casual labour as their main occupation. In terms of the individual castes, at present a majority of the households of *Kumhar* caste (53 percent) derive their livelihood from casual labour. *Khati* and *Lohar* are other two castes working mostly as casual labour to earn their livings. *Sunar* caste has the smallest proportion of its households engaged as casual labour (35 percent).

Service sector has continued to be the third largest livelihood provider for artisan/service communities over the three generations in the state. It reveals that educated people in these communities are getting absorbed in service sector. About 13 percent households of these communities have service as their main occupation with a higher proportion among *Khati* and *Lohar* castes (19 percent). There is not much difference between agriculturally developed and less developed district in this regard.

Artisan/service communities are by and large landless and have not been directly dependent on agriculture for earning their living. Only 2 to 4 percent households of these communities have been engaged in land cultivation for their living across the three generations. The proportion of such households has been marginally higher in agriculturally less developed areas in western parts of Haryana where due to larger land holdings and low rent some land is available at lease to landless people.

The category of "Other" occupations includes petty business, tailoring, knitting, weaving etc. which engage 12.40 percent households at present. In grandfather generation this value was only 1.2 percent which increased to 6 percent in father generation. *Kumhar* caste households (particularly in Kurukshetra district) are found to be most entrepreneurial in this regard as at present about 23 percent of them are engaged in above mentioned other vocations.

It is evident that artisan/service castes in Haryana have experienced large-scale occupational transformation over the last three generations, roughly covering a period of about half a century. The socially backward artisan/service castes have by and large abandoned their traditional occupations. As these communities have been educationally backward as well, a large number of households belonging to them have become dependent on casual labour to earn their livelihood. There is thus little upward mobility or improvement in the occupational status and economic conditions. However, about one-fourth of the head of households belonging to these communities who have attained education and acquired skills have joined services and other self-employed vocations. It is evident that only the educated section of the socially backward artisan/service castes is on the path of upward economic mobility.

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TREND, PATTERN AND DETERMINANTS OF INFANT MORTALITY RATE IN MADHYA PRADESH

KALYAN SUNDAR SOM and R.P. MISHRA
Sagar, India

Abstract

The objective of this study is to analyze the level, trend, patterns, differentials and key determinants of infant mortality, neonatal, and post-neonatal rates which have been recorded in Madhya Pradesh state at district level during 1981-2011. This study aims to find out the relative importance of key determinants of neo-natal, post-neonatal, and infant mortality so that effective strategies for improving the health and survival of children can be identified.

The study is based on Factor Analysis to find out association between IMR and various factors such as demographic, social, cultural, medical, environment and sanitation etc. In this process correlation matrix was compute to understand multi-collinearity among factors. Further, to find out the correlates of IMR with parsimony variables, correlation and multiple regression techniques are used for district level analysis. The data related to IMR is collected from Census Reports, Sample Registration System, Annual Health Survey and National Family Health Survey for three decades (1981-2012).

IMR in Madhya Pradesh was 23 points higher than the national average (42) as per AHS, 2012-13. And the state ranked second in the country after Uttar Pradesh. Over last four decades (1972-2012) the IMR has declined from 156 to 56 (35.90 per cent) which is a good indication of human health.

Spatially, *Bundelkhand* and eastern parts of Madhya Pradesh form a very high IMR zone while the south-central part has moderate to high IMR values. The south-western districts (Indore, Ujjain and surroundings) and northern districts (Gwalior, Bhind and Morena) have low IMR.

Key Words: IMR (infant mortality rate), NNMR (neo-natal mortality rate) PNNMR (post-neonatal mortality rate), PCFCI (per cent of children with complete Immunization), Breast-1h (breastfeed within one hour), PNCW- 48h (post-natal care within 48 hours), Factor Analysis, Multiple Regression Analysis.

Introduction

Birth rate, death rate and migration are three important components of population analysis of any region (Barclay, 1959). Infant Mortality is one of the indispensable conditions of population change which influences both fertility as well as birth rate (Barclay, 1959). It is also the principle ingredient for calculating the population projection and life expectancy. Moreover, the study of IMR is important for implementation and evaluation of public health policies and programs. Our country has recorded an appreciable progress in improving its overall health conditions, consequently, the rate of birth and death have declined significantly.   The crude death rate (CDR) in the country has declined from 19 per thousand (1960) to 12.5 per thousand (1981), and

further up to 7.1 per thousand (2013). The rate of decline in infant mortality rate (IMR) remains low when comparison is made with the crude death rate (CDR). At present, although India is in the third stage of demographic transition, where both birth rates and death rates are declining in a sharp curve, even then the size of population is increasing continuously.

India has made a significant stride in reducing infant mortality ($40^0/^{00}$ live births) and under-five mortality ($52^0/^{00}$ live births) in different states, one of the millennium development goals. In India six out of 29 states have achieve this goal where as Madhya Pradesh is far behind this target (Bhaumik, 2013; Ram, *et al.*, 2009; Claeson, *et al.*, 2000).

The situation in Empowered Action Group of states (EAG) in India is different from the average for the country and from non-EAG states. In EAG states both birth and death rates are higher and the size of population is increasing significantly (Som and Mishra, 2014). EAG states are in the second stage of demographic transition, where both birth rates and death rates are declining but in a slow rate and not keeping pace with that of the country. In addition these states have a higher proportion of population of the country and majority of population is in youthful stage containing a large proportion of children. The problem is complex and needs to be resolved not only for the development of these states but for the overall progress of the country.

Madhya Pradesh ranks second in terms of infant mortality rate (IMR) among Indian states after Uttar Pradesh. It has achieved a significant change in crude birth rate (CBR) and crude death rate (CDR), but the trend is slow when comparison made with country's average. According to the AHS report (2011-12) infant mortality rate in Madhya Pradesh was 65 per 1000 live births, which is 23 points higher than the average for the country. Among the Indian states, infant mortality rate varies from 13 in Kerala (NRHM, 2013) to 70 in Uttar Pradesh (AHS, 2011).

In Madhya Pradesh Crude birth rate (CBR) has curved down by about 13 points from 39.1 per

thousand in 1971 to 26.6 per thousand in 2012 and still it is still higher than that of the country's average (21.6 in 2012). Similarly, IMR has declined by 100 points in last four decades from 156 per thousand (1981) to 56 per thousand (2012), even then it is still higher than that of the country's average of 42 per thousand (SRS, 2013). Several factors are directly and indirectly responsible for this situation, e.g., a higher level of fertility, higher level of illiteracy (32 per cent), lower level of higher education particularly among females, shortage of safe drinking water, poor facilities of sanitation (http:// www.unicef.org/infobycountry/india_67695.html), agricultural failure, low purchasing power, lower level of living standard and poor availability of medical and health facilities, lack of awareness towards healthy conditions among children below six years of age and several others. In this state, higher IMR is also related to a higher level of fertility which is the result of a lower use of contraceptive measures (Chandra Shekhar, 2011).

Study Area

Madhya Pradesh is situated in the central part of country, between 17.49°-22.43°N and 81.27°- 87.29°E. As per 2011 Census it had fifty districts (Map. 1).The state has a population of 72.6 million and its rank in population size is 6th in the country. On the socio-economic front, Madhya Pradesh is among the less developed states with very high IMR and child mortality rate in India (NFHS-3, 2008). Madhya Pradesh has about one-third (31.8 per cent) child population (below 15 years) in the total population (AHS, 2012). As per 2011Census Madhya Pradesh has a relatively lower sex ratio (930 females per thousand males) than the country's average (940 females per thousand males). Literacy rate in Madhya Pradesh (70.63 per cent) is below the national average (74.4 percent) whereas male and female literacy rates are 80.5 percent and 60 percent respectively. The scheduled population was 36.71 percent (15.62 per cent SC and 21.09 per cent ST). The state has a very high maternal mortality ratio compare to other Indian states (277 per 1000 mothers).
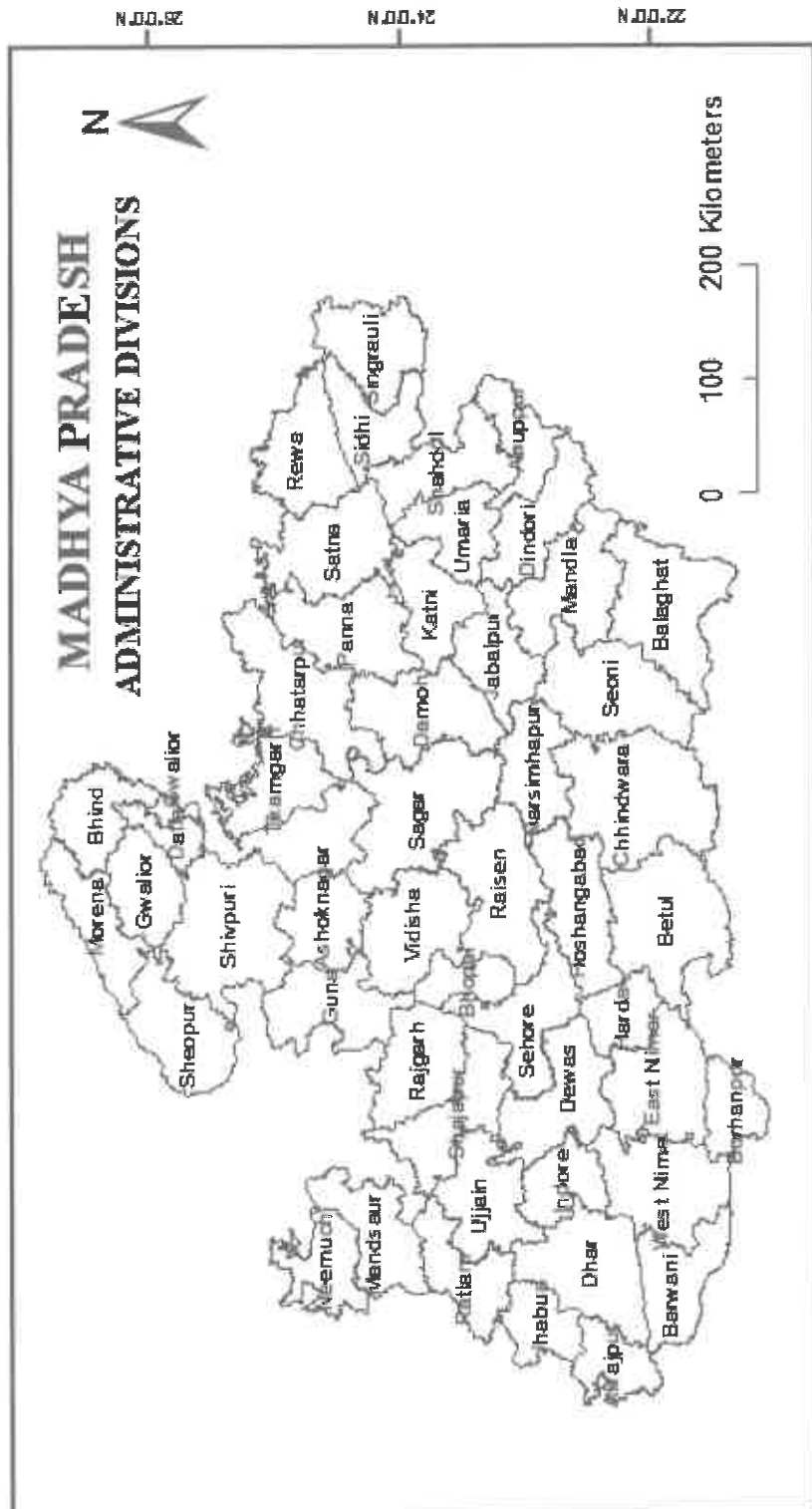
Map 1

Table - 1: Madhya Pradesh: NNMR and PNMR (1991-2013)

Year	1991	1993	1995	1997	1999	2001	2003	2005	2007	2009	2011	2013
NNMR	68	65	65	64	61	59	50	51	49	47	41	36
PNMR	58	53	56	56	54	44	39	45	46	45	38	33

Source: SRS Bulletin, Volume 47, No.1 (Sep., 2012); Volume, 48(Sep., 2013)

Objectives

(1)   To ascertain the level and trend of IMR in Madhya Pradesh and also compare it with national average during 1981-2012.

(2)   To understand the patterns and rural-urban differentials observed in the infant mortality, neonatal and post-neonatal rates in Madhya Pradesh at district level.

(3)   To find out the relative importance of key determinants of infant mortality, neo-natal and post-neonatal mortality rates so that effective strategies for improving the health and survival of children can be identified.

Source of Data and Method of Analysis

The study is based on the data obtained from various secondary sources i.e. District Level Health Survey (DLHS-3), Annual Health Survey (AHS, 2012-13), Sample Registration System (SRS), Census Reports, National Family and Health Survey (NFHS-3) and National Rural Health Mission (NRHM, Madhya Pradesh) and Data book for Planning Commission (Dec. 2014).

Factor analysis is used to know the factorial weights and variance of variables of Infant Mortality Rate. A correlation matrix has been prepared to analyse the inter correlation between 51 variables. Finally, on the bases of correlation matrix multi-colinearity has been identified to select the parsimony variables for multiple regression analysis. In multiple regression analysis district level data has been used to determine the significant factors which affect IMR, NNMR and PNNMR in Madhya Pradesh.

Level and Differentials

The available SRS-based NNMR and PNMR data are tabulated in Table 1. The NNMR

has declined from 68 in 1991 to 36 in the year 2013, which gives a net decline of 32 points. This indicates that there is a quite satisfactory progress in the health scenario of the state. Similarly, the PNMR has declined from 58 in 1991 to 33 in the year 2013, which gives a net decline of 25 points.

The trend in IMR in Madhya Pradesh and India (Table 2) shows that the average IMR is always higher in Madhya Pradesh since 1971 in comparison to the country's average. This gap has fluctuated between 1971-1990. It was highest in 1990 and has declined significantly in later years in both the units. The IMR, both in rural and urban centres of the state, is higher than the average of the country (Table 3). It is interesting to note that the pace of decline is higher in rural areas, when comparison is made with urban centers of the state. The overall decline in IMR has always been higher in the country in comparison to Madhya Pradesh. At district level, the IMR is extremely high in 30 districts of the state. These districts constitute 30 per cent districts in the top 100 districts of the country where the IMR is very high.

Table 4 shows sex differentials   in IMR during 1961-2012 in India and Madhya Pradesh. The IMR is higher among female infants (59) than that of male (54) in the year 2012. This situation has reversed during last fifty years (Table 4). In 1961 IMR was higher in male infants (158) than among females (140). This was according to the biological selection rule but the current trend is against this rule and consequently the CSR (child sex ratio) is declining in this state and the country.

Spatial Pattern of IMR, NNMR & PNNMR

INFANT MORTALITY RATE (IMR)

In India, 100 districts have recorded a very high IMR. These districts are from the states of

Table – 2
India and Madhya Pradesh: IMR (1971-2012)

Year	IMR		
	India	Madhya Pradesh	Difference
1971	129	135	6
1975	140	151	11
1980	114	142	28
1985	97	122	25
1990	80	111	31
1995	74	99	25
2000	68	87	19
2005	58	76	18
2010	47	62	15
2011	44	59	15
2012	42	56	14

Source: SRS Bulletin, Volume 47, No.1 (Sept., 2013),
Volume 48,(Sept., 2013).

Table - 3
India and Madhya Pradesh: Change in Rural-Urban
Deferential in IMR (1999-2010)

	Madhya Pradesh		India	
Year	Rural	Urban	Rural	Urban
1999-00	93.7	54.0	73.7	43.3
2009-10	66.3	42.3	51.3	31.3
Change	-29.2 %	-21.7%	-30.4%	-27.1%

Source: Data Book for Planning Ccommission, 22nd December, 2014

Table - 4
Madhya Pradesh and India: Sex Differential in IMR
(1961-2012)

Year		1961	1981	2006	2010	2011	2012
India	Male	122	74	56	46	43	41
	Female	108	79	59	49	46	44
Madhya Pradesh	Male	158	131	72	62	57	54
	Female	140	136	77	63	62	59

Source: Economic Survey 2012-13; Sample Registration System 46,47,48 dated
Dec. 2011; October 2012; Sept. 2013; Office of Registrar General, Ministry of Home
Affairs

Map 2

Map 3

Madhya Pradesh
NEO-NATAL MORTALITY RATE : 2011-2012
(Data by Districts)

NNMR/000 infants

52 - 65
46 - 51
40 - 45
34 - 39
25 - 33

Madhya Pradesh
POST NEO-NATAL MORTALITY RATE : 2011-2012
(Data by Districts)

PNNMR/000 infants

27 – 30
24 – 26
21 – 23
16 – 20
13 – 15

0   80   160 Kilometers

Map 4
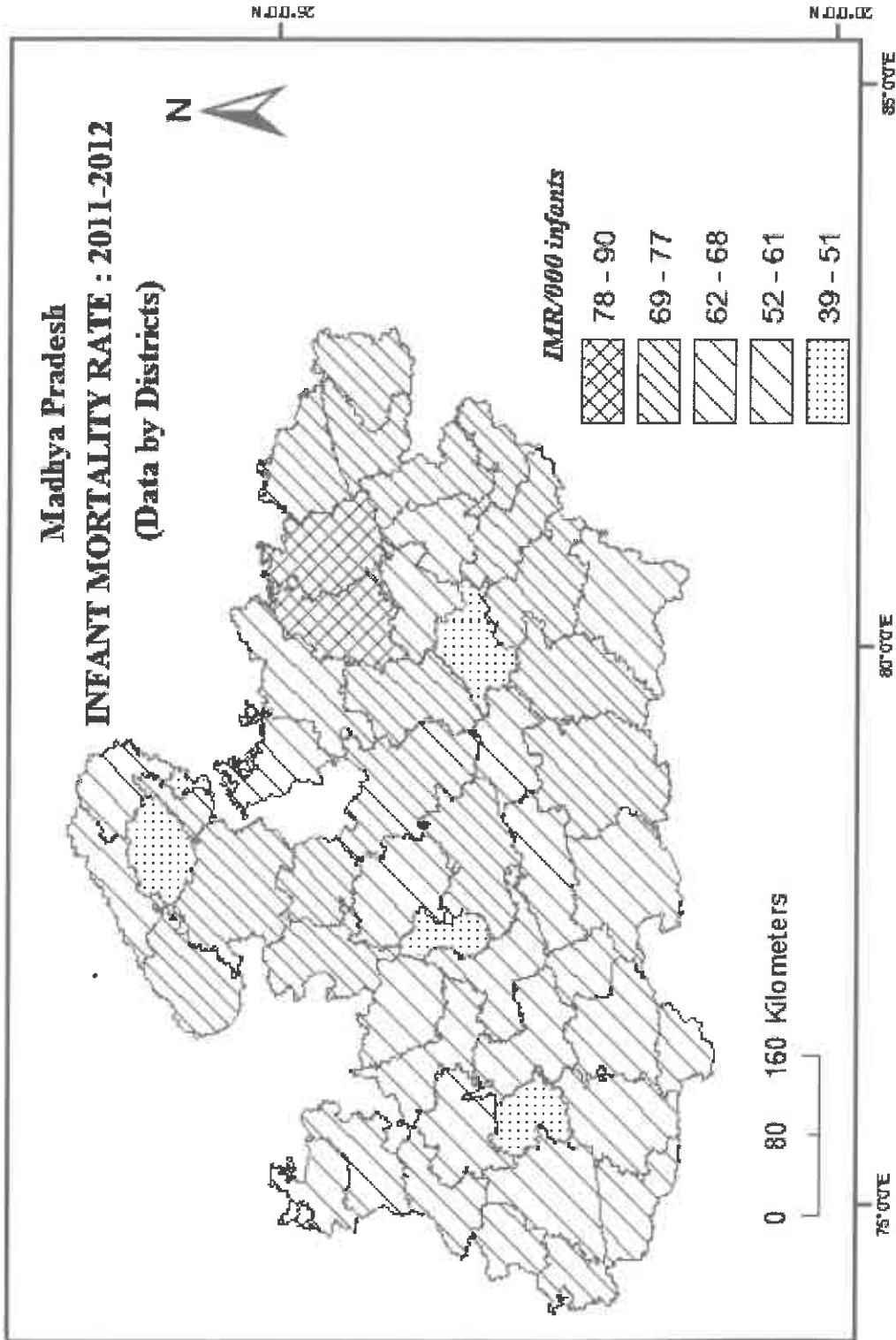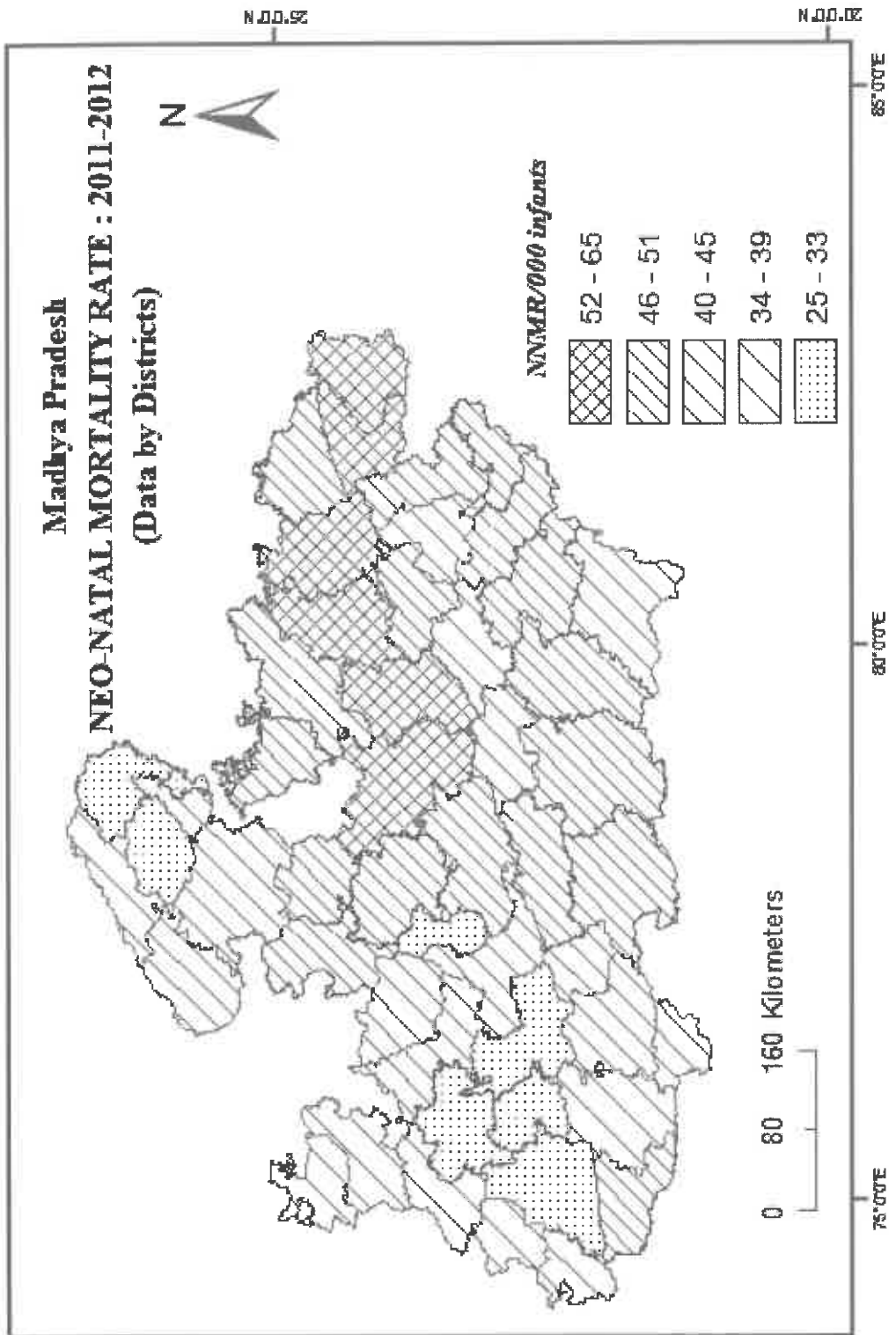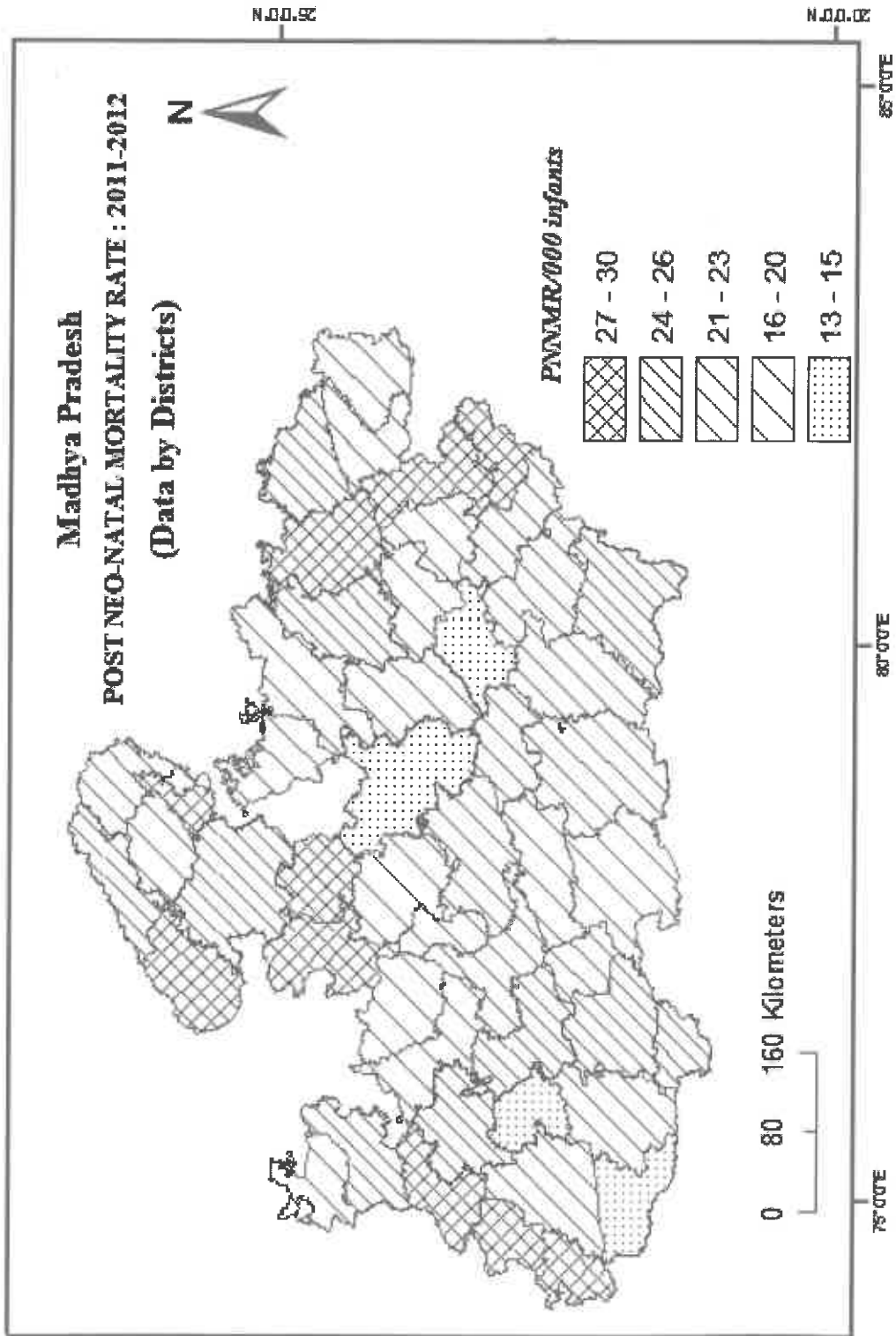
Uttar Pradesh, Rajasthan, Odisha, Madhya Pradesh, Bihar, Assam and Uttarakhand. Out of these 100 districts thirty districts are from Madhya Pradesh alone (AHS, 2012-13). Map 2 shows the district wise spatial pattern of IMR in the state. At district level, IMR in Madhya Pradesh varies from 39 in Indore to 90 in Panna district. The areas of very high IMR comprise *Bundelkhand*, *Bagehlkhand* and *Satpura* region while, *Chambal* and *Malwa* region are in the lower category. The top ranking five districts which have very high IMR are Panna (90), Satna (87), Guna (77), Damoh (77) and Raisen (74). It is interesting to note here that Panna and Satna are the two districts which are on the top in this list and they have recorded extremely high IMR (above 80) and they are placed in the top 10 districts of the country where the IMR is very high.

On the other hand, five districts which have low and very low IMR are Bhind (53), Jabalpur (49), Gwalior (49), Bhopal (49), and Indore (39). Four districts (8 per cent) belong to very low category and 8 (16 per cent) districts are in the low category while 17 (34 per cent) districts are in the high category zone.

NEO-NATAL MORTALITY RATE (NNMR)

Map 3 shows the district wise spatial pattern of NNMR in the state. Indore district has recorded the lowest (29) NNMR (neo-natal mortality rate) while Panna district has recorded the highest value (65) in Madhya Pradesh. Six districts (12 per cent) comprise the very high category and 17 districts (34 per cent) are placed in high category of NNMR. Twelve districts (24 per cent) belong in moderate category and 8 districts (16 per cent) have recorded low and very low NNMR. Broadly, the districts in the western part of the state have recorded a lower level in NNMR while the districts in *Bundelkhand* region show a very critical situation.

POST NEO-NATAL MORTALITY RATE (PNNMR)

Map 4 shows the district wise spatial

pattern of PNNMR in the state. At district level, Sagar has recorded the lowest (13) Post Neo-Natal Mortality Rate (PNNMR), while Guna and Datia districts have recorded the highest (30). About 40 percent districts of the state have recorded a higher PNNMR than the state average. Sagar and its surrounding districts of *Bundelkhand* region are included in the low to very low category, while western tribal districts and *Baghelkhand* (Shahdol, Annupur and Satna districts) region are in the high to very high category.

Regional Typology

Table 5 and Map 5 present a composite picture of IMR, NNMR and PNNMR values according to the seven physio-cultural regions and the districts comprising these. On the basis of the range of district level values three types of regions *viz*. Problematic, Prospective and Dynamic can be identified in the state. The percentage of births attended by trained medical personnel and poverty, are the two important determinants of regional variations in neo-natal mortality; and the village–level availability of medical facilities and the extent of triple vaccination are the two important determinants of post-neo-natal mortality. The influence of adult women's literacy on infant mortality is explained by better medical care at birth and preventative and curative medical care during the post –neo-natal period (Jain, 1988).

Health Infrastructure in Madhya Pradesh

Health infrastructure facilities have a direct impact on IMR. In Madhya Pradesh there are 8869 sub-centres which are 29 percent lower than the required as per given norms of Government of India. Number of primary health centres (PHC) is 42 percent lower than the required number, while there is a 33 percent shortfall of community health centres (CHC). Table 6 indicates that both female and male health assistants at PHC level are very much lower than the requirement. There is a 40 percent shortfall of laboratory technicians, on the

POPULATION GEOGRAPHY

Table- 5
Madhya Pradesh: Regional Variations in Infant Mortality Rate (IMR), Neo-natal Mortality Rate (NNMR), and Post Neo-natal Mortality Rate (PNNMR)

(2013)

Status of the Region	Physio -Cultural Region	Districts	IMR	NNMR	PNNMR
			Value per thousand		
(A) Problematic Region	1.Bundelkhand Region	Panna, Damoh, Sagar, Chhatarpur Tikamgarh	90-65	65-46	28-13
	2.Baghelkhand Region	Satna, Shahdol, Sidhi, Dindori, Mandla, Rewa, Umaria	87-64	59-45	28-17
	3.Satpura Region	Chhindwa, Seoni, Betul, Balaghat	70-62	47-46	23-15
(B) Prospective Region	1.Madhya Bharat Region	Datia, Sheopur, Shivpuri, Morena, Bhind, Gwalior	73-49	44-30	30-17
	2.Nimar Uplands	Khandwa, Barwani, Khargone	68-56	44-35	25-22
	3.Narmada Valley	Katni, Narsinghpur, Harda , Hoshangabad, Jabalpur	68-51	50-32	19-17
(C) Dynamic Region	1.Malwa Region	Guna, Raisen, Vidisha, Sehore Mandsaur, Jhabua, Ratlam, Rajgarh, Shajapur, Dewas, Neemuch, Ujjain, Dhar, Bhopal, Indore	77-39	51-25	30-14

Source: Calculated by authors based on Annual Health Survey, 2013.

Madhya Pradesh
Regional Typology based on IMR, NNMR and PNNMR

Legend

Problematic Region

Prospective Region

Dynamic Region

Map 5
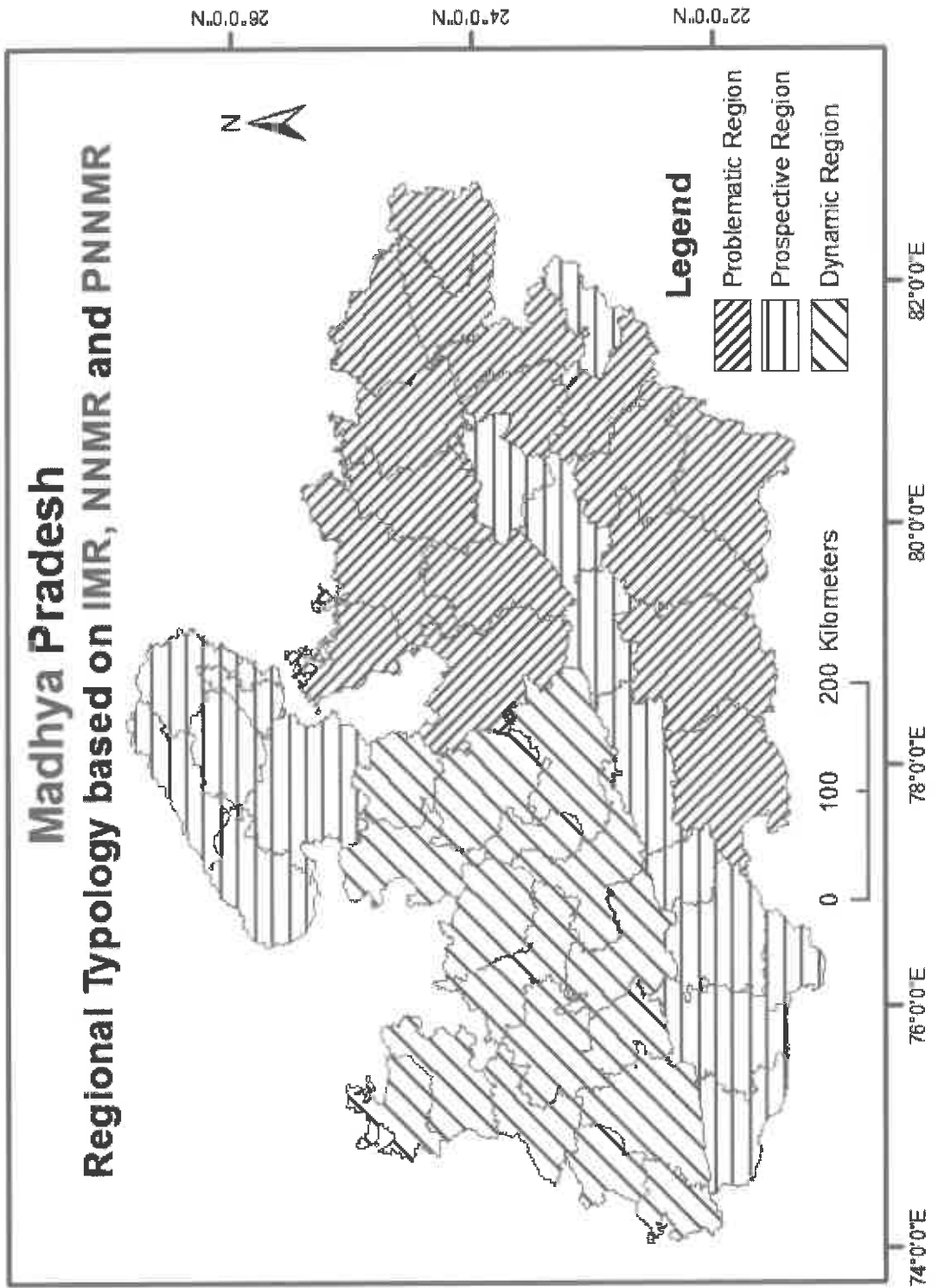
Table- 6
Madhya Pradesh: Health Infrastructure (2013)

Particulars	Required	Available	Shortfall /surplus
Sub-centre	12415	8869	- 29%
Primary Health Centre	1989	1156	- 42%
Community Health Centre	497	333	- 33%
Health Assistant (Female) at PHCs	1156	519	-55.10%
Health Assistant (Male) at PHCs	1156	288	-75.09%
Lab. Technicians at PHCs & CHCs	1489	892	-40.09%
Nursing Staff at PHCs & CHCs	3487	3629	+ 4.07 %
Doctor at PHCs	1156	999	-13.58%

Source: Rural Health Statistics, India, 2013

other hand, the nursing staff is 4.07 per cent higher than the requirement at PHCs and CHCs level in the state. The availability of doctors is 13.58 percent lower at PHCs level in the state.

Results and Discussion

MULTIPLE REGRESSIONS ANALYSIS

(a) Association of Development factor with IMR: Tables 7, 8, and 9 present the results of analysis of the association between development factor and IMR, NNMR and PNNMR respectively. There is a strong inter-relationship between population and development. The population resource may be best utilized and controlled by development (ICPD, 1994). Similarly, birth and death rates can be optimized through development, particularly in our country. Development is the best component which can help in reducing the IMR, NNMR, and PNNMR. This link has been tested and proved in this study. Three indicators of development have been considered in this study i.e. percent urbanization (PUP), percent households below poverty line (BPL) and scheduled population (SC and ST). The IMR shows significant association with development variables (51.41 percent variability in IMR at district level in Madhya Pradesh with significance level 0.001). Percent urbanization gives 41.16 percent variability in IMR, BPL about 22 percent, while Scheduled population has only 6 percent variability. It is

interesting to note that the income of individual has more impact on IMR than being from a socially backward group (Table 7). The development variable has also recorded similar association in the case of NNMR and PNNMR. However, it is more prominent in the case of NNMR in comparison with the PNNMR (Tables 8 and 9).

(b) Association of Status of Women factor with IMR: Table 10 presents the results of analysis of the association between status of women factor and IMR. A higher status of women gives inverse impact on IMR in Madhya Pradesh. Four parsimony variables have been considered for status of women, i. e., (i) female literacy rate (FL), (ii) currently married women literates (CMWL), (iii) work participant rate of females (WPRF) and (iv) sex ratio. These four variables determine 16 percent variability of IMR in Madhya Pradesh but significance level is very low. It is interesting to note here that this study shows that literacy rate among married women gives individual inverse impact with a 0.01 percent significance level. Currently married women literacy rate explains 17 percent IMR in Madhya Pradesh with 0.001 percent significance level. These four variables also have an impact both on NNMR and PNNMR. In the case of NNMR the impact is very small (6 percent) but in the case of PNNMR it has more impact (22 percent) with very high significance level.

Table- 7
Madhya Pradesh :Association between Development Factor and IMR

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	44.87134	12.09459	3.71	0.000630***
PUP	-0.32035	0.07973	-4.018	0.000252***
SC	0.7073	0.39897	1.773	0.083876 .
ST	0.07687	0.11867	0.648	0.5208
HH_BPL	0.36931	0.11777	3.136	0.003208 **
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1				
Multiple R-squared: 0.5583, Adjusted R-squared 0.5141, p-value: 9.725e-07				

Source: Calculated and tabulated by the Authors
Note: For abbreviations used in this and succeeding tables see Appendix.

Table- 8
Madhya Pradesh :Association between Development Factor and NNMR

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	27.69111	11.04788	2.506	0.016361 *
PUP	-0.23933	0.07283	-3.286	0.002119**
SC	0.31251	0.36445	0.858	0.396274
ST	-0.04871	0.1084	-0.449	0.655592
HH_BPL	0.425	0.10758	3.951	0.000308***
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1				
Multiple R-squared: 0.5232, Adjusted R-squared 0.4755, p-value: 4.229e-06				

Source: Calculated and tabulated by the Authors
Note: For abbreviations used in this and succeeding tables see Appendix.

Table- 9
Madhya Pradesh :Association between Development Factor and PNNMR

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	18.69671	7.39267	2.529	0.0155 *
PUP	-0.08644	0.04873	-1.774	0.0837 .
SC	0.35964	0.24387	1.475	0.1481
ST	0.11701	0.07253	1.613	0.1146
HH_BPL	-0.06905	0.07199	-0.959	0.3432
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1				
Multiple R-squared: 0.2151, Adjusted R-squared 0.1366, p-value: 0.04176				

Source: Calculated and tabulated by the Authors
Note: For abbreviations used in this and succeeding tables see Appendix.

Table- 10
Madhya Pradesh : Association between Status of Women and IMR

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	49.83851	50.59293	0.985	0.3305
FL	0.593817	0.41047	1.447	0.15578
CMWL	-0.57097	0.20016	-2.853	0.00683 **
WPRF	0.093187	0.172136	0.541	0.59126
Sex_Ratio	-0.00311	0.053332	-0.058	0.95385
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1				
Multiple R-squared: 0.2374, Adjusted R-squared 0.1611, p-value: 0.02546				

Source: Calculated and tabulated by the Authors
Note: For abbreviations used in this and succeeding tables see Appendix.

Table- 11
Madhya Pradesh : Association between Fertility, Contraceptive and IMR

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	205.6219	73.6631	2.791	0.00844**
TFR	7.25661	3.34284	2.171	0.03681 *
PBO3P+	0.06468	0.29696	0.218	0.82883
MAM	-7.23206	3.27352	-2.209	0.03379 *
MAAFB	1.59399	2.14032	0.745	0.4614
PGMB18	-0.5284	0.3096	-1.707	0.09674 .
Birth_Spac	-0.55369	0.22057	-2.51	0.01684 *
Mcpr	-0.26024	0.26449	-0.984	0.33192
Un_Spac	-1.03649	0.4642	-2.233	0.03205 *
Un_Limit	0.48902	0.43422	1.126	0.26773
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1				
Multiple R-squared: 0.5853, Adjusted R-squared 0.4787, p-value: 0.0001053				

Source: Calculated and tabulated by the Authors
Note: For abbreviations used in this and succeeding tables see Appendix.

(c) Association of Fertility and Contraceptive factor with IMR: Tables 11, 12 and 13 present the results of analysis of the association between fertility practice, use of contraceptive and IMR, NNMR and PNNMR. Generally, fertility and mortality (especially IMR) are related to each other in Madhya Pradesh. There is a tendency of high IMR because of frequent fertility practice among women, due to pregnancy complications, immature baby, undernourishment and malnutrition among mothers. Lower age at marriage, high number of births per woman, low gap between successive births and lower used of contraceptive have stimulated IMR in the state. For the analysis of IMR in Madhya Pradesh total fertility rate, per cent of birth above third order, mean age at marriage, median age at fertility, percent of birth before legal age, spacing between successive births, modern contraceptive prevalence rate and unmet need have been used. Fertility and contraceptive use determine 47.87 percent variability in IMR at district level in Madhya Pradesh with 0.01 level (Table 11).

It is interesting to mention here that TFR, girls marrying age, birth spacing and modern contraceptive prevalence rate are individually significant for determining IMR. Only TFR can determine 37 percent variability in IMR with 0.001 percent significance level. It is concluded that in Madhya Pradesh the high infant mortality rate is mainly fertility induced. Birth spacing factor determines 13.79 percent IMR in the state.

(d) Association of Health Facility and PNN-care factor with IMR: Tables 14, 15 and 16 present the results of analysis of the association between health facility, neo-natal care and IMR, NNMR and PNNMR. In this study, health facility and neo-natal care include seven variables – (i) institutional delivery, (ii) percent safe delivery, (iii) percent villages having CHC, (iv) sub-centre facility, (v) availability of doctors (vi) health centers having essential drugs/medicines (at least 60 per cent) and (vii) post-natal care within 48 hours of birth.

Among these variables, only essential drug variable has determined 22.8 percent IMR in the state at 0.001 significance level but all other variables together controlled 37.51 percent variability at district level IMR. This study suggests that post-neonatal mortality is mainly controlled by two main factors i.e. availability of doctors and availability of essential drugs/medicines.

Table- 12
Madhya Pradesh : Association between Fertility, Contraceptive and NNMR

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	151.352	62.5797	2.419	0.02092 *
TFR	9.1164	2.8399	3.21	0.00284**
PBO3P+	-0.2757	0.2523	-1.093	0.28192
MAM	-3.9941	2.781	-1.436	0.15982
MAAFB	-0.582	1.8183	-0.32	0.75083
PGMB18	-0.4253	0.263	-1.617	0.11488
Birth_Spac	-0.2906	0.1874	-1.551	0.12997
Mcpr	-0.2561	0.2247	-1.14	0.26206
Un_Spac	-0.458	0.3944	-1.161	0.25334
Un_Limit	0.477	0.3689	1.293	0.20448
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1				
Multiple R-squared: 0.6128, Adjusted R-squared 0.5133, p-value: 3.664e-05				

Source: Calculated and tabulated by the Authors
Note: For abbreviations used in this and succeeding tables see Appendix.

Table- 13
Madhya Pradesh : Association between Fertility, Contraceptive and PNNMR

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	52.81719	39.96031	1.322	0.1948
TFR	-2.35513	1.8134	-1.299	0.2025
PBO3P+	-0.38576	0.16109	2.395	0.0221 *
MAM	-3.26379	1.7758	-1.838	00.0746 .
MAAFB	2.20155	1.16107	1.896	0.0662 .
PGMB18	-0.10482	0.16795	-0.624	0.5366
Birth_Spac	-0.27684	0.11965	-2.314	0.0267 *
Mcpr	0.0213	0.14348	0.148	0.8828
Un_Spac	-0.58993	0.25182	-2.343	0.0250 *
Un_Limit	0.06919	0.23555	0.294	0.7707
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1				
Multiple R-squared: 0.4196, Adjusted R-squared 0.2704, p-value: 0.0135				

Source: Calculated and tabulated by the Authors
Note: For abbreviations used in this and succeeding tables see Appendix.

Table- 14
Madhya Pradesh : Association between Health Facility, Care and IMR

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	90.14591	15.378848	5.862	1.06e-06***
PNCw48h	-0.16452	0.242595	-0.678	0.502
NPNChu	0.009621	0.025211	0.382	0.705
Ins_Deli.	0.212134	0.610611	0.347	0.7303
PSD	-0.43359	0.645438	-0.672	0.506
Vill_SC	-0.23052	0.225839	-1.021	0.3142
Vill_Doc	-0.11346	0.14686	-0.773	0.4448
SC_Faci	-0.5877	0.48149	-1.221	0.2302
Ees_Drug	1.092861	0.52531	2.08	0.0447 *
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1				
Multiple R-squared: 0.4887, Adjusted R-squared 0.3751, p-value: 0.001047				

Source: Calculated and tabulated by the Authors
Note: For abbreviations used in this and succeeding tables see Appendix.

Table- 15
Madhya Pradesh : Association between Health Facility, Care and NNMR

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	76.5491	12.57053	6.09	5.28e-07***
PNCw48h	-0.06923	0.1983	-0.349	0.729
NPNChu	0.01792	0.02061	0.87	0.39
Ins_Deli.	0.48785	0.49911	0.977	0.335
PSD	-0.82214	0.52757	-1.558	0.128
Vill_SC	-0.26971	0.1846	-1.021	0.153
Vill_Doc	0.01489	0.12004	0.124	0.902
SC_Faci	-0.25422	0.39357	-0.646	0.522
Ees_Drug	0.56961	0.42938	1.327	0.193
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1				
Multiple R-squared: 0.5581, Adjusted R-squared 0.4599, p-value: 0.0001084				

Source: Calculated and tabulated by the Authors
Note: For abbreviations used in this and succeeding tables see Appendix.

Table- 16
Madhya Pradesh : Association between Health Facility, Care and PNNMR

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	12.165303	8.496154	1.432	0.1608
PNCw48h	-0.067672	0.134024	-0.505	0.6167
NPNChu	-0.008488	0.013928	-0.609	0.5461
Ins_Deli.	-0.207695	0.337337	-0.616	0.542
PSD	0.299497	0.356577	0.84	0.4065
Vill_SC	0.084251	0.124767	0.675	0.5038
Vill_Doc	-0.150841	0.081134	-1.859	0.0712 .
SC_Faci	-0.372016	0.266003	-1.399	0.1705
Ees_Drug	0.582439	0.290211	2.007	0.0523 .
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1				
Multiple R-squared: 0.2578, Adjusted R-squared 0.09291, p-value: 0.1706				

Source: Calculated and tabulated by the Authors
Note: For abbreviations used in this and succeeding tables see Appendix.

Table- 17
Madhya Pradesh : Association between Household Characteristics and IMR

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	101.9930	15.4948	6.582	9.08e-08***
Fam_Size	-5.68433	3.44826	-1.648	0.1075
HH_tv	-0.07755	0.24263	-0.320	0.7510
HH_tel	-0.17598	0.41235	-0.427	0.6719
HH_vech	0.47762	0.52667	0.907	0.3702
HH_sani	-0.32075	0.12886	-2.489	0.0173 *
HH_Pucca	-0.22228	0.14952	-1.487	0.1454
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1				
Multiple R-squared: 0.5422, Adjusted R-squared 0.4699, p-value: 2.4e-05				

Source: Calculated and tabulated by the Authors
Note: For abbreviations used in this and succeeding tables see Appendix.

Table- 18
Madhya Pradesh : Association between Household Characteristics and NNMR

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	88.20422	13.69045	6.443	1.41e-07***
Fam_Size	-7.73469	3.04671	-2.539	0.0153 *
HH_tv	0.05807	0.21438	0.271	0.7879
HH_tel	-0.18545	0.36433	-0.509	0.6137
HH_vech	0.15614	0.46534	0.336	0.7391
HH_sani	-0.19257	0.11385	-1.691	0.0990 .
HH_Pucca	-0.19094	0.13211	-1.445	0.1566
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1				
Multiple R-squared: 0.5376, Adjusted R-squared 0.4646, p-value: 2.852e-05				

Source: Calculated and tabulated by the Authors
Note: For abbreviations used in this and succeeding tables see Appendix

(e) Association of Household Characteristics factor with IMR: Tables 17 and 18 present the results of analysis of the association between household characteristics and IMR and NNMR. In this study, household characteristics include family size, telephone, television, vehicle, sanitation, and *pucca* house. Among these variables family size and sanitation show individually significant impact on IMR. Sanitation and water supply are responsible for spreading infectious diseases, particularly diarrhea, which has a direct impact on IMR. Generally when family size increases sanitation facility and practices become restricted. Sanitation has determined about 41 percent while family size gives 13 percent variability in IMR in Madhya Pradesh. Considered collectively these explain 46.46 percent variability in IMR at district level with less than 0.0001 level of significance.

Table- 19
Madhya Pradesh : Association between Immunization and IMR

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	103.7778	20.40068	5.087	1.08e-05***
MRANC+	-0.00372	0.138282	-0.027	0.9787
Full_ANC	0.049304	0.815041	0.060	0.9521
TT_inject	-0.29481	0.264734	-1.114	0.2726
IFA_100d	-0.33507	0.745590	-0.449	0.6558
PCFI	-0.22979	0.126496	-1.817	0.0774 .
Breast_1h	-0.04589	0.120011	-0.382	0.7044
Breast_6m	0.257210	0.147386	1.745	0.0893 .
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1			
Multiple R-squared: 0.3835, Adjusted R-squared 0.2669 , p-value: 0.008081			

Source: Calculated and tabulated by the Authors
Note: For abbreviations used in this and succeeding tables see Appendix

Table- 20
Madhya Pradesh : Association between Immunization and NNMR

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	71.88523	16.31449	4.406	8.68e-05***
MRANC3+	0.15944	0.11058	1.442	0.1578
Full_ANC	0.11974	0.65179	0.184	0.8552
TT_inject	-0.30764	0.21171	-1.453	0.1546
IFA_100d	-0.36650	0.59625	-0.615	0.5425
PCFI	-0.20824	0.10116	-2.059	0.0466 *
Breast_1h	-0.02494	0.09597	-0.260	0.7964
Breast_6m	0.17609	0.11786	1.494	0.1437
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1			
Multiple R-squared: 0.4899, Adjusted R-squared 0.3934, p-value: 0.0004156			

Source: Calculated and tabulated by the Authors
Note: For abbreviations used in this and succeeding tables see Appendix

(f) Association of Immunization factor with IMR: Tables 19, 20 and 21 present the results of analysis of the association between immunization factor and IMR, NNMR and PNNMR respectively. In developing regions, 7 out of 10 childhood deaths occur due to five main causes i.e. pneumonia, diarrhea, measles, malaria, and malnutrition – the last one is greatly affecting all the other (Wegman,

2001). Under nutrition and malnutrition are associated with a decrease in immune function. A weak immune function often leads to an increased susceptibility to infection (Beck, 1996). In our country, including Madhya Pradesh, vaccination protects children against many life threatening diseases such as Tuberculosis, Diphtheria, Pertusis, Polio, Tetanus, Hepatitis-B and Measles

Table- 21
Madhya Pradesh : Association between Immunization and PNNMR

	Estimate	**Std. Error**	**t value**	**Pr(>|t|)**
(Intercept)	30.27618	9.344472	3.240	0.00253 **
MRANC3+	-0.15526	0.063339	-2.451	0.01907 *
Full_ANC	-0.08749	0.373327	-0.234	0.81600
TT_inject	0.016172	0.121260	0.133	0.89463
IFA_100d	0.031589	0.341515	0.092	0.92680
PCFI	-0.00722	0.057941	-0.125	0.90142
Breast_1h	-0.01232	0.054970	-0.224	0.82387
Breast_6m	0.073460	0.067510	1.088	0.28357
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1				
Multiple R-squared: 0.3848, Adjusted R-squared 0.2684, p-value: 0.007827				

Source: Calculated and tabulated by the Authors
Note: For abbreviations used in this and succeeding tables see Appendix

Table- 22
Madhya Pradesh : Association between Health Facility, Care and PSD

	Estimate	**Std. Error**	**t value**	**Pr(>|t|)**
(Intercept)	8.00935	3.59657	2.227	0.03230 *
Ins_Deli.	0.86447	0.03280	26.356	< 2e-16 ***
Vill_SC	0.15624	0.04653	3.358	0.00187 **
Vill_Doc	-0.04473	0.03813	-1.173	0.24841
SC_Faci	-0.04158	0.12838	-0.324	0.74788
Ees_Drug	0.05127	0.13938	0.368	0.71516
PGMB18	0.10711	0.05383	1.990	0.05426 .
Birth_Spac	-0.01275	0.04621	-0.276	0.78415
Full_ANC	-0.01586	0.04250	-0.373	0.71115
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1				
Multiple R-squared: 0.9671, Adjusted R-squared 0.9598, p-value: < 2.2e-16				

Source: Calculated and tabulated by the Authors
Note: For abbreviations used in this and succeeding tables see Appendix

among others. Infants are immunized against preventable diseases every year. The Government of India supports the vaccination programme by supply of vaccines and syringes, cold chain equipments and provision of operational costs (MoHFW, 2014).

In this study, immunization factor covers child immunization (PCFCI), mother immunization (Mranc3+, Full_ANC, TT_Inj, IFA_100d). Breast feeding practices are also used as an immunization factor. At the time of cutting of umiblical cord some households insist that the same knife which had been used in the family for generations should be used. Generally such knives

are old and rusty and can easily be a source of infection (Khan, 1993).

In the present study tetanus injection is giving a good result. Immunization is determining 26.69 percent IMR variability at district level with 0.001 percent significance level. Percent of child with complete immunization and breastfeed up to six months are individually significant at 0.1 percent level. Except these two variables all others have no significance. On the other hand, immunization has more weight (39.34 percent) to control NNMR than IMR. Only PCFI is controlling 26.68 percent IMR variability with 0.001 percent significance level.

(g) Association of Health Facility and Care factor with PSD: Table 22 presents the results of analysis of the association between health facility for neonatal care and per cent safe delivery (PSD) . Infant mortality rate IMR can be controlled by restricting still birth, NNMR, and PNNMR. Institutional delivery is the most import component with a high level of significance to control still birth. It is interesting to mention here that, still birth can be restricted by 95.98 percent by health facility and care variables with 0.05 level of significance. Institutional delivery alone can determine 94 percent safe delivery (PSD).

Conclusion

In India one hundred districts have recorded a very high IMR. Out of these one hundred districts thirty are from Madhya Pradesh alone (Annual Health Survey, 2012-13) which indicates the situation of IMR in this state. The areas of very high IMR are *Bundelkhand*, *Bagehlkhand* and *Satpura* region while *Chambal* and *Malwa* regions are in the lower category. In terms of NNMR the *Bundelkhand* region has recorded a critical situation. Health infrastructure facilities have a direct impact on IMR in Madhya Pradesh. Indicators like BPL, SC and HH_BPL have significant impact on IMR. Development variables reduced about 51.41 percent variability in IMR at district level with a significance level of 0.001. BPL has about 22 percent impact, while Scheduled Population has 6 percent variability in this regard. It is interesting to note that the income of an individual has more impact on IMR in comparison to socially backward groups. Fertility and contraceptive use has determined 47.87 percent variability in IMR at district level with 0.01 level of significance. It is therefore suggested that in Madhya Pradesh the high infant mortality rate is mainly fertility induced. Post-neonatal mortality is mainly influenced by the availability of doctors and availability of essential drugs/medicines. Percent of child immunization and breastfeed within six months are individually significant at 0.1 percent level while all other variables (among immunization) have no significance. Immunization has more weight (39.34 percent) in controlling the NNMR than IMR. Still birth can be reduced by 95.98 percent by the facility and care variable with 0.05 level of significance.

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APPENDIX : Abbreviations used in the text/tables

S. No.	Abbreviation	Full Form
1	AHS	Annual Health Survey
2	Birth_Space	Birth spacing between successive birth
3	Breast_1h	Breastfeed within one hour
4	Breast_6m	Breastfeed up to six month
5	CBR	Crude Birth Rate
6	CDR	Crude Death Rate
7	CHC	Community health centre
8	CMWL	Current Married Women Literacy Rate
9	DLHS	District Level Health Survey
10	EAG	Empowered Action Group
11	Ees_Drug	Health centre having drug/medicines (at least 60%)
12	Fam_Size	Family Size
13	FL	Female Literacy Rate

14	Full_ANC	Mother receive full antenatal care
15	HH_BPL	Household living Below Poverty Line
16	HH_Pucca	Household having Pucca house
17	HH_sani	Household having sanitation facility
18	HH_tel	Household having telephone
19	HH_tv	Household having television
20	HH_vech	Household having vehicles
21	IFA_100d	Mother receive 100 days iron folic acid
22	IMR	Infant Mortality Rate
23	Ins_Deli.	Institutional delivery
24	MAAFB	Median age at first birth
25	MAM	Mean age at marriage
26	Mcpr	Modern contraceptive prevalence rate
27	MRANC3+	Mother receive more than three antenatal care
28	NFHS	National Family and Health Survey
29	NPNchu	Not received any post natal care
30	NRHM	National Rural Health Mission
31	PBOP3+	Percent of women birth more than third order
32	PCFCI	Percent of children with complete Immunization
33	PGMB18	Percent of girl marrying before 18 years
34	PHC	Primary health centre
35	PNCw48h	Post natal care within 48 hours
36	PNNMR	Post-neonatal mortality rate
37	PSD	Percent of safe delivery
38	PUP	Percent of Urban Population
39	SC	Schedule Cast
40	SC_Faci	Sub centre have more than 60 percent necessicity facility
41	SRS	Sample Registration System
42	ST	Schedule Tribe
43	TFR	Total fertility rate
44	TT_Inject	Mother receive tetanus injection
45	Un_Limit	Unmeet need of Limiting
46	Un_Spac	Unmeet need of Spacing
47	Vill_Doc	Village having doctor
48	Vill_SC	Village having Sub centre
49	WPRF	Working Population Rate of Female

BURDEN OF ANAEMIA AMONG ADOLESCENT GIRLS IN SHAHID BHAGAT SINGH NAGAR DISTRICT OF PUNJAB (INDIA)

MANISHA BHATIA and PAWAN KUMAR SHARMA
Fatehgarh Saheb and Chandigarh, India

Abstract

A large number of women in India are burdened with anaemia when they enter into pregnancy stage. To mitigate this, it was decided to give iron and folic supplementation during the adolescent period before childbearing to improve anemia among them. The present study was initiated with the quest as to what is the prevalence of anaemia among the adolescent girls who would be entering the motherhood stage in future loaded with the "burden of anaemia" in otherwise food surplus state of Punjab. To capture the ground realities, SBS Nagar district of Punjab was particularly selected as the district has some socio-economic peculiarities of having the highest per capita income and child sex ratio in the state. The present study captures prevalence of anaemia among the adolescent girls in SBS Nagar district and the associated socio-economic and demographic factors, and dietary patterns along with access to safe drinking water causing differentials in the severity of anaemia among 150 sampled adolescent girls. To measure levels of anaemia finger-pricked blood samples were collected by officials of the district health department using Haemoglobinometer device. The state has not fully translated its agriculture-led economic growth into improvements in nutritional conditions of adolescent girls. It must now correct the situation.

Key Words: Anaemia, Adolescent Girl, Dietary Pattern, Safe Drinking Water.

Introduction

Anaemia is a condition in which the haemoglobin count of the blood gets lower than the normal as a result of deficiency of one or more essential nutrients. It is a global public health problem affecting both developing and developed nations with major consequences for human health as well as social and economic development. It occurs at all stages of the life cycle, but is more prevalent in pregnant women and young children. In 2002, iron deficiency anaemia was considered to be among the most important contributing factors to the global burden of disease (WHO, 2008). Different countries have framed their own policies to combat lower levels of anaemia among the vulnerable segment of population.

Many nutritional programs have been developed by the Government of India for different segments of its population. Since the problem of under nutrition is quite gigantic, a number of public agencies have been involved at different stages to tackle it. The Department of Women and Child Development is managing the Integrated Child Development Schemes and Nutrition Program for Adolescent Girls. The Department of Ministry of Health and Family Welfare is responsible for providing the iron deficiency disorders control programme, Vitamin-A supplementation of children of 9-60 months, weekly iron and folic acid supplementation programme and National Iodine Deficiency

Disorder Control Program (NIDDCP). The Food and Nutrition Board runs Nutrition Advocacy and Awareness Programs. The Department of Elementary Education and Literacy provides mid-day meal scheme for primary school children (Sreedevi, 2016, p.7).

As early as in 1970 the Government of India under the National Nutritional Anaemia Prophylaxis Programme (NNAP) had planned to distribute iron and folic acid supplementations to tackle anaemia. This Programme was started specifically targeting the pregnant women in the country. A number of modifications in the NNAP were carried out by the government owing to failure of the programme to achieve the desired goals. A comprehensive National Nutrition Policy (NNP) was introduced in the country in 1993 to combat the problem of anaemia. The policy considered nutrition as a multi-sectoral issue that needed to be tackled at various levels. It stated that nutrition affects development as much as development affects nutrition. The policy deemed it important to tackle the problem of nutrition both through direct nutrition intervention for especially vulnerable groups as well as through various development policy instruments which would create conditions for improved nutrition. The short term intervention included ensuring proper nutrition to target groups, expanding the safety net for children through proper implementation of universal immunization, oral rehydration and provisions of Integrated Child Development Services (ICDS), growth monitoring in 0-3 year age group, nutrition of adolescent girls to enable them to attain safe motherhood, nutrition of pregnant women to decrease incidence of low birth weight and food fortification. The long term intervention included food security, improving dietary pattern, imparting nutrition education, nutritional surveillance and prevention of food adulteration. While framing NNP-1993, Government of India had faced a paucity of reliable and comparable data across different parts of the country to make the policy more rational.

NNP-1993 laid special emphasis on reaching the adolescent girls for improving their anaemia levels. It highlighted that the ICDS should be intensified so that adolescent girls are made ready for a safe motherhood, their nutritional status (including iron supplementation in the body) is improved and they are given some skill upgradation training in home-based skills and covered by non-formal education particularly nutrition and health education. It aimed to reach all adolescent girls from poor families through the ICDS by 2000, in all the CD blocks of the country and half of the urban slums. The desired goal set up in NNP-1993 could not be achieved which led to reformulation of some of the key components. The National Nutrition Mission was launched with two components - information, education and communication (IEC) campaign against malnutrition and multi-sectoral nutrition programme. One of the key objectives of National Nutrition Mission continued to be reduction in the incidence of anaemia among young children, adolescent girls and women.

The Ministry of Health and Family Welfare launched the Weekly Iron and Folic Acid Supplementation Programme in the year 2000. The programme is being implemented in both rural and urban areas and covers school going adolescent girls and boys in 6th to 12th class enrolled in government/government aided/municipal schools through the platform of schools and, out of school adolescent girls through *anganwadi* centres. In addition to this, the modalities of implementation also include screening of adolescents for mild/moderate and severe anaemia and referring these cases to appropriate health facility and bi-annual administration of de-worming (Albendazole 400 mg) tablets. Under this, information and counselling for improving dietary intake and for taking action for prevention of intestinal worm infestation is also being imparted. Despite a number of efforts to combat anaemia as mentioned above, it has remained India's major public health problem. Anemia has been called as the national disease and in fact it has become a national calamity. Statistics reveal that every second Indian woman is anaemic and one in every five maternal deaths is directly due to anaemia. The best way to combat anaemia is supplementation with iron and folic acid tablets, since the absorption of iron from Indian dietaries is too low (Trivedi and Palta, 2007,

p. 45).

National Nutritional Anaemia Prophylaxis Programme implemented four decades ago could not get the desired results. One reason for this underachievement was delay in providing iron and folic acid supplementations. A large number of women were found to be already anaemic, to a great extent, when they entered into pregnancy stage. This realization led to a policy formulation wherein iron and folic acid supplementation was planned to be started prior to pregnancy or even earlier during the adolescent period before childbearing to improve anemia among them.

Adolescence is a crucial phase of growth in the life cycle of a woman. This period of transition between children and adulthood, as defined by World Health Organization, falls in the age group of 10 to 19 years. Adolescent girls form a crucial segment of the population and act as a "bridge" between the present generation and the next. The Ministry of Health and Family Welfare, Government of India, also recognizes that adolescence is one of the important stages of life cycle in terms of health interventions. More than 33 per cent of the disease burden and almost 60 per cent of premature deaths among adults can be associated with behaviour or conditions that begin to occur during adolescence.

Adolescent girls are more vulnerable to lower levels of anaemia. The overall prevalence of anemia calculated as per WHO Guidelines was significantly higher among girls as compared to boys (Basu, *et al.*, 2005). Young adolescent girls require more iron to meet the requirements of increased blood volumes in the menstrual flow. Excessive menstrual flow, which is quiet common, can more than double the loss. Even though a moderate degree of anaemia may not affect everyday work yet it has a massive impact on those engaged in heavy physical activities. Nutritional anaemia in India is associated with lower productivity and higher sickness having inter-generational effect. Morbidity during adolescent period has implication on future safe motherhood, optimum growth and development of foetus and children. The rates of low birth weight, prematurity, neonatal and infant mortality among the children born to undernourished adolescent girls is

high (Challen and Paul, 2010, p. 60).

Iron deficiency anaemia among adolescent girls is also a major cause of growth retardation, impaired physical and mental development, delayed menarche, morbidity, and future poor reproductive outcomes. Reason attributable for high percentage of women suffering from anaemia in Punjab is primarily undernourishment (Sharma and Bhatia, 2012, p. 31). Hookworm infestation is also one of the contributory factors of anaemia in the state. The factors such as barefoot walking, unhygienic habits and the use of untreated water generally lead to infestation of hookworm which feeds on blood inside the guts, thus, leading to deficiency of blood in the body. Besides inadequate iron consumption, other major causes of anemia are high menstrual blood loss and malaria. In addition to these direct causes, there are indirect socio-economic factors such as illiteracy, poverty, and rural residence that affect anaemia.

The state of Punjab faces a unique development paradox of being in the front ranks of fast growing agrarian economies, credited for ushering the Green Revolution in the country by translating agricultural technology into the Green Revolution and making it a food surplus state and yet in stark contrast it was ranked at top of State Hunger Index. This is despite a realization that it is critical to prevent undernutrition, as early as possible, across the life cycle, to avert irreversible cumulative growth and development deficits that compromise maternal and child health and their survival. Anaemia in young children, adolescent girls and women across life cycle in the state is also reflected in the fact that around 57 per cent of children under five years of age (6-59 months) and 53.5 per cent of women (15-49 years) are undernourished (NFHS, 2016). Ironically the proportion of women suffering from anaemia has increased from 38 per cent in NFHS-3 (2005-06) to 53.5 per cent in NFHS-4 (2015-16).

On the count of anaemia among the adolescents the state was also not comfortably placed. According to NFHS-3 about two out of every four adolescents are anaemic and are at a risk of mortality and morbidity. District Level Household and Facility Survey,2014 (DLHS-4)

had confirmed that about one out of every two adolescent girls in Punjab suffered from anaemia and 3.2 per cent of them suffered from severe anaemia. The data further revealed that the proportion of females living in rural areas in the age group of 6-10 years and belonging to scheduled caste category suffering from anaemia was higher as compared to their counterparts. Further, district-wise data indicated that the prevalence of anaemia was highest in districts of Hoshiarpur (57.5 per cent), Muktsar (57.4 per cent) followed by districts Mansa, Ludhiana (54 per cent each) and Jalandhar (53 per cent).

Shahid Bhagat Singh Nagar (SBS Nagar) district is also one of the districts where the prevalence of anaemia (50.2 per cent) is higher than the state average of 48 per cent (Fig. 1). One out of every two adolescent girls in the district suffers from some degree of anaemia. Socio-economic and demographic factors have a bearing on prevalence of anemia (Deshpande, *et al.*, 2005; Gawarika, *et al.*, 2006, p. 288; Kapoor and Aneja, 1992). The district has some unique socio-economic characteristics. With a decadal growth rate of 9.5 per cent, it is home of highest proportion of scheduled caste population (42.5 per cent) among all 22 districts of Punjab. With a sex ratio of 954 females per thousand males against 895 at the state level, SBS Nagar district was ranked at second place. The position was even better as regards the child sex ratio. The district with a child sex ratio of 885, much higher than the state average of 846,was ranked at the top. It is one of the smaller districts in terms of area and population in the state, ranked at 18th position in terms of area and population size (Census of India, 2011). On the economic front, SBS Nagar district with a per capita income of Rs. 102,202, which was 1.3 times higher than the state average of Rs. 76,895, was ranked at the top. To capture the ground realities pertaining to prevalence of anaemia among the adolescent girls, this study was conducted in SBS Nagar district of Punjab due to these socio-economic peculiarities associated with it.

Objectives

The present study aims to screen school going adolescent girls between 11-19 years of age

for the prevalence of anaemia in the SBS Nagar district of Punjab. An effort is also made to study the associated indirect and direct factors such as socio-economic and demographic background, dietary patterns and access to safe drinking water causing differentials in determining the severity of anaemia among the adolescent girls.

Methodology

The locale of the present study was Government Senior Secondary School, Nawanshahr city in SBS Nagar district. All the adolescent girls in the age group of 11-19 years studying in class VII to XII were listed. The sample for the study was fixed at 200 girls from a total of 325 girls enrolled in the school. The catchment area of the sampled adolescent girls in the school was quite wide spreading over a number of neighbouring villages as well as Nawanshahr city. The study, however, could cover only 150 adolescent girls who were selected at random from the list of adolescent girls. Other adolescent girls either abstained from the blood test or were absent on the day of data collection.

Hb concentration is the most reliable indicator of anaemia at the population level, as opposed to clinical measures which are subjective and therefore have more room for error. For increasing the accuracy level in the measurement of Hb levels skilled health officials deputed by Chief Medical Officer, SBS Nagar were put in service. Blood test to check the Hb levels of adolescent girls was conducted by the health officials from Health Department after obtaining informed consent from the adolescent girls.

Finger-pricked blood samples were collected using Haemoglobinometer device which was used to measure the Hb levels. It provided the instant value of Hb levels. The results on prevalence of anaemia were classified as per the WHO guidelines. Accordingly, adolescent girls having anaemia levels between 10 to 12 g/dl were considered as mild anaemic, those having Hb levels of 8 to 10 g/dl were categorized as moderate anaemic and those having Hb levels between 6 to 8 g/dl were considered as suffering from severe anaemia.

PUNJAB
Districtwise Percentage of Adolescents Having Anemia 2012-13
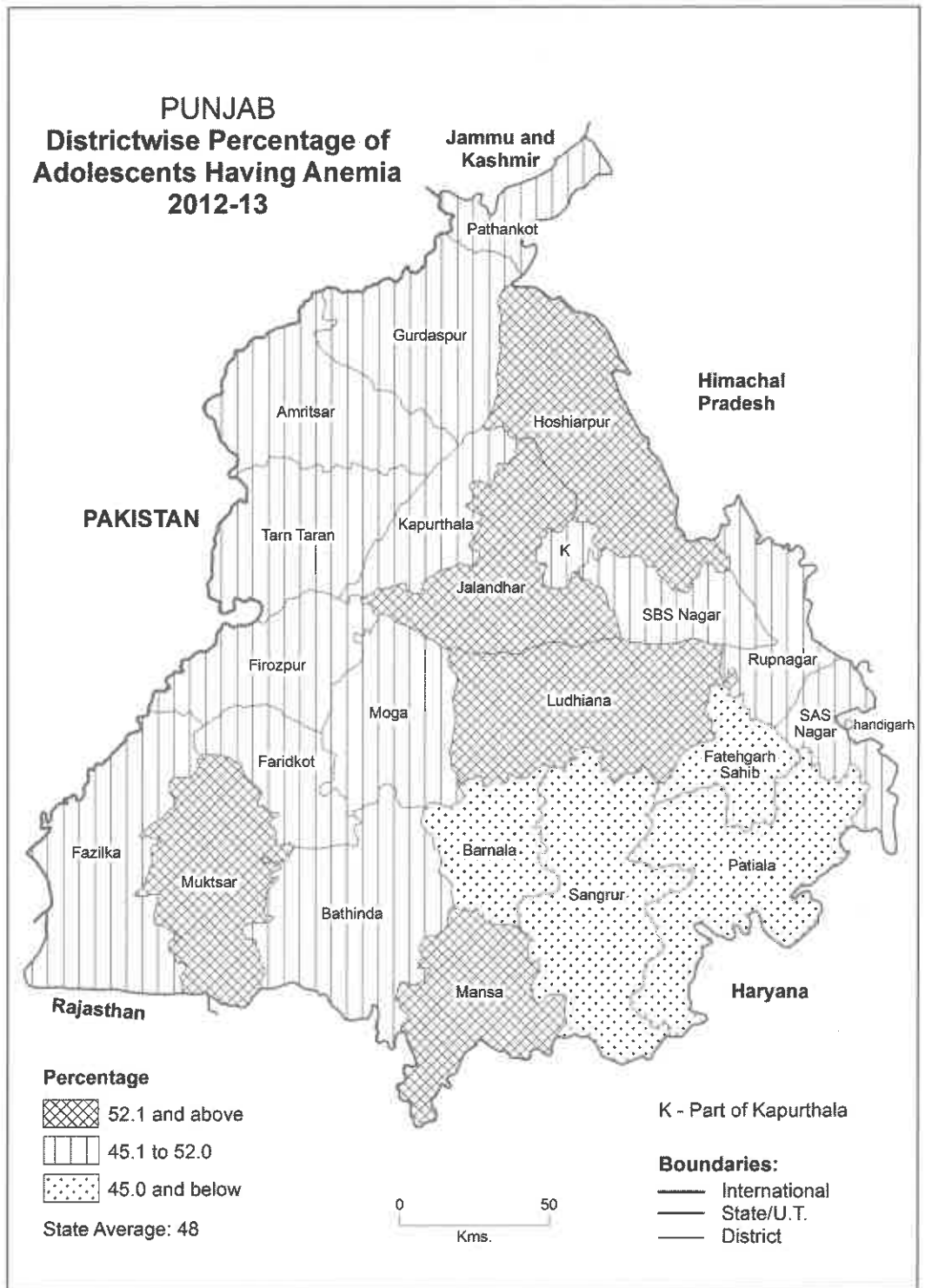
Fig. 1

On the day of sample collection, details about the socio-economic and demographic background of respondent adolescent girls, treatment of drinking water and eating habits were also obtained and recorded in a pre-designed interview schedule. Data was analyzed in Statistical Package for the Social Science (SPSS) and bi-variate tables were generated.

Findings

The findings of the survey portray a grim picture on nutritional status of adolescent girls in the district. All the sampled adolescent girls suffered from some degree of anaemia. The fact that 13.3 per cent of the adolescent girls were suffering from severe anaemia in the district was quite worrisome. An additional one half of the other adolescent girls suffered from moderate level of anaemia.

The difference in the proportion of adolescent girls in the rural and urban areas was quite much visible. About 17 per cent of the adolescent girls in rural areas had severe anaemia which was higher than 13.43 per cent among adolescent girls in urban areas (Table 1). The prevalence of moderate level of anaemia among adolescent girls in rural areas was 16 per cent points higher than the adolescent girls in urban areas. These girls in the moderate group were on the brink of moving into the category of severe anaemia, if things go unchecked, raising the proportion of girls suffering from severe anaemia. The other alarming phenomenon was that these girls were unaware about the fact that they were suffering from severe anaemia which required immediate medical attention.

The reason for higher anaemia among the rural adolescent girls is the dietary patterns peculiar to the rural areas of Punjab. The diet of the population in the rural areas is generally cereal based. The tradition of eating twice a day and preference for eating *rotis/paranthas* with pickle are quiet common in rural areas. A cereal based diet with fewer intakes of green leafy vegetables and Vitamin-C and higher consumption of tea and milk hinder the absorption of iron in the body, thus, leading to its deficiency. However, these differentials in the eating patterns in the rural and

urban populations can be systematically studied in more detail in some future endeavors in the light of impact on anaemia due to differentials in access to health care facilities, intake of clean drinking water and dietary habits.

As mentioned earlier SBS Nagar district has the peculiarity of having highest the proportion of scheduled caste population in the state. It was considered appropriate to note whether there are any caste based differentials in the proportion of adolescent girls who suffer from anaemia. Table 1 reveals that such differentials are negligible as regards the adolescent girls suffering from severe anaemia. However, the fact that a slightly higher proportion of adolescent girls belonging to scheduled caste households (56.1 per cent) suffered from moderate level of anaemia than their counterparts belonging to the general category (53.8 per cent) cannot be ignored.

The data on the type of family, its composition and ordinal position of family are imperative to study the access to various food items and its equitable availability to all members of the family. Majority of the respondents in the present study are from rural areas belonging to joint families. Prevalence of severe anaemia was higher among the adolescent girls belonging to joint families (9.8 per cent) as compared to nuclear families (6.9 per cent). However, the corresponding figures of adolescent girls suffering from moderate level of anaemia at 48 and 53 per cent display a reverse scenario. Moderate anaemia was higher among the adolescent girls belonging to nuclear families as compared to those belonging to joint families. The severity of anaemia increased with an increase in the size of the family. The prevalence of severe anaemia was at 7.7 per cent among the families with less than five members which increased to 8.5 per cent in families with five to seven members and 9.8 per cent among families with more than eight members. This indicates inequitable distribution of resources to all members in the larger families. The adolescent girls in the bigger joint families seem to have been ignored on a number of factors responsible for their balanced physical and mental growth.

Ordinal position refers to the ordering of the adolescents according to their place or rank of

Table- 1

Distribution of Adolescent Girls according to Severity of Anaemia Categorized by their Socio-Economic and Demographic Characteristics

Socio-economic and demographic characteristics	10 to 12 g/dl (Mild)	8 to 10 g/dl (Moderate)	6 to 8g/dl (Severe)	Total number of adolescent girls (N)
Residence				
Rural	36.14	46.99	16.87	83
Urban	55.22	31.34	13.43	67
Caste				
General	36.54	53.85	9.62	52
Scheduled castes	34.69	56.12	9.18	98
Type of family				
Nuclear	39.66	53.45	6.90	58
Joint	42.39	47.83	9.78	92
Family members				
Up to 5	44.23	48.08	7.69	52
5 to 7	40.43	51.06	8.51	47
8 to 9	35.29	54.90	9.80	51
Age (in years)				
11 to 13	41.67	52.08	6.25	48
14 to 16	41.10	49.32	9.59	73
17 to 19	34.48	58.62	6.90	29
Ordinal position				
1	35.29	58.82	5.88	34
2	36.67	56.67	6.67	30
3	35.59	55.93	8.47	59
4	46.67	50.33	9.67	15
5	33.33	41.67	8.33	12
Monthly family Income (in Rs.)				
<3000	33.33	58.33	8.33	12
3000-6000	39.47	52.63	7.89	38
6000-9000	41.38	50.00	8.62	58
9000-12000	44.83	48.28	6.90	29
>12000	38.46	46.15	7.69	13

Source: Field Survey, 2016

birth order in the family. There was no consistent pattern as regards prevalence of severe anaemia among the adolescent girls. However, it displayed that the girls with higher ordinal position suffered more from severe anaemia as compared to those having lower birth orders. Similarly, there was no consistent pattern among the adolescent girls suffering from severe anaemia categorized on the basis of monthly income.

Thus, adolescent girls residing in rural areas, belonging to joint large sized families, in the middle years of the adolescence period (14 to 16 years) and relatively higher ordinal positions were vulnerable to severe anaemia.

Dietary Patterns of Adolescent Girls

This section of the paper deals with the dietary patterns and eating habits of the adolescent girls. Eating habits are changing rapidly especially among the adolescents. With attractive packaging and easy availability of junk food, adolescents are attracted towards it. Junk food commonly known as fast food are zero in nutritional value and often high in fat, salt, sugar, and/or calories. Common junk foods include salted snack foods, fried fast food, and carbonated drinks. This type of food provides them with the instant energy and fulfills their requirements of calories but the need of the other nutrients is not met from such kind of food.

The junk food industry targets children of all ages accessible at a number of places. Their easy availability around schools attracts adolescent girls as well. However, it is recommended that adolescents must eat green leafy vegetables and fruits daily to meet their requirements of vitamins and minerals. In order to ascertain the eating habits among the adolescent girls, their frequency of eating different foods was recorded.

Severe anaemia at 10.5 per cent was highest among the adolescent girls consuming junk food on a weekly basis. Surprisingly, this was 6.7 per cent among those who consumed it daily. Unexpectedly, 20 per cent of the adolescent girls had severe anaemia who consumed green leafy vegetables daily, followed by 8 per cent who consumed it on weekly basis (Table 2). The scenario was no different in case of adolescent girls consuming fruits. Unpredictably, severe anaemia was higher among those girls who were eating fruits with higher frequency. This could be due to

wrong reporting of eating habits by the respondent adolescent girls. The other reason was that they were not consuming leafy vegetables and specifically iron rich fruits in adequate quantity having little impact on alleviating higher levels of anaemia.

However, prevalence of severe anaemia was on expected lines among those girls who were consuming non-vegetarian food. No adolescent girl suffered from severe anaemia who was consuming non-vegetarian food on a daily basis as compared to 13 per cent who were consuming these occasionally. The reason for this may be due to the fact that non-vegetarian food items are rich in iron as compared to vegetarian food items. Interestingly, about 13 per cent of the adolescent girls who were vegetarian had severe anaemia.

Midday meal is provided to the adolescents to improve the school dropout rates and also to provide at least one healthy meal in a day. The study indicates that 33 per cent girls brought lunch

Table- 2

Percentage of Adolescent Girls according to Severity of Anaemia and Dietary Patterns

Type of food items consumed with their frequency	10 to 12 g/dl (Mild)	8 to 10 g/dl (Moderate)	6 to 8g/dl (Severe)	Total number of adolescent girls (N)
Junk food				
Daily	20.00	40.00	6.67	15
Weekly	36.05	53.49	10.47	86
Occasionally	34.69	57.14	8.16	49
Never	0.00	0.00	0.00	2
Green leafy vegetables				
Daily	20.00	60.00	20.00	5
Weekly	37.00	58.00	8.00	100
Occasionally	35.56	57.78	6.6.7	45
Never	0.00	0.00	0.00	0.00
Fruits				
Daily	40.00	50.00	10.00	10
Weekly	39.81	50.00	10.00	108
Occasionally	37.50	58.13	9.38	32
Never	0.00	0.00	0.00	0
Non-vegetarian food				
Daily	80.00	20.00	0.0	5
Weekly	47.83	43.48	8.70	23
occasionally	49.49	37.37	13.13	99
Never	39.13	47.83	13.04	23

Source: Field Survey, 2016

Table- 3
Percentage of Adolescent Girls according to Severity of Anaemia and Access to Safe Drinking Water

Source and purification of water consumed	10 to 12 g/dl (Mild)	8 to 10 g/dl (Moderate)	6 to 8g/dl (Severe)	Total number of adolescent girls (N)
Source of drinking water				
Well	38.71	41.94	12.90	31
Running water	39.39	51.52	9.09	99
Storage tank	30.00	60.00	10.00	20
Treatment of water				
Purified	35.14	56.76	8.11	37
Not purified	32.74	57.52	9.73	113

Source: Field Survey, 2016

from home in addition to midday meal and 11 per cent neither brought lunch from home nor they had midday meal at school. Thus, they are deprived of nutrition at a very crucial stage of their life.

The responses were also gathered from adolescent girls regarding the consumption of iron and folic acid tablets in the school which are provided to them free of cost. It is the duty of the teacher to ensure administration of these tablets to the adolescent girls. A majority of the respondents informed that although they take tablets from the teachers but do not consume them for fear of vomiting and nausea which they experienced after consuming these tablets. On further investigation, it was revealed that majority of the respondents come to school without having breakfast and they felt uncomfortable after consuming these tablets as their stomachs were empty.

Safe drinking water

Water is an essential nutrient. It is more important to have an adequate intake of water than it is to have enough calories. Water is responsible for many essential metabolic processes, including delivering nutrients. Drinking water supplies may contain some of these essential minerals naturally or through deliberate or incidental addition.

The finding of the study highlight that adolescent girls drinking water from a well are more vulnerable to severe anaemia. About 13 per cent of them had severe anaemia followed by 10 per cent consuming water from storage tanks and

nine per cent drinking water from a tap (Table 3). Adolescent girls drinking purified water had a lower level of severe anaemia at 8.11 per cent as compared to 9.73 per cent consuming unpurified water. However, in-depth studies on the quality of drinking water consumed and its effects on determining Hb need to be conducted so that adequacies and inadequacies can be documented and possibly mitigated.

Conclusions

The increased food production in Punjab has failed to ensure improvement in the nutritional status of its population. The findings of the survey portray a grim picture on the nutritional status of adolescent girls. Astonishingly all the 150 sampled adolescents girls suffered from anaemia with varied degree ranging from severe, moderate to mild. The fact that 13.3 per cent of the adolescent girls were suffering from severe anaemia is quite worrisome. Adolescent girls residing in rural areas, belonging to joint large sized families, in the middle years of the adolescence period (14 to 16 years) and relatively higher ordinal positions are more vulnerable to severe anaemia.

Unpredictably, severe anaemia was higher among those girls who were eating iron rich fruits with higher frequency. This was largely due to the fact that they were not consuming leafy vegetables and iron rich fruits in adequate quantity having little impact on alleviating higher levels of anaemia. The finding of the study further highlighs

that adolescent girls drinking water from wells are most vulnerable to severe anaemia.

National Health Mission which aims to improve anaemia levels in the state needs to work with more missionary zeal to reach out to the rural adolescent girls with improved emphasis on qualitative aspects. This is pertinent in the light of the fact that although iron and folic acid tablets are provided to adolescent girls there is no check on their consumption. It is also imperative to ban junk food from schools, just like tobacco products, where children have easy access to these foods.

The impact of a variety of strategies to combat anaemia among adolescent population in the state has been quite feeble. The state needs to strengthen its efforts to fight against anaemia among adolescents. Public health institutions, Department of Women and Child Development and Punjab Agricultural University - the key players - can play a vital role in this regard. The first two under the umbrella of National Health Mission are required to promote administration of micronutrient supplements to adolescent girls more vigorously. A mechanism needs to be evolved under which the Punjab Agricultural University, through its vast network of Krishi Vigyan Kendras, can be entrusted with the task of promoting nutrition education to adolescent girls to enable them to feed and nourish themselves adequately as a matter of long term goal. All in all, the state has not fully translated its agricultural-led economic growth into improvements in nutritional conditions. It must now correct the situation. Nutrition challenges among adolescent girls in the state, in general, and SBS Nagar, in particular, call for urgent action, as a critical development, imperative for ensuring faster, more inclusive and sustainable development.

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URBAN-URBAN MIGRATION IN THE CLASS I CITIES OF PUNJAB: A SPATIO-TEMPORAL ANALYSIS (1971-2001)

RASHMI and GURINDER KAUR
Patiala, India

Abstract

Urban-urban migration refers to that stream of migration where a migrant moves from one urban area to another urban area. This type of migration is mainly qualitative in nature. It depends on the potential capacity and capability of those migrants who can sustain themselves in the city life. Punjab, one of the most developed and urbanised states of India, has also witnessed a significant proportion of urban-urban migration. The present study seeks to explore the spatio-temporal patterns of urban-urban migration in the Class I Cities of Punjab. It has been observed from the study that in the Class I Cities of Punjab urban-urban migration has witnessed a three-fold increase from 1971 to 2001. A large proportion of urban-urban migrants are concentrated in the cities of Ludhiana, Amritsar and Jalandhar, due to their location on the National Highway-I and Amritsar-Delhi industrial corridor. Among all the Class I Cities of Punjab, S.A.S. Nagar (Mohali) stands as a unique example of urban-urban migration as it gained the status of a Class I City only in 2001, but reported more than half of its migrant population to be from other urban areas. In terms of distance involved, inter-district urban-urban migration dominated from 1971 to 2001. The share of intra-district urban-urban migration remained high only in those cities which had another large urban centre within the same district. Inter-state urban-urban migration became a prominent feature of those Class I Cities which are located near the state borders.

Keywords: Urban-Urban Migration, Class I Cities, Urbanisation, Industrial Corridor, Locational Advantage.

Introduction

Urban-urban migration is a flow of migration which involves movement of an individual or a group of people from one urban area to another. Migration mainly depends on the conditions and requirements of an individual which drive him from one place to another. Urban-urban migration is usually qualitative in nature. Rather than moving *en-masse* from one urban area to another (which happens only in certain conditions like war, floods etc.), people tend to move either alone and are later joined by their family or in other cases, people who migrate with family undertake it on the basis of the benefits attached to such type of migration.

Urban-urban migration is mainly associated with an advanced stage of urbanisation (Zelinsky, 1971). The volume of migrants increases when a nation rapidly under goes the process of urbanisation. Urban-urban migration is also associated with the existence of a number of inter-urban disparities in a region. This flow of migration is facilitated by development in the means of transport and communication. An improvement in the transportation sector facilitates a smooth flow of people from one urban area to another urban area, while an improvement in the means of communication increases the information sphere, which helps people to find

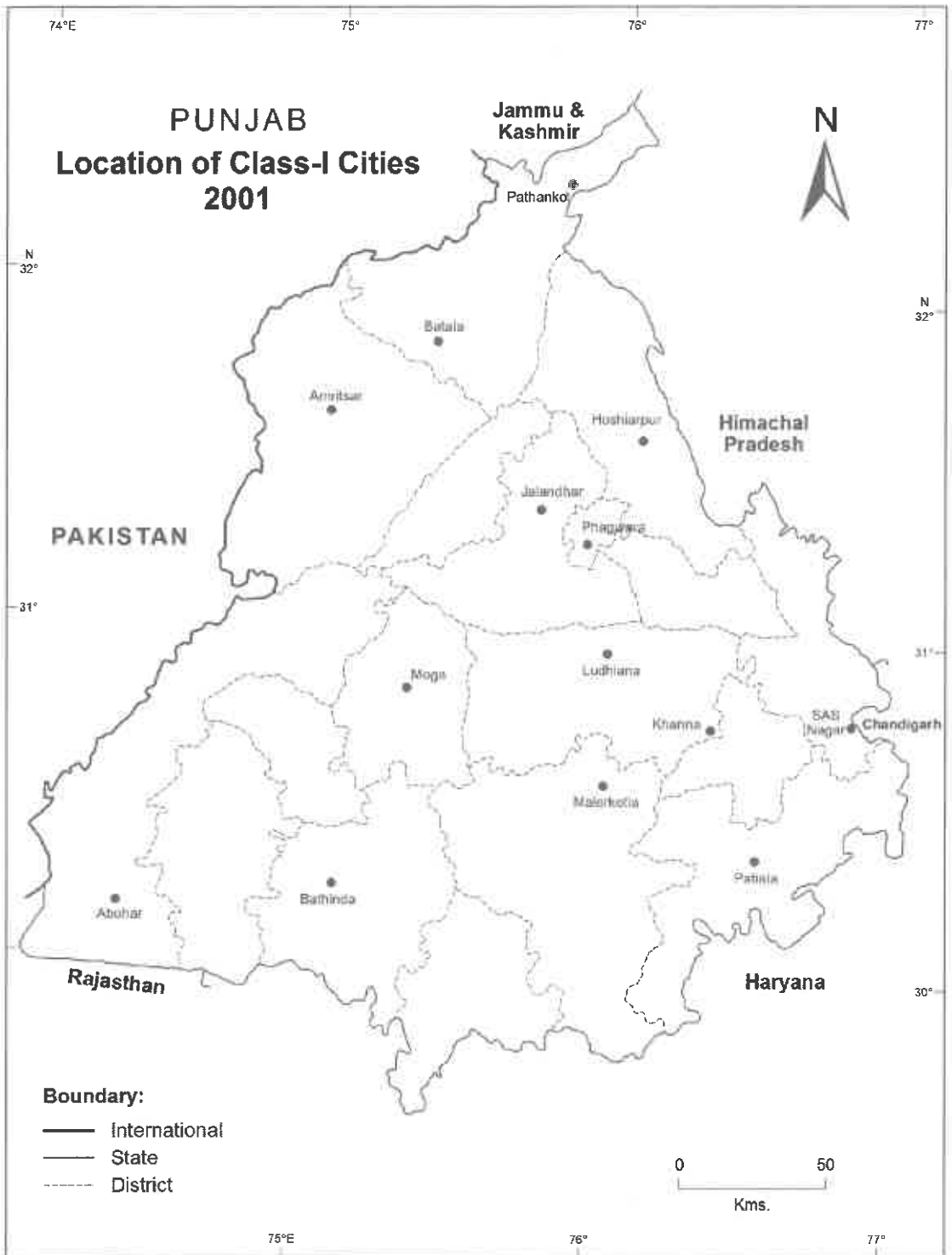new opportunities and prompts their transition between two urban areas.

In the present scenario of urbanisation, when nearly 54 per cent of the world's population is living in urban areas, the flow of urban-urban migration gains high relevance. It is a paradox that in the contemporary world where more than half of the world population has an urban residence, the academic world still has a strong obsession with the study of rural-urban flow of migration. However, Ravenstein, who is known as founder of laws of migration (1885), explored urban-urban migration in his seminal work in the context of Great Britain. Ravenstein's claim was refuted by Zimmereman (1926) in his chance selection hypothesis of migration to cities. Zipf (1946) explained the urban-urban migration and also introduced the concept of distance decay phenomenon. Stouffer (1940) gave the concept of intervening opportunities and competing migrants after testing his hypothesis on inter-city data of the United States. Lee (1966) also proposed that the degree of diversity within a given territory induces high volume of migration. Zelinsky (1971) discussed different phases of urban-urban migration in his theory of mobility transition. Gedik (1985) observed high volume of urban-urban migration in his study of Turkey. Wilson (1986) used log linear model on data matrix of in-migration and out-migration from metropolitan and non-metropolitan areas of U.S.A from 1935-1980. Cerutti and Bertoncello (2003) observed that after 1970, Latin America registered a high share of urban-urban migrants than the rural-urban migrants. Premi (1980) undertook the study of out migration from towns in Punjab and Haryana and found more female participation than male in the urban-urban flow of migration. Skeldon (1997) and Das and Saha (2013) observed that the urban-urban migration pattern was valid in long distance migration in India.

In the context of India, urban-urban migration flow is the third most important flow of migration after rural - rural and rural-urban flow of migration. According to Census of India 2001, out

of the total 97 million migrants, approximately 14 million migrants moved from one urban area to another urban area. In India, urban-urban migration is mainly undertaken from small urban areas to the Class I cities. The major push factors of the urban-urban flow of migration include poor job sector in smaller urban centres and, stagnation and decline of towns. The spatial disparities also contribute to urban-urban migration because people living in urban areas of less developed states move towards areas of greater opportunities created by development (Gill, 1992). The pull factors of urban-urban migration include location of Class I cities on major trade and transport routes of the state which eases their accessibility, administrative importance of cities that makes these abode of several transferred public and private employees, good life style attached with the presence of basic amenities, luxuries, and physical and social infrastructure. Along with these, the keenness to improve the standard of living has been another vital consideration in increasing migration from small towns to big cities (Gosal and Krishan, 1975). The present paper makes an attempt to study urban-urban migration in the Class I cities of Punjab. The study area as shown in Map 1 comprises of 14 Class I cities of Punjab in 2001, namely Ludhiana, Amritsar, Jalandhar, Patiala, Bathinda, Pathankot, Batala, Hoshiarpur, Moga, Abohar, Khanna, Phagwara, S.A.S Nagar (Mohali) and, Malerkotla.

Migration in Punjab

The ushering of Green Revolution and state's reorganization on   linguistic basis in November, 1966 brought changes in the economy of Punjab which played a major role in shaping the demographic situation of the state. The state became a leader in the development process and attracted migrants from far and wide. Punjab underwent a tumultuous period of social disturbance during 1980s. The state resurrected itself on the path of development during 1990s which resulted in an increase in the levels of urbanisation and migration.

PUNJAB
Location of Class-I Cities
2001

Jammu & Kashmir

N

Pathanko

Himachal Pradesh

Batala

Amritsar

Hoshiarpur

Jalandhar

Phagwara

PAKISTAN

Ludhiana

Moga

Khanna

SAS Nagar Chandigarh

Malerkotla

Patiala

Bathinda

Abohar

Rajasthan

Haryana

Boundary:
International
State
District

0   50
Kms.

Map 1

Table-1
Punjab : Proportion of Migrants in Various Migration Streams
(1971-2001)

Migration Stream	1971	1981	1991	2001
Rural-Rural	64.56	61.37	60.00	57.24
Rural-Urban	15.28	16.43	6.57	20.28
Urban-Urban	13.65	15.28	16.59	18.03
Urban-Rural	6.50	6.92	16.85	4.45
Total	100	100	100	100

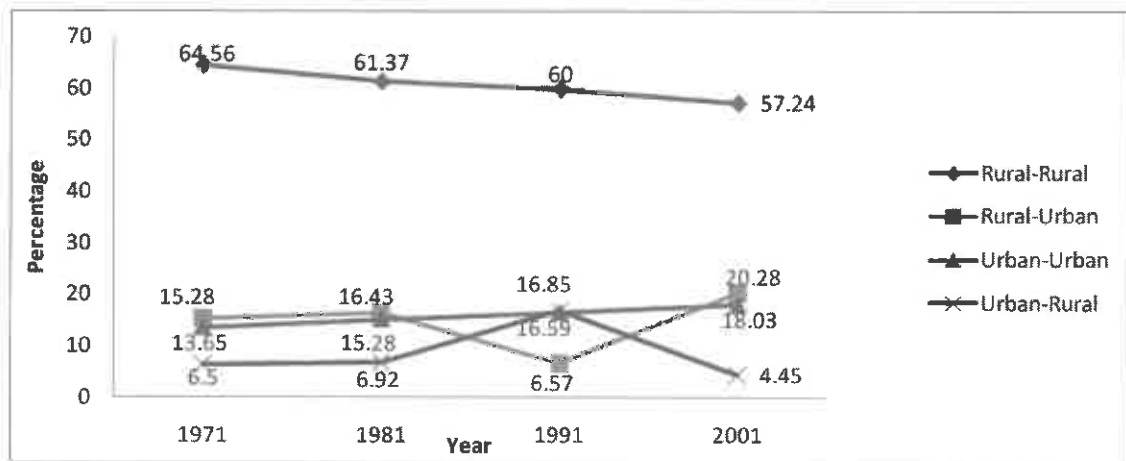*Source: Migration Tables of 1971, 1981, 1991 and CD of 2001*

Fig. 1

Punjab: Proportion of Migrants in Various Migration Streams (1971-2001)

It can be observed from Table 1 and Figure 1 that in Punjab during 1971-2001, rural-rural migration remained the most dominant among all the migration streams. It is primarily because Punjab has an agriculture based economy and the prosperity in the state's agricultural activities attracted large proportion of migrants (64.56 per cent in 1971). However, the proportion of migrants in this stream declined continuously in successive decades and was recorded to be 57.24 per cent in 2001. The second most important migration stream in Punjab is rural-urban migration. The increasing agricultural prosperity set a pace for urbanisation and attracted rural migrants to urban areas of the state. This stream comprised 15.28 per cent migrants in 1971 which increased to 20.28 per cent. This stream lost its shine only in 1991

because of social disturbances in Punjab and comprised 6.57 per cent migrants. The only stream of migration, that has witnessed a consistent upward surge from 1971 to 2001 is the urban-urban migration. In 1971 it comprised 13.13 per cent migrants of the state, which increased to 15.28 per cent in 1981, rose to 16.59 per cent in 1991 and was recorded to be 18.03 per cent in 2001. Urban-rural migration attracted the lowest proportion of migrants between 1971-2001. It can be due to increasing urbanisation and decreasing ruralisation in the state.

Urban-Urban Migration in Class I Cities of Punjab

Punjab with its highest level of urbanisation in the entire north-western region of India has always received a high volume of migrants from other urban areas. The Integrated Urban Development Programme introduced
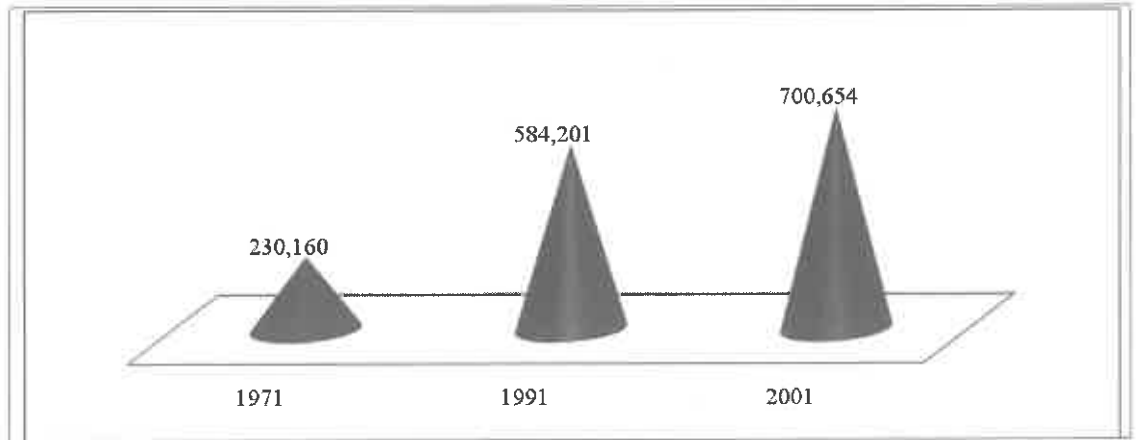
Fig. 2

Table-2
Punjab : Trends of Urban-Urban Migration in Class I Cities of (1971-2001)

Name of the City	Total Migrants		
	1971	1991	2001
Ludhiana	89,930 (50.77)	2,53,967(58.85)	2,74,666 (36.10)
Amritsar	55,445 (46.58)	72,952 (44.78)	51,280 (23.62)
Jalandhar	51,115 (54.01)	82,646 (53.80)	66,736 (30.18)
Patiala	33,670 (57.95)	49,542 (58.21)	47,218 (40.79)
Bathinda	-	36,161 (48.87)	52,717 (47.90)
Pathankot	-	18,480 (49.04)	15,435 (28.43)
Batala	-	13,775 (42.17)	9,763 (24.46)
Hoshiarpur	-	23,002 (43.39)	27,064 (41.59)
Moga	-	18,094 (48.91)	17,257 (33.96)
Abohar	-	15,582 (45.31)	18,442 (43.26)
Khanna	-	-	22,414 (39.10)
Phagwara	-	-	15,403 (32.15)
S.A.S Nagar	-	-	74,183 (67.37)
Malerkotla	-	-	8,076 (45.58)
Total Migrants	230,160 (51.27)	584,201 (53.01)	700,654 (36.67)

Note: The proportion of urban-urban migrants in total migrants is shown in brackets.
Source: Migration Tables of 1971, 1991 and CD of 2001

during the Fourth Five Year Plan (1969-74) was launched to upgrade the level of infrastructure in cities (Krishan, 2005). This resulted in an increase in the work opportunities and quality of life in the cities of Punjab and a large number of people from other urban areas moved into Class I cities of the state. Figure 2 shows that during the period of three decades from 1971 to 2001 urban-urban migration in Class I cities has observed a three-fold rise. In 1971 only 230,160 urban-urban migrants were residing in the Class I cities of Punjab and their number rose to 700,654 migrants by 2001. It is

important to note that the migration data of 1981, related to Class I cities is not available with the Census of India and the present study includes migration data of 1971, 1991 and 2001 only.

Punjab: Urban-Urban Migration in Class I Cities (1971-2001)

Table 2 shows the distribution of urban-urban migrants in Class I cities of Punjab. In 1971 there were only four such cities which had attracted 51.27 per cent of the total migrants in the state. The proportion of urban-urban migrants in these varied from 46.58 per cent in Amritsar city to 57.95 per cent in Patiala. In 1991 the number of Class I cities increased to ten and collectively these attracted more than double the number of urban-urban migrants as compared to 1971 (584,201 persons) which comprised 53.01 per cent of the total number of migrants in the state. The proportion of urban-urban migrants in these varied from 42.17 per cent in Batala city to 58.85 per cent in Ludhiana. The number of Class I cities in 2001 increased to 14 and collectively the proportion of urban-urban migrants in these was 36.67 per cent. The proportion of urban-urban migrants in these varied from 23.62 per cent in Amritsar city to 67.37 per cent in S.A.S.Nagar. To get an overview of changing dynamics of the concentration of urban-urban migration, the Class I cities of Punjab have been categorised as : (a) Cities receiving a relatively high volume of urban- urban migrants (more than 50,000 persons), (b) Cities receiving a moderate volume of urban-urban migrants (between 25,000 to 50,000 persons), and (c) Cities receiving a relatively low volume of urban-urban migrants (less than 25,000 persons).

(a) *Cities receiving a relatively high volume of urban- urban migrants (more than 50,000 persons):* In 1971 out of the four cities the number of migrants was more than 50,000 per sons in three i.e. Ludhiana (50.77 per cent), Amritsar (46. 58 cent) and Jalandhar (54.01 per cent) in the same order. In 1991 the number of such cities remained to be three of the total ten. These three were the same as in 1971 but

their relative position had changed to Ludhiana (58.85 per cent), Jalandhar (53.80 per cent) and Amritsar (44.78 cent). In 2001 the numbr of cities having more than 50,000 urban-urban migrants increased to five out of a total of fourteen and their relative ranks were S.A.S.Nagar (67.37 per cent), Bathinda (47.90 per cent), Ludhiana (36.10 per cent), Jalandhar (30.18 per cent) and Amritsar (23.62 cent). Among these cities Ludhiana, Jalandhar and Amritsar have a good industrial, administrative and trade base due to their location on the National Highway-I that connects these with the National Capital Territory of Delhi. The presence of several important government offices like Guru Nanak Dev Thermal Power Plant, National Fertilisers Limited and a number of trade and industrial establishments have helped Bathinda to enter this category in the year 2001. Similarly, S.A.S. Nagar (Mohali) is characterised with a very high volume and very high proportion of urban migrants due to its location near Chandigarh, the capital city of Punjab and Haryana.

(b) *Cities receiving a moderate volume of urban-urban migrants (between 25,000 and 50,000 persons):* This category witnessed the presence of Patiala city from 1971 to 2001. It was because of its small size and absence of any big industrial and commercial establishments in the district of Patiala. The proportion of urban-urban migrants in the total migrant population of the city varied between 57.95 per cent in 1971 to 40.79 per cent in 2001. This could be related mainly to the presence of several important government offices like Electricity Board, Punjab Public Service Commission etc. and a large number of educational institutions like Thapar University, Punjabi University, Government Medical College etc. The emergence of S.A.S. Nagar (Mohali) in 2001 as a Class I City also had a negative influence on the migrant share of Patiala. In addition to Patiala in 1991 Bathinda city (48.87 per cent) also registered a moderate share of the urban-urban migrants in

1991, while in 2001 Hoshiarpur city (41.59 per cent) joined Patiala in this category.

(c) *Cities receiving a relatively low volume of urban-urban migrants (below 25,000 persons):* There was no city in this category in 1971. In 1991, the number of cities in this category was five, namely, Hoshiarpur, Pathankot, Moga, Abohar and Batala in the same order in terms of number of urban-urban migrants. However, the proportion of urban-urban migrants in total migrants in these cities varied from 49.04 per cent in Pathankot to 42.17 per cent in Batala (Table 2). In 2001, the city of Hoshiarpur recorded an improvement in the number of urban- urban migrants and moved up to the category of a moderate proportion of migrants, at the same time three cities were added to this category raising the total number to seven, namely, Khanna, Abohar, Moga, Pathankot, Phagwara, Batala, and Malerkotla in the same order in terms of

number of urban-urban migrants. The proportion of these migrants in the total number of migrants varied between 45.58per cent in Malerkotla and 24.46 per cent in Batala. The growth of Bathinda city is responsible for the low proportion of urban-urban migrants in other urban centres of the region and pushing Abohar city in the category of cities with low volume of urban-urban migration, although it had recorded an improvement in the volume of urban-urban migration during 1991-2001. In comparison, Pathankot, Batala and Moga registered a fall in the number of urban-urban migrants but remained in the same category in 2001. Among the Class I cities that came up in 2001, Khanna and Phagwara appeared in the low category as these cities absorbed excessive migrant pressure of Ludhiana and Jalandhar city respectively.

Table-3
Distance and Urban-Urban Migration in the Class I Cities of Punjab
(1971-2001)

Name of the City	Intra-District			Inter-District			Inter-State		
	1971	1991	2001	1971	1991	2001	1971	1991	2001
Ludhiana	6.54	20.14	36.28	51.35	41.67	30.68	42.11	38.19	33.04
Amritsar	10.50	26.94	0.00	42.76	34.67	48.83	46.74	38.39	51.17
Jalandhar	9.18	17.27	0.00	52.46	45.94	57.24	38.36	36.78	42.76
Patiala	13.60	16.88	0.00	40.84	40.11	51.35	45.56	43.01	48.65
Bathinda	-	25.00	37.45	-	42.14	38.06	-	32.86	24.49
Pathankot	-	24.62	0.00	-	35.17	33.18	-	40.21	66.82
Batala	-	60.87	0.00	-	28.02	72.65	-	11.11	27.35
Hoshiarpur	-	34.18	33.66	-	40.54	40.17	-	25.29	26.17
Moga	-	22.49	0.00	-	54.85	76.96	-	22.66	23.04
Abohar	-	20.73	33.87	-	31.00	28.29	-	48.27	37.84
Khanna	-	-	50.45	-	-	27.23	-	-	22.32
Phagwara	-	-	0.00	-	-	70.15	-	-	29.85
S.A.S Nagar	-	-	19.45	-	-	24.49	-	-	56.07
Malerkotla	-	-	27.45	-	-	42.19	-	-	30.36
Punjab	**56.76**	**28.02**	**15.22**	**52.65**	**30.04**	**17.31**	**62.57**	**24.12**	**13.31**

Source: Migration Tables of 1971, 1991 and CD of 2001

Urban-Urban Migration by Distance

Distance has its own importance in the flow of urban-urban migration. It is well recognised that in the initial phase of urbanisation, urban-urban migration remains long distance due to the development of only a few urban centres. However, with the passage of time and the emergence of several urban centres, improvement in transport and communication facilities, establishment of industries and centres of education reduce distance of movement of population from one urban area to another urban area. In the Class I cities of Punjab, similar factors have also altered the trends of urban-urban migration on the basis of distance. The trends of urban-urban migration by distance in Class I cities of Punjab have been elucidated in Table 3.

During 1971-2001 except for intra-district migration, a general pattern of decline in the proportion of migrants in various streams by distance can be noticed (Table 3). The intra-district urban-urban migration has remained the most dominating stream in Punjab. It can be observed from the table that in 2001, intra-district migration witnessed a sharp increase in the proportion while a slump was observed in inter-district and inter-state migrants. The spatial pattern of urban-urban migration by distance in Class I cities can be studied under the three following headings:

1. Intra-District Urban- Urban Migration
2. Inter-District Urban- Urban Migration
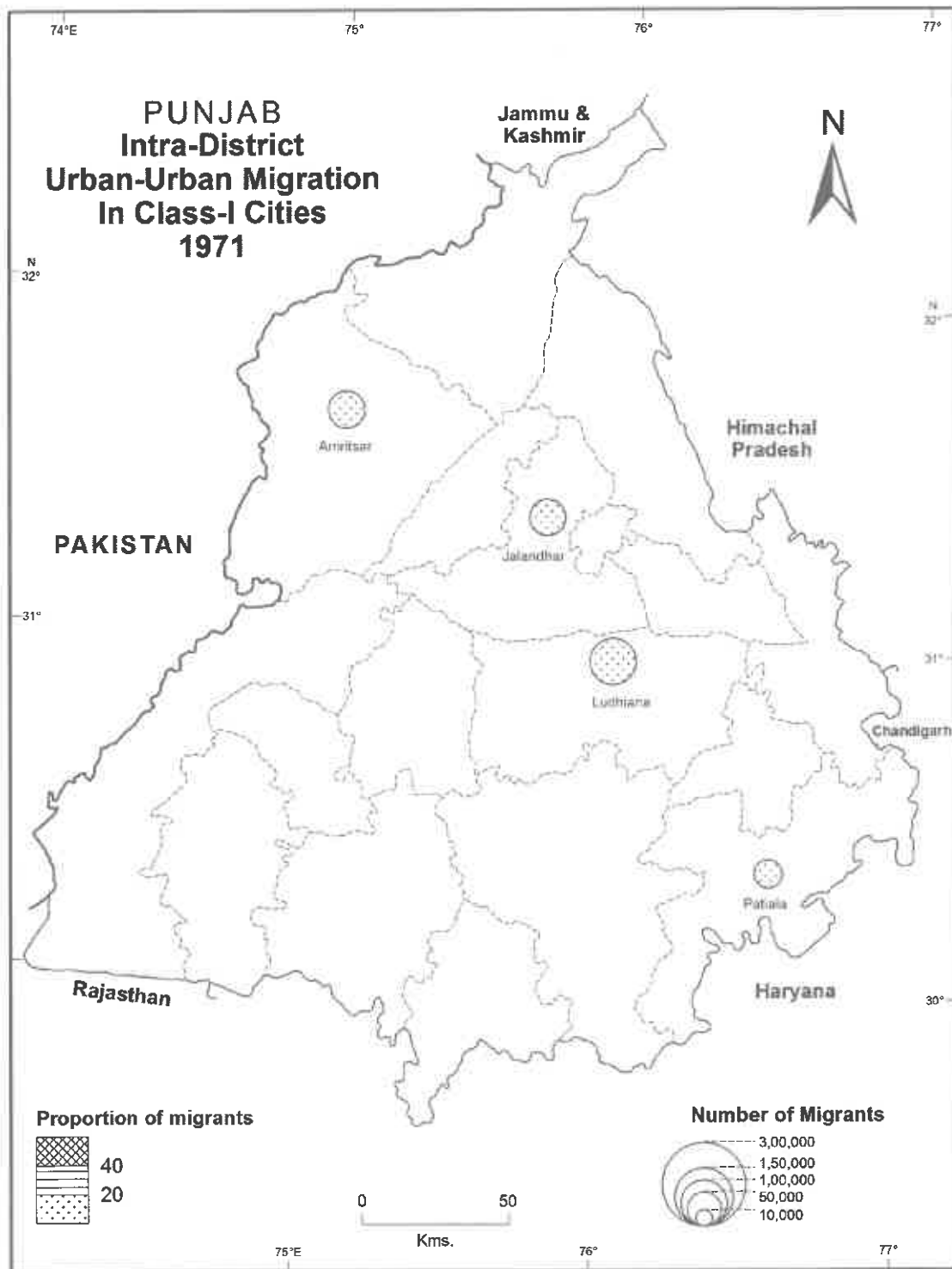3. Inter-State Urban-Urban Migration

1. INTRA-DISTRICT URBAN-URBAN MIGRATION

Intra-district migration refers to migration that happens to be within the jurisdiction of the district of enumeration. To analyse the spatio-temporal trends of intra-district urban-urban migration in Class I cities of Punjab, the data demonstrated in Table 3 has been shown in Maps 2, 3 and 4 for the years 1971, 1991 and 2001 respectively.
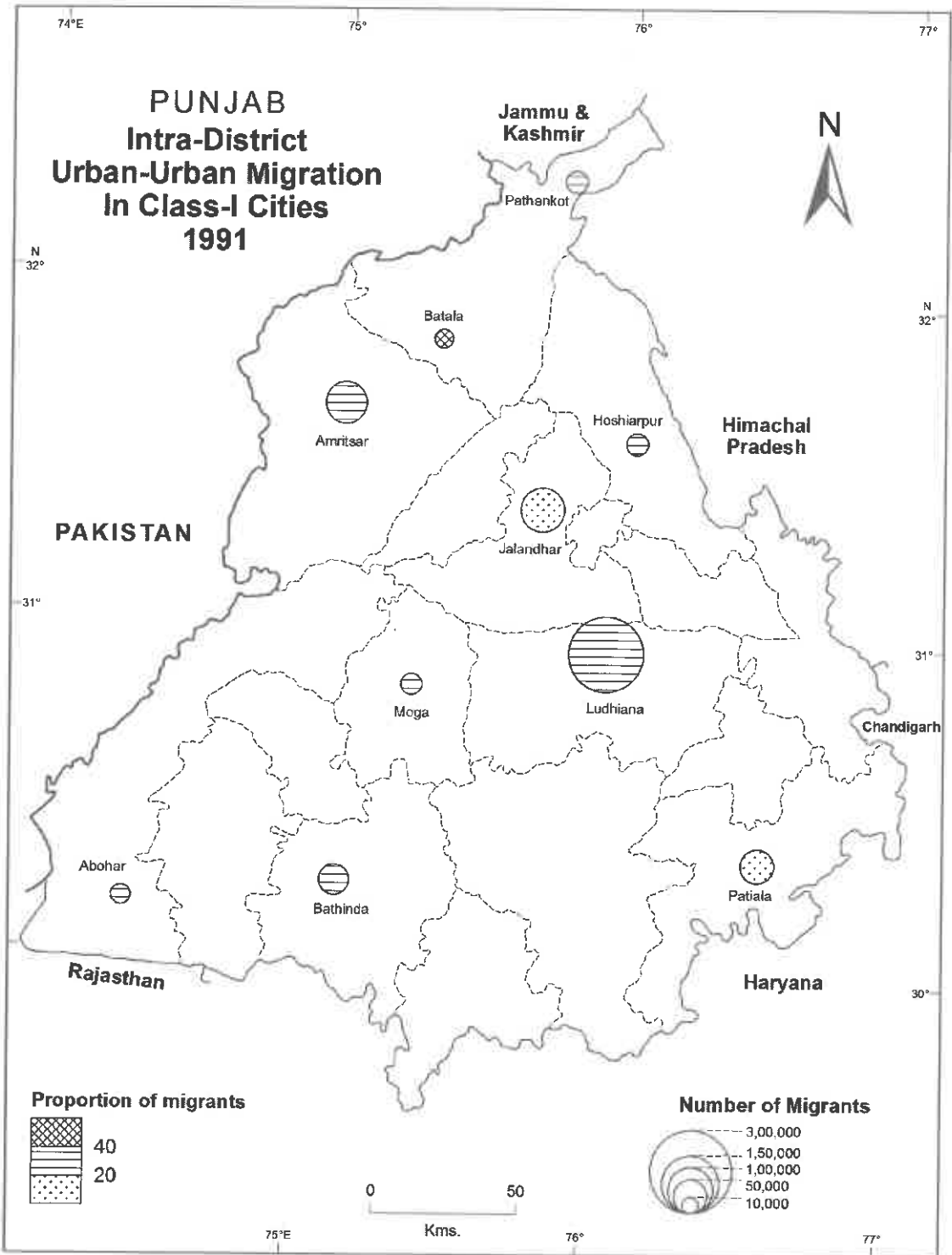
On the basis of proportion of urban-urban migrants undertaking intra-district migration, the

Class I Cities have been categorised as : (a) Cities with a relatively high proportion of intra-district urban–urban migration (above 40 per cent), (b) Cities with moderate proportion of intra-district urban–urban migration (20 per cent- 40 per cent) and (c) Cities with a relatively low proportion of intra-district urban–urban migration (below 20 per cent).

(a) *Cities with a relatively high proportion of intra-district urban-urban migration (above 40 per cent):* Due to low level of urbanisation and a small number of urban areas in Punjab, none of the four Class I cities reported a high intra- district urban-urban migration in 1971. In 1991 Batala, an important industrial city of Gurdaspur district which had gained the status of Class I city in 1981, registered 60.87 per cent of its urban-urban migrants from within the district of enumeration. But after 1990's, Batala witnessed a decline of industry resulting in the loss of its rank in the high category. In 2001 again, only one city Khanna, recorded 50.45 per cent urban-urban migrants from the district of enumeration. This could be associated with its location in Ludhiana district, which is a highly urbanised district of Punjab and Khanna city serves as an absorption valve for the heavily populated Ludhiana city.

(b) *Cities with a moderate proportion of intra-district urban-urban migration (20 per cent – 40 per cent):* In 1971, none of the four Class I cities came in this category. However, in 1991, seven out of total ten cities viz. Hoshiarpur, Amritsar, Bathinda, Pathankot, Moga, Abohar, and Ludhiana, in the same order recorded a moderate intra-district urban-urban migration and formed a linear zone running from north eastern to south-western Punjab. The proportion of intra-district urban-urban migration increased in 2001 and the cities of Ludhiana, Bathinda, Hoshiarpur, Abohar, S.A.S Nagar and Malerkotla were reported in the moderate category. The pattern in the map shows that all these cities are prominent urban centres of their respective districts.

(c) *Cities with a relatively low proportion of*

PUNJAB
Intra-District
Urban-Urban Migration
In Class-I Cities
1971

Jammu &
Kashmir

N

Himachal
Pradesh

PAKISTAN

Amritsar

Jalandhar

Ludhiana

Chandigarh

Patiala

Rajasthan

Haryana

Proportion of migrants

40
20

Number of Migrants

3,00,000
1,50,000
1,00,000
50,000
10,000

0   50

Kms.

Map 2

PUNJAB
**Intra-District
Urban-Urban Migration
In Class-I Cities
1991**

Jammu &
Kashmir

Pathankot

N

Batala

Amritsar

Hoshiarpur

Himachal
Pradesh

PAKISTAN

Jalandhar

Moga

Ludhiana

Chandigarh

Abohar

Bathinda

Patiala

Rajasthan

Haryana

Proportion of migrants

40
20

Number of Migrants

3,00,000
1,50,000
1,00,000
50,000
10,000

0   50

Kms.

Map 3

PUNJAB
Intra-District
Urban-Urban Migration
In Class-I Cities
2001

Jammu &
Kashmir

Pathankot

N

Batala

Amritsar

Hoshiarpur

Himachal
Pradesh

PAKISTAN

Jalandhar   Phagwara

Moga

Ludhiana

SAS Nagar

Chandi-
garh

Malerkotla

Abohar

Bathinda

Patiala

Rajasthan

Haryana

Proportion of migrants

40
20

Number of Migrants

3,00,000
1,50,000
1,00,000
50,000
10,000

0   50

Kms.

Map 4

intra-district urban-urban migration (below 20 per cent): The Census of 1971 reported only 4 Class I cities in the state of Punjab *viz.* Ludhiana, Amritsar, Jalandhar and Patiala. All the four cities registered less than 20 per cent intra-district migration. In 1991, this category included only two cities of Jalandhar and Patiala. The city of S.A.S Nagar (Mohali) in 2001 was the only city with 19.45 per cent of intra-district urban-urban migrants while the cities of Amritsar, Jalandhar, Patiala, Pathankot, Batala, Moga and Phagwara reported negligible proportion of intra-district urban-urban migrants. The patterns clearly reflect that low intra-district migration is a characteristic of those Class I cities which are located either on the district borders (Jalandhar, Ludhiana, Amritsar, Batala and Moga) or state borders (Pathankot, Patiala and S.A.S. Nagar) which attract more inter-district or inter-state migration.
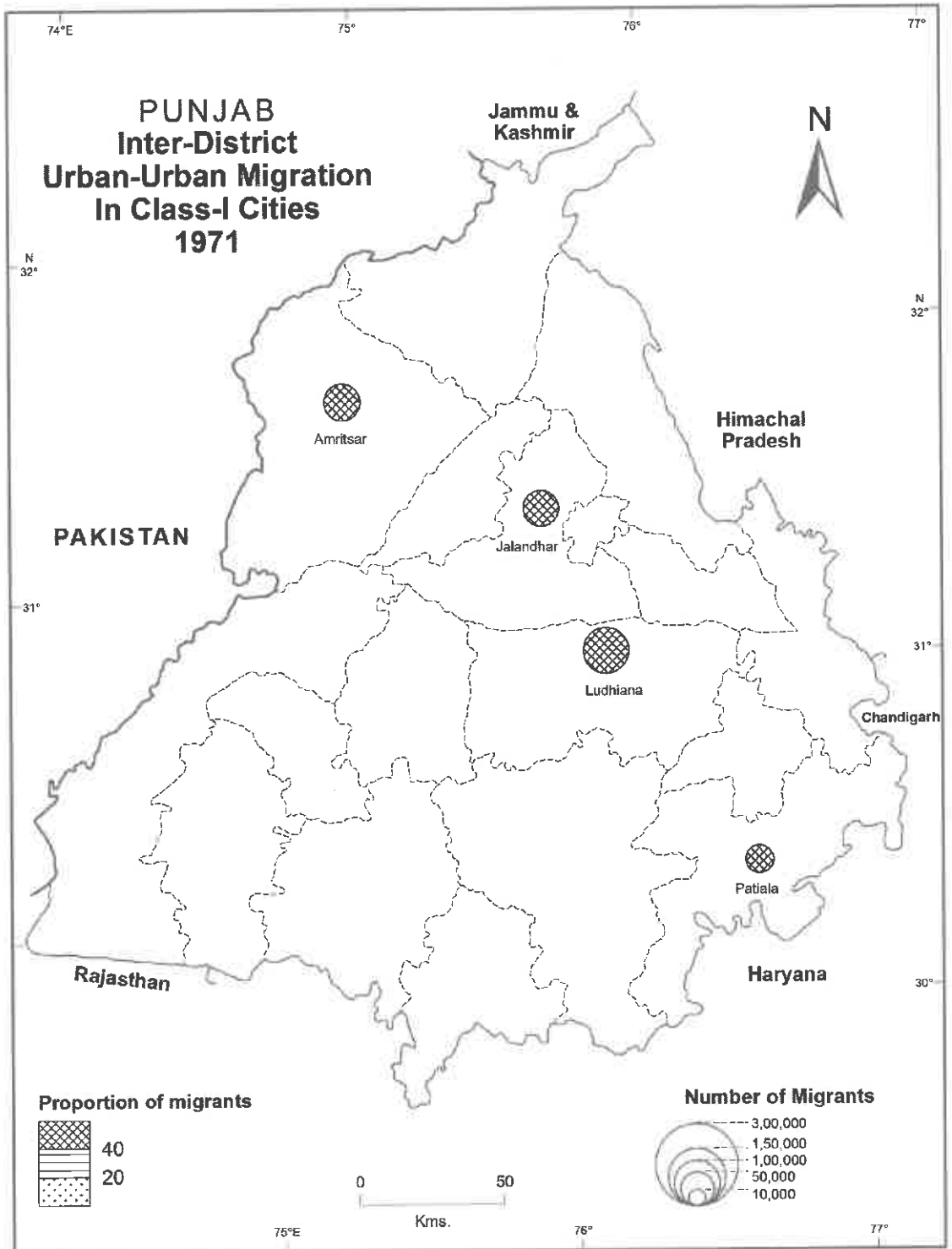
2. INTER-DISTRICT URBAN-URBAN MIGRATION

Inter-district migration is the medium distance migration. In this stream of migration, a migrant moves within the state, but outside the district of enumeration. This stream of migration becomes an indicator of intra-urban differences in a state. In Punjab, inter-district migration holds an important place. The spatio-temporal patterns of inter-district migration based on data demonstrated in Table 3 have been presented through Maps 5, 6 and 7 for 1971, 1991 and 2001 respectively. In order to understand the spatial patterns of inter-district urban-urban migration, the Class I cities of Punjab have been categorised as: (a) Cities with a relatively high proportion of inter-district urban–urban migration (above 40 per cent), (b) Cities with moderate proportion of inter-district urban–urban migration (20 per cent- 40 per cent), (c) Cities with a relatively low proportion of inter-district urban–urban migration (below 20 per cent).
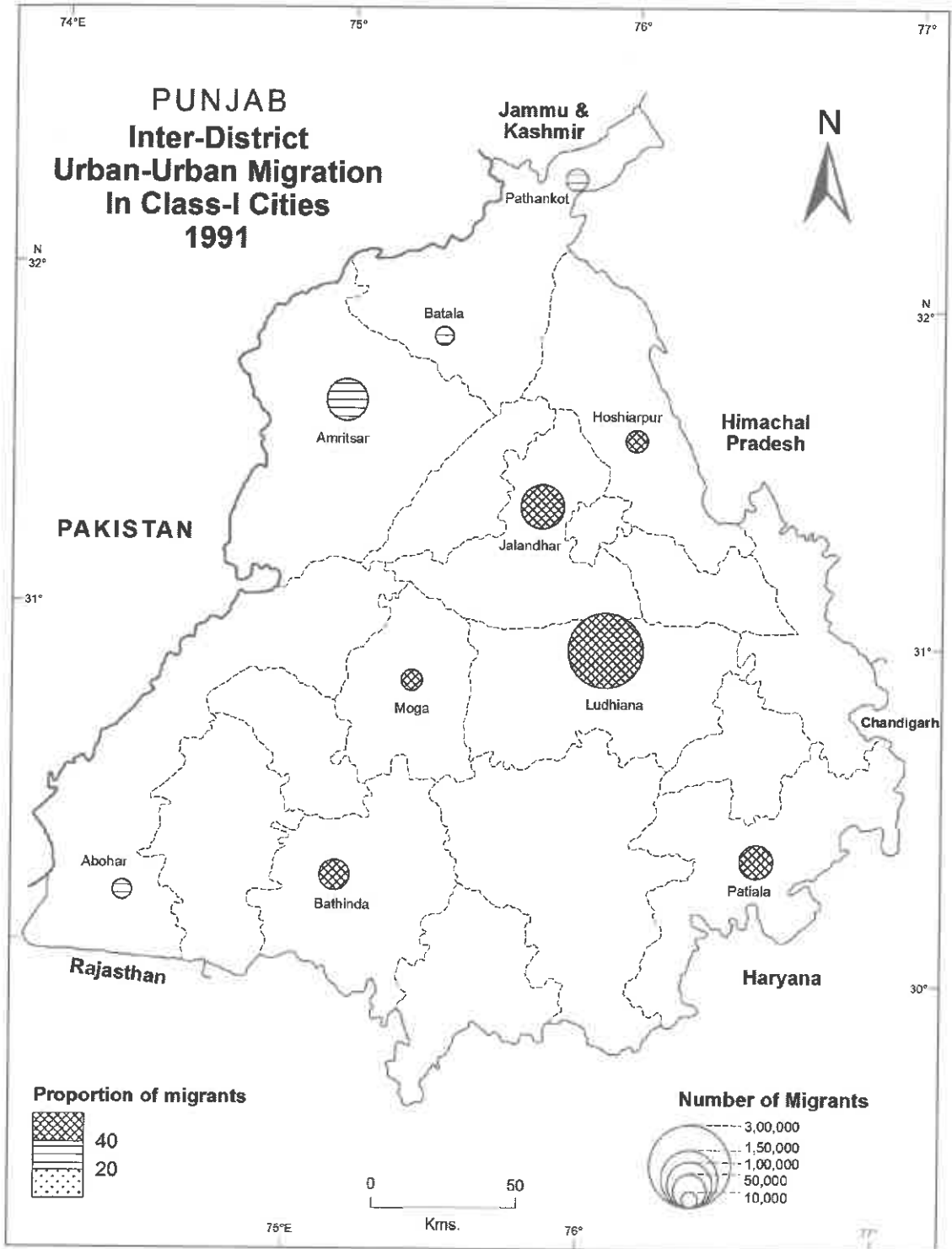
(a) *Cities with a relatively high proportion of inter-district urban-urban migration (above*

40 per cent): All the four Class I cities in the state in 1971 registered more than 40 per cent inter-district urban-urban migration which was highest in Jalandhar (52.46 per cent) and lowest in Patiala (40.84 per cent). The development in Punjab came to a standstill in 1980s, because of socio-political disturbances in the state. The uncertainty prevalent in the state restricted the free movement of population and inter-district urban-urban migration reported a decline. The situation changed by 1991, due to which, the cities of Ludhiana, Jalandhar, Patiala, Hoshiarpur, Bathinda and Moga reported more than 40 per cent of inter-district urban-urban migrants. All these Class I cities lie in that zone of Punjab which experienced a moderate to low impact of social disturbance during the decade of 1980s. Improvement in the social conditions brought further changes and inter-district urban-urban stream of migration again got momentum. In 2001, out of the fourteen Class I cities seven, namely Amritsar, Jalandhar, Patiala, Hoshiarpur, Phagwara, Malerkotla, Batala and Moga reported relatively high proportion of inter-district urban-urban migration. It is important to note that the cities of Batala, Phagwara and Moga are situated on the district boundaries due to which these cities recorded more than 70 per cent urban migrants from other districts of the state. The lowest proportion of urban-urban migrants (40.54 per cent) was recorded in Hoshiarpur.

(b) *Cities having moderate proportion of inter-district urban-urban migration (20 per cent – 40 per cent):* In 1971, urbanisation remained polarised in the Class I Cities of Punjab and not a single city appeared in the moderate category. In 1991, the cities of Amritsar, Pathankot, Batala and Abohar received moderate proportion of inter-district urban-urban migrants. It is notable that Amritsar, Batala and Pathankot are located in *Majha* region, which experienced severe wrath of disturbed socio-political conditions during '80s and '90s, but due to the city status, three of these Class I Cities managed to record 20-40

Map 5

PUNJAB
Inter-District
Urban-Urban Migration
In Class-I Cities
1991

Jammu &
Kashmir

Pathankot

N

N
32°

Batala

Amritsar

Hoshiarpur

Himachal
Pradesh

PAKISTAN

Jalandhar

31°

Moga

Ludhiana

31°

Chandigarh

Abohar

Bathinda

Patiala

Rajasthan

Haryana

30°

Proportion of migrants

40
20

Number of Migrants

3,00,000
1,50,000
1,00,000
50,000
10,000

0   50

75°E   Kms.   76°   77°

Map 6

Map 7
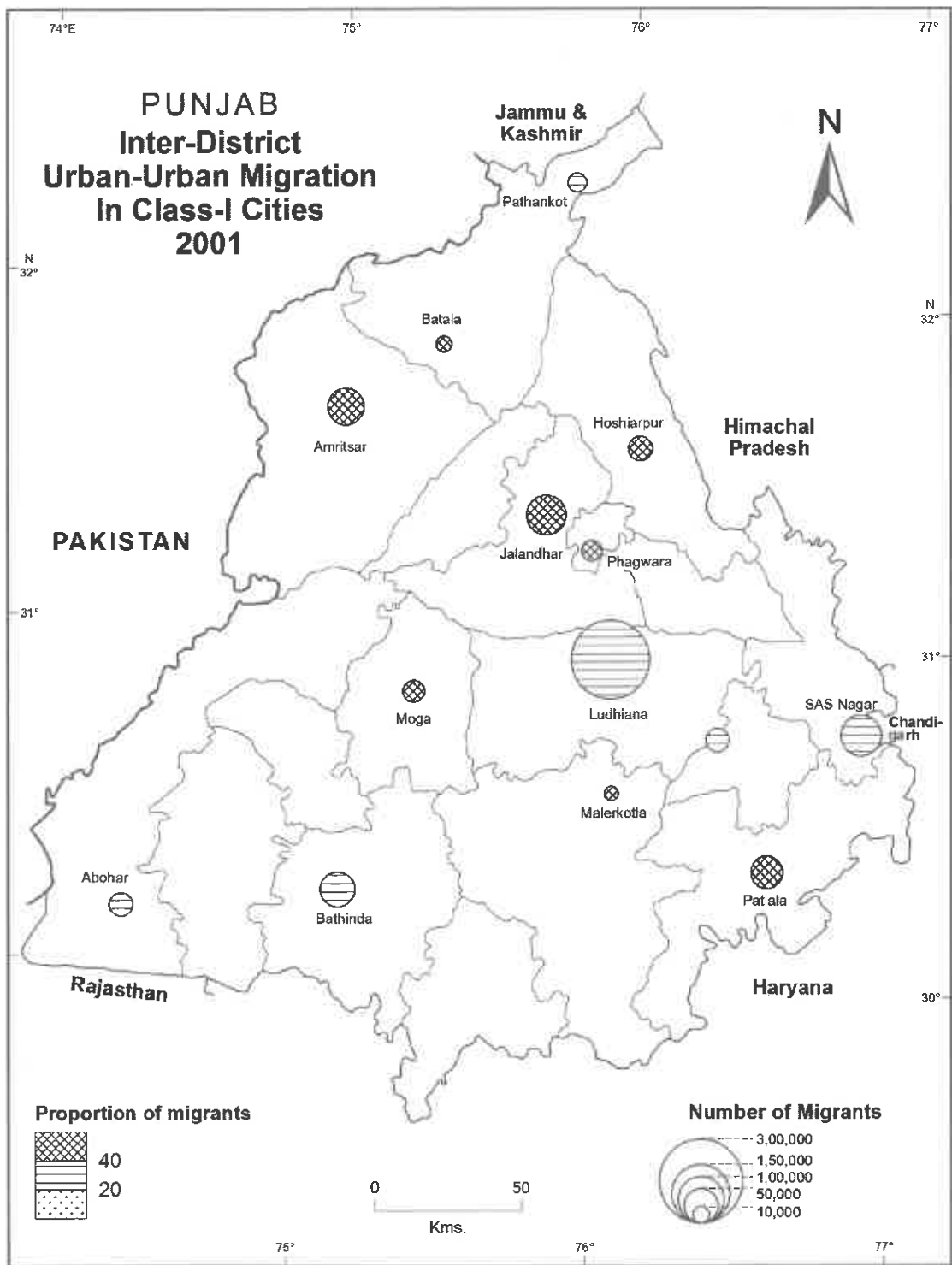
per cent of urban-urban migrants. By the year 2001, the cities of Bathinda, Pathankot, Abohar, Ludhiana, Khanna and S.A.S Nagar (Mohali) reported moderate proportion of inter-district urban-urban migrants. It was because the cities of Pathankot, Abohar and S.A.S. Nagar (Mohali) attracted more inter-state urban-urban migrants and the cities of Ludhiana, Bathinda and Khanna recorded more intra-district than inter-district urban-urban migration.

(c) *Cities with a relatively low proportion of inter-district urban-urban migration (below 20 per cent):* Inter-district urban-urban migration seems to have remained restricted to the smaller urban centres because of which none of the Class I cities of Punjab reported less than 20 per cent inter-district migration in 1971, 1991 and 2001.

3. INTER-STATE URBAN-URBAN MIGRATION

India is a country of high diversity and urbanisation is one of the variables which shows wide inter as well as intra-state urban disparities. The location of urban areas in the vast and fertile plains of India, has given rise to large scale inter-state movement of population. This inter-state urban disparity results in movement of people from less developed states to more developed ones. Punjab has a long urban history of migration but nowadays due to its high level of development, the state attracts a good score of migrants from its neigbouring as well as far off states. In the whole scenario of urbanisation, the Class I cities of Punjab hold an important position because more than half of the state's urban population has lived in these cities since 1991. The spatio-temporal patterns of urban-urban migration in Class I cities of Punjab can be observed from Table 3 and Maps 8, 9 and 10 for 1971, 1991 and 2001 respectively. Since the number of the Class I cities in Punjab has grown considerably after 1971, the share of inter-state urban-urban migrants has also witnessed changes. In order to understand the spatial patterns of inter-state urban-urban migration from 1971 to 2001, the Class I cities of Punjab have been

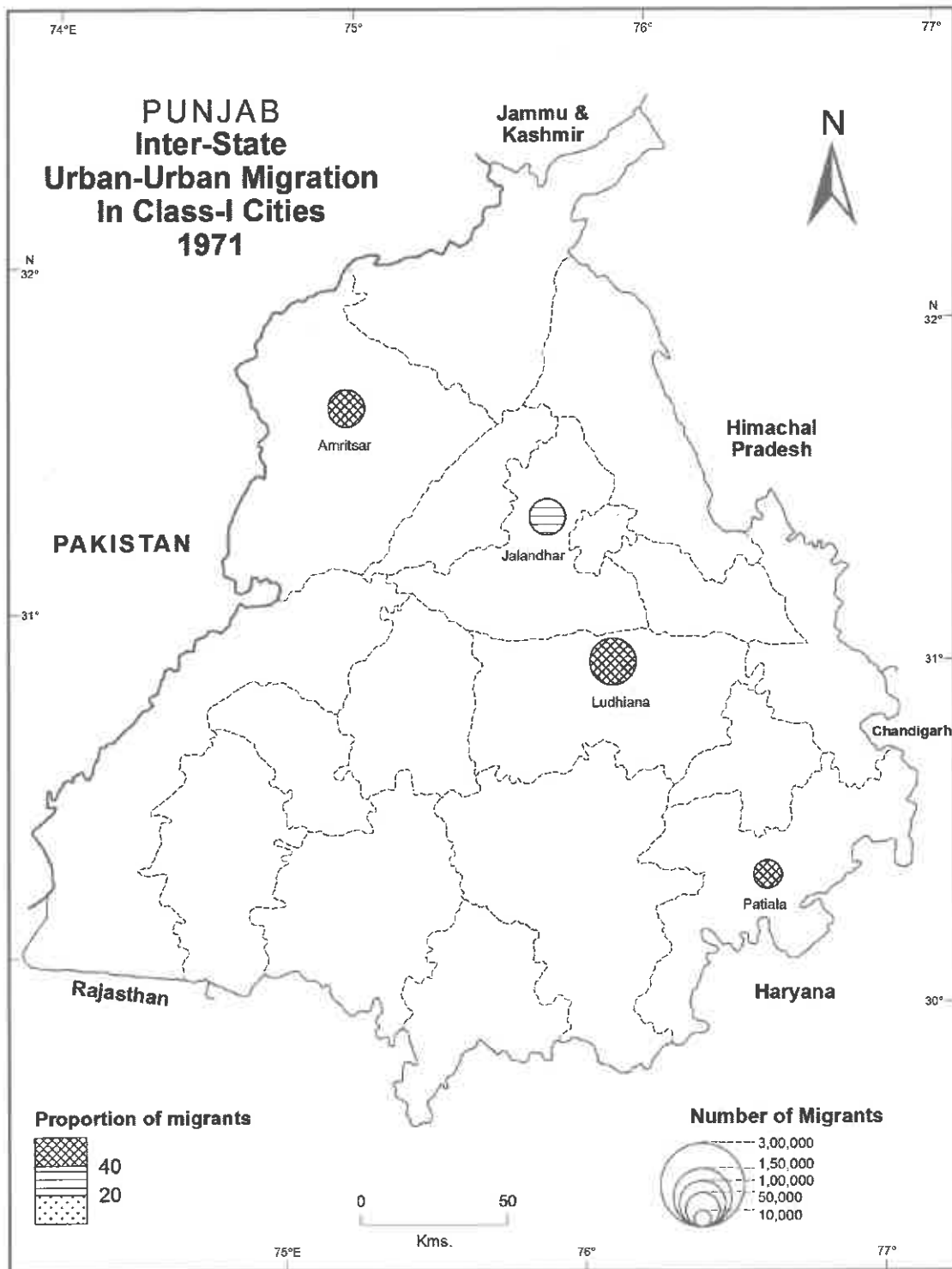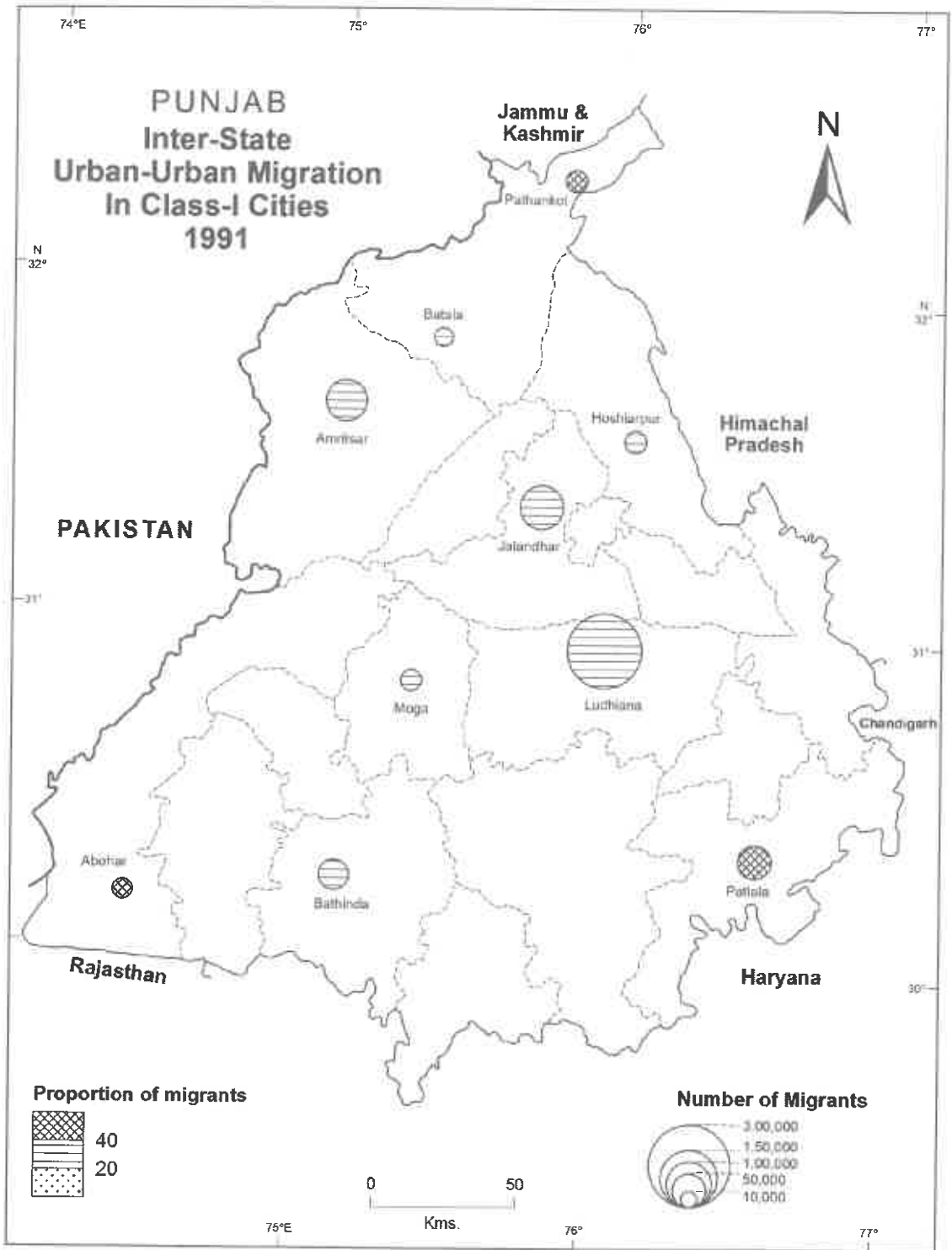categorised as: (a) Cities with a relatively high proportion of inter-state urban–urban migration (above 40 per cent), (b) Cities with moderate proportion of inter-state urban–urban migration (20 per cent- 40 per cent), (c) Cities with a relatively low proportion of inter-state urban–urban migration (below 20 per cent).
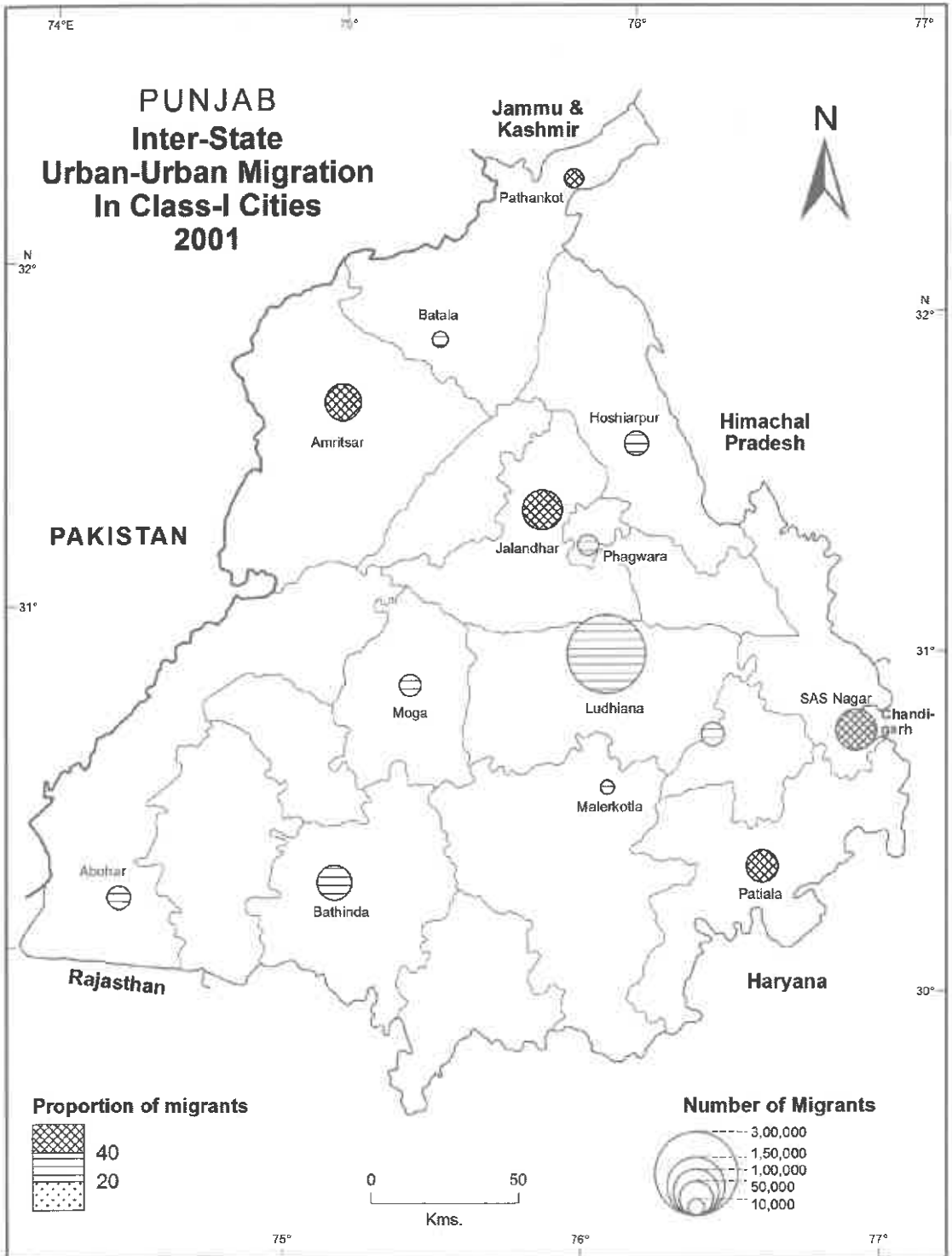
(a) *Cities with a relatively high proportion of inter-state urban-urban migration (above 40 per cent):* Ludhiana and Amritsar emerged as the big urban centres of the state in 1971. The socio-economic importance of these cities created a plethora of opportunities and both of these cities recorded more than 40 per cent inter-state urban-urban migrants. Patiala also reported in the same category in 1971. The high proportion of inter-state urban migrants in Patiala has been because of its location near the inter-state border. The only city which did not cross this threshold was Jalandhar. In 1991 the number of Class I cities in the state increased to ten out of which three large cities, Ludhiana, Amritsar and Jalandhar witnessed a decline in the share of inter-state urban-urban migrants. The fourth city, Patiala, however registered an increase. Two new cities i.e. Pathankot and Abohar also recorded more than 40 per cent of urban-urban migants. It can be observed from Map 9 that all these Class I cities are located close to the state border which played an important role in attracting a relatively high proportion of urban migrants from other states of India. It becomes clear from Table 3 and Map 10 that in the year 2001, out of the fourteen cities five, namely Amritsar, Jalandhar, Patiala, Pathankot and S.A.S Nagar (Mohali) received more than 40 per cent inter-state urban-urban migrants. This was a result of an improvement in the means of transportation and communication that facilitated easy movement of people. The spatial pattern reveals that the cities of Patiala, Pathankot, and S.A.S Nagar (Mohali) are located near the state boundaries of Punjab and attract large number of migrants from urban centres of the neighbouring states. The other two cities, *viz.*, Amritsar and Jalandhar in

PUNJAB
Inter-State
Urban-Urban Migration
In Class-I Cities
1971

Map 8

PUNJAB
Inter-State
Urban-Urban Migration
In Class-I Cities
1991

Map 9

Map 10

this category benefitted from their regional importance as well as nearness to less urbanised states of the country i.e. Jammu & Kashmir and Himachal Pradesh.

(b) *Cities with a moderate proportion of inter-state urban-urban migration (20 per cent- 40 per cent):* Only one out of the four cities in the state in 1971, Jalandhar, recorded a moderate (38.36 per cent) proportion of inter-state urban-urban migrants in 1971. In 1991 six out of ten Class I cities, namely Ludhiana, Amritsar, Jalandhar, Bathinda, Hoshiapur and Moga in the same order reported a moderate proportion, ranging from 38.39 per cent in Ludhiana to 22.66 per cent in Moga, of urban-urban migrants from other states of India. In 2001 nine out of the total fourteen cities *viz.*, Abohar, Ludhiana, Malerkotla, Phagwara, Batala, Hoshiarpur, Bathinda and Moga with values ranging from 37.84 per cent in Abohar to 23.04 per cent in Moga comprised this category. Ludhiana and Bathinda witnessed a decline in their share, while the cities of Hoshiarpur and Moga recorded a marginal improvement in their proportion of inter-state urban-urban migrants from 1991 to 2001. Khanna, Phagwara and Malerkotla which became Class I city in 2001 only, managed to gain more than 20 per cent urban migrants from the other states. Ironically, the inter-state urban-urban migration has been losing its significance since 1971, but the regional importance of the Class I cities of Punjab especially in the entire north-western region of India, has helped the cities to become home to a considerable proportion of inter-state urban migrants.

(c) *Cities with a relatively low proportion of inter-state urban-urban migration (below 20 per cent):* Owing to their socio-economic dynamism, the Class I Cities of Punjab have always remained a preferred destination for migrants coming from urban areas of other states of the country. Due to this reason, none of the Class I cities in 1971 as well as in 2001, reported less than 20 per cent inter-state urban-urban migrants. Only in 1991 Batala city, with

its location between the cities of Pathankot and Amritsar reported 11.11 per cent of inter-state urban-urban migrants. The very low proportion of inter-state urban-urban migrants in Batala can be attributed to its location near Pathankot city which lies in the same district and has an inter-state border location. This factor helped Pathankot in absorbing a larger proportion of urban-urban migrants coming from other states while the proportion of inter-state urban-urban migrants got affected in Batala.

Inter-State Urban-Urban Migration: A State Wise Break-Up

The Class I cities of Punjab have always attracted a significant proportion of migrants from the urban areas of other states, particularly from Uttar Pradesh, Haryana, Delhi, and Himachal Pradesh since 1971 (Table 4). However, the inter-state urban-urban migration from these states to Class I cities of Punjab has declined since 1971. It is because of the development of National Capital Region and emergence of metropolitan cities in the neighbouring states which changed the whole urbanisation scenario of the country. As a result, majority of the urban migrants moved either to the metropolitan cities or to the other urban centres in search of employment and good standard of living. The state-wise break up shows that a high proportion of urban-urban migrants coming to the Class I Cities of Punjab have reported their last residence in the states of Uttar Pradesh and Haryana. Although the proportion of inter-state urban-urban migrants from both these states declined during the period of 1971-2001, yet Uttar Pradesh with a poor rate of urbanisation and Haryana with its neighbourhood location, continue to send a significant proportion of migrants to Punjab in general and the Class I cities in particular in 2001. The socio-cultural association of Punjab with Delhi also attracted significant proportion of migrants from the national capital, however, its overall share of inter-state urban-urban migrants in the Class I Cities of Punjab declined during this period.

Table-4
Punjab : Proportion of Inter-State Urban-Urban Migrants to Class I Cities by States
(1971 and 2001)

Name of the State/UT	Year	
	1971	2001
Uttar Pradesh	29.81	22.18
Haryana	21.36	16.22
Chandigarh	4.22	12.45
Delhi	14.43	10.55
Himachal Pradesh	10.50	7.04
Bihar	1.08	6.87
Rajasthan	4.58	5.88
Jammu & Kashmir	4.91	3.50
Others	9.11	15.31

Source: Migration Tables of 1971 and 2001.

It can be observed from Table 4 that the proportion of migrants from Chandigarh has increased three times of its share from 1971 to 2001. It was primarily because of the emergence of its adjacent city, S.A.S. Nagar (Mohali) as a Class I city in 2001. Due to high cost of living and dense concentration of population in Chandigarh, a large number of people working in the Union Territory of Chandigarh preferred to make Mohali city as their residence. The Government of Punjab also developed S.A.S. Nagar (Mohali) on the lines of Chandigarh, which helped the city in becoming a migrant heaven. In the case of other states, the inter-state urban-urban migration from Bihar and Rajasthan has increased while Himachal Pradesh and Jammu & Kashmir witnessed a decline in their share of inter-state urban-urban migration in Class I cities of Punjab.

Conclusion

It can be concluded from the above discussion that urban-urban migration is associated with the high level of urbanisation and development in the state. All the Class I cities of the state have attracted a significant number of urban-urban migrants in 1971 and 1991 but by 2001, urban-urban migration in the Class I cities has declined because of an increase in the number

of the Class I cities and other urban centres. The cities of Ludhiana, Amritsar, Jalandhar and Patiala have always attracted a large number of migrants from other urban areas due to their administrative, social and economic significance. Other than these larger Class I cities, the year 2001 witnessed inclusion of Bathinda and S.A.S. Nagar in the list of the Class I cities having a large volume of migrants having urban background. However, it is pertinent to note that at the individual city level, the proportion of urban-urban migrants in the total migrant population has declined. This decline is a result of an increase in the rural-urban migration and emergence of new Class I cities in each subsequent decade. In terms of distance, inter-district urban-urban migration remains the most important stream of migration because of urban differentials present within the state. Intra-district urban-urban migration gained importance only in those Class I cities which shared the same district with a large Class I city, one such example is Khanna city. The inter-state urban-urban migration became a characteristic feature of those Class I cities which share border with other states e.g. Pathankot and S.A.S Nagar (Mohali). The Class I cities of Punjab also attracted a large proportion of inter-state urban-urban migration from poorly urbanised states of Uttar Pradesh, Himachal Pradesh and Jammu & Kashmir. Besides this, a

significant proportion of urban migrants comes from Haryana and gets settled in the Class I cities of Punjab. Both Haryana and Punjab share a long border with each other and thus validate the presence of distance decay phenomenon of urban-urban migration in the Class I cities of Punjab.

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PEOPLING OF ANDAMAN AND NICOBAR ISLANDS

PUNAM TRIPATHI
Siliguri, India

Introduction

Andaman and Nicobar Islands (henceforth A&N Islands) are a union territory of India. They lie towards east of the Indian mainland in the Bay of Bengal, between 6°N to 14°N latitudes and 92°E to 94°E longitudes (Fig 1). The archipelago consists of 572 islands and rocky outcrops which appear like emerald beads strewn in the blue sea. The average distance of A&N Islands from the mainland India is 1200 kilometres. The A&N Islands consists of two distinct archipelagos – Andaman Islands and the Nicobar Islands. Andaman Islands consist of 550 islands, and account for 78 percent of the total geographical area of 8249 sq km, while Nicobar Islands account for the remaining 22 islands and 22 percent of the total geographical area. Of the total 572 islands, only 37 are inhabited, 26 in Andaman and 11 in Nicobar.

The population of A&N Islands is so diverse that it is often referred to as "mini-India". There is a juxtaposition of the aboriginal tribal population who are hunter and gatherers with technologically advanced non-tribal population. The former have occupied the islands from time immemorial while the latter set foot on these islands in the 18th century. Thus, the population composition of A&N Islands is unique and merits further enquiry. When and how did these islands, came to be peopled? What has been the sequential occupance of the A&N Islands? When did these islands see a rapid growth of population? What is the population composition of A&N Islands? What has been the impact of the peopling of A&N Islands?

Population of A&N Islands

Total population of A&N Islands is 380,581

Table-1
Tribal Population in A&N Islands (2011)

Tribe	Population (in 2011)	Per cent to total tribe population	Per cent to total population of A&N
Tribes of Andaman Islands			
Sentinelese (estimated)	15	0.05	0.00
Onges	101	0.36	0.03
Jarawas	380	1.36	0.10
Great Andamanese	44	0.16	0.01
Tribes of Nicobar Islands			
Shompens	229	0.83	0.06
Nicobarese	27168	97.25	7.14
Total	**27937**	**100**	**7.34**

Source : Based on Census of India (2011b)

Fig 1   The A&N Islands, 2011
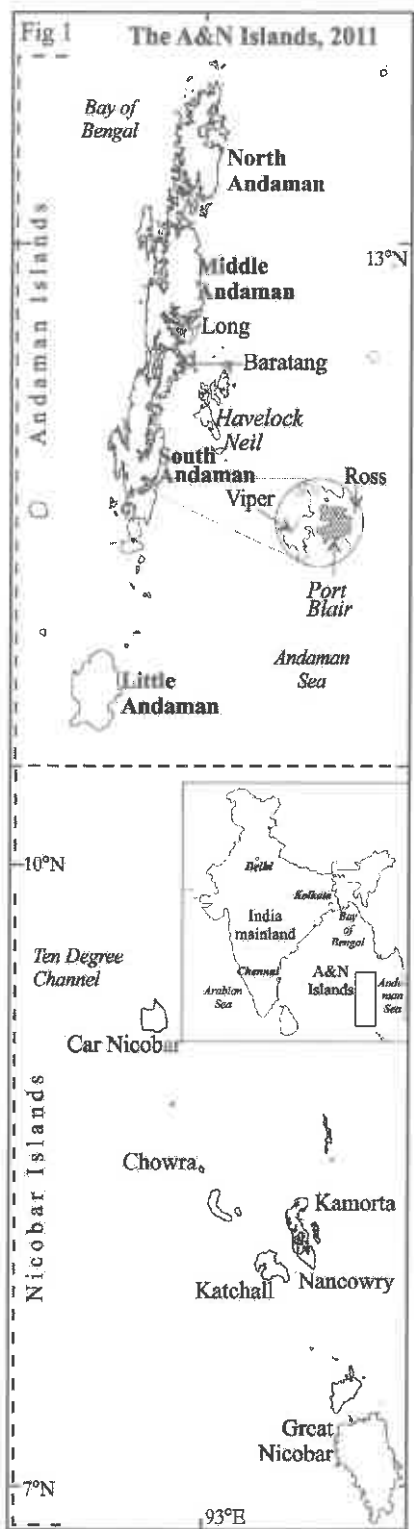
(Census of India, 2011a). Andaman Islands account for 90 percent while Nicobar Islands contribute the remaining 10 percent of the total population. The population of A&N Islands consists of two distinctly different groups – the aboriginal tribal population and the non-tribal population. The aboriginal tribal population constitute 7.34 percent of the total population (Census of India, 2011b). There are in all six aboriginal tribes, four in Andaman Islands and two in Nicobar Islands (Table 1). The Nicobarese, account for 97.2 percent of the total tribal population of A&N Islands and the rest of the five tribes account for the remaining 2.8 percent. The tribes of A&N Islands are scheduled tribes.

The non-tribal population accounts for the remaining 92.66 percent of the total population. The non-tribal population came to A&N Islands after the British set up the Penal Colony at Port Blair in Andaman Islands in 1858. Peopling of both Andaman Islands and the Nicobar Islands has differed, but in both the aboriginal tribal population has been marginalized and the non-tribal population has become the dominant populace over the last 159 years.

Peopling of A&N Islands

The peopling of A&N Islands took place in three distinct periods and the population has grown ever since. Each of these periods can be differentiated on the basis of the motive of peopling and the population that came to occupy the islands. First, was the pre-colonial period (before 1858); second, the colonial period (1858–1947) and third the post-independence period (1947 – present). The least known among these is the pre-colonial period.

PRE-COLONIAL PERIOD (BEFORE 1858)

The term 'pre-colonial' refers to the period before the establishment of the Penal Colony in 1858. Very little was known about the A&N Islands until the British occupied them in 1858. The earliest reference to Andaman Islands is in Ptolemy's world map prepared in the second century AD. Apart from vague references with incorrect information about these islands in the travelogues of the Arab, European and Chinese travellers, there is no documented history before the arrival of the British. Throughout history the Andaman Islands and the Nicobar Islands have been referred to interchangeably. It was only after trading was established, with the Nicobarese, it became evident that the tribes of Andaman Islands were hostile, while that of Nicobar Islands were friendly.

Tribes of Andaman Islands

The earliest reference to the Andaman Islands is found in the writings of Claudius Prolemaeus also known as Ptolemy in the Second Century AD. He has mentioned a chain of islands in the Bay of Bengal from Cape Negrais to Sumatra. He calls the islands "Insulae Bonae Fortunae", and that these islands "produce quantities of shells, and the inhabitants go naked and are called Agmatae" (cited in Portman, 1899, p. 19). *'Agmatae'* got converted into *'Agdaman'*, *'Angaman'*, and ultimately *'Andaman'* by about 9th century A.D. Another important reference to A&N Islands is found in the writings of the Chinese traveller, I-Tsing. He referred to Andaman Islands as *'Andaban'*. The inhabitants were described as dog faced with tails who were fierce cannibals. This myth was prevalent till the time the British occupied the Andaman Islands as the Andamanese were hostile to all ships that harboured on its coast. According to W. E. Maxwell, a well-known Malay (Malaysia) scholar, the Malays had known and enslaved the Andamanese from time immemorial. The Malays called the Andamanese as the *Handumans*, after Hanuman from the epic Ramayana, and consequently the islands came to be known as *Handuman* and then got modified to Andaman (Portman, 1899).

Presently there are four aboriginal tribes that inhabit the Andaman Islands – the Sentinelese, Onges, Jarawas and Great Andamanese. Prior to the arrival of British, the Great Andamanese dominated the Andaman Islands. When and how did the tribal population arrived in A&N Islands is debateable, but based on the studies of kitchen-middens[1] excavated in Andaman Islands, Cipriani (1955) concluded that Andamanese have occupied

the Islands for the last 5000 – 6000 years. As the Andamanese bear resemblance to the Negritos of Philippines, it has been proposed that the probable route taken by the Andamanese was that from Philippines they moved west into Indonesia, Malaysia to Myanmar and then to Andaman Islands.

Portman (1899) has proposed that Andamanese arrived at the shores of Little Andaman Island[2] first. Later moved north into the Great Andaman Islands and spread to different parts. This group came to be known as Great Andamanese by the British, while the former were designated as the Onge-Jarawa group. With time, these two groups lost all contact with each other and evolved into two distinct groups with different language, hunting equipment, crafts and canoes, customs and rituals. Then at a later period, another group from Little Andaman moved north. They landed on the territory of the Great Andamanese and occupied the territory of the South Andaman Islands and came to be known as Jarawa (the term 'Jarawa' means 'the other' in the Great Andamanese language). Thus there are two major divisions among the Andamanese – the Great Andamanese Group and the second is the Onge-Jarawa group. When the British arrived in the islands in 1858, more than 22 sub-tribes of these two major groups occupied the entire Andaman Islands.

Tribes of Nicobar Islands

Reference to the Nicobar Islands has been more consistent than the Andaman Islands. Throughout history it has been known as 'the land of the naked people'. I-Tsing mentions Nicobar Islands as 'Yeng-to-Mang' meaning 'the land of the naked' and describes the transactions with the tribals of Nicobar Islands. The Arabs also called it 'Nagabalus' or 'Lankabalus'. Marco Polo called them 'Necuverum', Odoric named it 'Nicoveran' and later the Portugese called it the 'Nacabar' or the 'Nicubar'. In India, reference to the Nicobar Islands can be found in the Tanjore inscription of 1050 AD. It is mentioned as 'Timaillivu' or the "islands of impurity". The Chola king Rajendra I called it 'Nakkavaram' about 1125 AD when he sent a naval expedition across Bay of Bengal against Sailendras, the ruling dynasty of Malay

and neighbouring countries (Imperial Gazetteer of India, 1909; Dhingra, 2005; Singh, 2003).

There are two aboriginal tribes in Nicobar Islands – The Shompens of Great Nicobar Island and the Nicobarese who are spread all across the other Nicobar Islands including parts of Great Nicobar Islands. Both have Mongoloid racial features. This indicates that they had come to the Nicobar Islands from Myanmar, Sumatra or Indo-China (Dhingra, 2005). Study of the Nicobari language confirmed their association with the South-East Asia. Their language belongs to the Mon-Khmer branch of the Austro-Asiatic family (Dhingra, 2005). It is hence proposed that the Nicobarese might have moved across Andaman Sea from Myanmar or Indonesia and settled on the Nicobar Islands. Nicobarese legends about their own history too, cite Myanmar as the place of origin. Since the tribes of Nicobar Islands have lived a life of partial seclusion for a long period, they adapted themselves to the local island environment and over time became culturally different from their ancestors from Myanmar, Sumatra or Indo-China. Their date of arrival is still unknown. It is speculated that they arrived at a much later period than the Andamanese.

Based on the legends and the customs of the Nicobarese it has been concluded that they arrived first on the shores of the Chowra Island (Justin, 1990). From here they moved to the north, east and south, thereby occupying all islands south of the Ten Degree Channel. This channel separates Andaman Islands from the Nicobar Islands. The Nicobarese never crossed the Ten Degree Channel before the colonial period. Perhaps, they did not have the technology, or maybe, the group who ventured to cross, did not come back and might have been killed by the Andamanese. So, throughout the pre-colonial history, there was no contact between the Andamanese and the Nicobarese.

Before the arrival of the British, the Andaman Islands were inhabited by the Andamanese while the Nicobarese dominated the Nicobar Islands. With the increase in world trade, and the discovery of the route around Cape of Good Hope, the Strait of Malacca became an

important trade route. The isolation of the Nicobar Islands ended when they became the halting point of the mariners voyaging from the different Indian ports namely Tamralipta (Bengal), Palura (Ganjam, Odisha) and other ports near Masulipattam from 10th century onwards. It was after the 15th century that a more accurate account becames available. When the British expanded territorial control over Indian sub-continent, the A&N Islands also came under the purview of colonization. Colonization of A&N Islands not only affected the history of these islands, but also changed its population composition.

COLONIAL PERIOD (1858–1947)

The British set up the Penal Colony in Andaman Islands at Port Blair in 1858. With this began the colonial phase of the peopling of A&N Islands. This was not the first time when colonists occupied these islands. Before 1858, many futile attempts to colonize the A&N Islands were made by several European countries (Table 2). France, Austria and Denmark attempted to colonize the Nicobar Islands, while the British in 1789 made an attempt to colonize the Andaman Islands. However, all these attempts failed because the colonists could not adapt to the island climate and

all these settlements were marred with sickness. Sustaining these settlements was such a daunting task that trading, exploiting resources, spreading Christianity and civilizing the population, all took a back seat. All these attempts can be safely termed only as "presence" since except for being European there was no feature that could be termed as colonial. Thus colonialism in the real sense began in 1858 with the Penal Colony set up by the British which made irreversible changes to the population dynamics of the A&N Islands.

The British brought in the first group of non-tribal population to the A&N Islands. After the failed attempt of colonizing A&N Islands in 1789, the British were contemplating of establishing a colony in the islands when the 1857 uprising broke out in India. As a form of severe punishment to discourage any such event in future, the idea of penal colony was proposed and Andaman Islands were chosen to set up the penal colony. Thus in the colonial period, the convicts formed the dominant group among the non-tribal population while the other group consisted of the non-convicts. The first group of convicts to arrive in Andaman Islands were from the United Province (present day Uttar Pradesh) and the Central Province (present day Madhya Pradesh). Later convicts were brought

Table-2
Colonization Attempts in the Pre-colonial Period

Country	No. of attempts	Beginning year	Closing year	Islands occupied	Duration of stay (in years)
France	4	1711	1715	Nicobar	3½
		1742	1742	Nicobar	<1
		1836	1836	Nicobar	<1
		1842	1842	Teressa and Kamorta Islands	<1
Austria	2	1778	1778	Nicobar	5 months
		1868	1868	Nicobar	<1
Denmark	4	1756	1757	Great Nicobar and Kamorta	1
		1768	1787	Nancowry	9
		1784	1787	Nancowry	3
		1845	1869	Great Nicobar and Little Nicobar	29*
England	1	1789	1796	South Andaman and North Andaman	7

*this was sporadic – there was no continuous presence
Source: Based on Portman (1899), Singh (2003) and Dhingra (2005)

from other parts of India also but majority were from Bengal and Punjab.

The Convicts

The convict population of Andaman Penal Colony was of two types – (a) rebels and (b) criminals. The 'rebels' were persons convicted for revolting against the British Raj. The rebels in A&N Islands can be classified into 3 groups on the basis of the time and nature of the rebellions. First were the rebels of 1857 Revolt. In March 1858 the first batch of 200 rebel convicts were sent to Andaman Islands. Their numbers increased with time. The second group consisted of the 'rebels' of the *Moplah* Rebellion of 1921-22. The *Moplahs* are the Muslim peasants of Malabar region of Kerala. They revolted against the oppressive Hindu landlords. As the British were protector of the landlords, the rebellion was seen as an act against the British Raj. The revolt spread through the late 19th and early 20th century and was at its peak in 1921. In the 1921 revolt, 2337 *Moplah* were killed, 1652 injured and 5995 captured while another 39348 surrendered (Ansari, 2008). The *Moplahs* were sentenced for life imprisonment and sent to Andaman Penal Colony. In 1922 a total of 1885 *Moplahs* including 714 women arrived in Andaman Islands and were settled around Port Blair. The third kind of 'rebels' were the freedom fighters. With the rise of nationalistic sentiments in late 19th and early 20th century, groups of revolutionaries began attacking the colonial regime, and with the partition of Bengal in 1905, these attacks increased. The British labelled them as 'terrorists' and transported them to the Cellular Jail that was constructed in 1905. The later became infamous as *'kalapani'*, the most dreaded form of punishment. Freedom fighters of Maniktola Bomb Case (1909), Delhi Conspiracy Case (1915), Lahore Conspiracy Case (1915) and Manipur Conspiracy Case (1918) were transported to Andaman Islands.

Criminals formed the second type of convicts who were sent to Andaman Penal Colony. There were two types of criminals – first, who committed heinous offences like dacoity, causing grievous hurt, burglary and theft. Second, were 'criminals' convicted under the Criminal Tribe Acts

that the Government of British India passed in 1871, 1910 and 1920. As per the Act, nomadic communities were classified as being 'addicted to the systematic commission of non bail-able offenses and under this Act 150 tribes and castes were notified as criminal tribes (Coomar, 1997). The *Bhantus* of United Province and Central Province were notified as 'criminal tribe' and it was decided by the Government of India during 1924 to 1926, to transport 285 *Bhantus*, which included 135 women, to Andaman Island under the care of the Salvation Army (Coomar, 1997). They too were settled around Port Blair in South Andaman Islands.

To manage the affairs of Andaman Penal Colony and the convicts, another set of non-tribal population was commissioned to the Andaman Islands. These were the non-convict population.

The Non-Convicts

The non-convict population consisted of three groups of people – first, the administrators of the Penal Colony; second, the labourers and third, the 'local born' population. To manage the affairs of the Penal Colony and the 'convicts', government officials with their families were commissioned to A&N Islands. This was the group of administrators which included the British and the Indians. Their numbers were limited, but they constituted the upper echelon of the Penal Colony. This group included the chief commissioner, deputy commissioner, assistant commissioners, settlement commissioners, jail superintendent, besides the officers of judiciary, police, medical, forest, civil supplies and other departments, including the petty officers and clerks. The group also included the clergy and the officer in-charge of the Andamanese. They lived on the Ross Island that overlooked the Penal Colony.

The second group of non-convicts brought in during the colonial period were the labourers. Labour was required in A&N Islands Penal Colony to extract the timber from the dense forest. The estimated yield of high-quality timber was 10000 to 12000 tons per year (Imperial Gazetteer of India, 1909). The convicts could not be used as forest labourers because most of the convicts were agriculturalists and thus not adept at clearing the

jungle. Moreover, convicts had a tendency to flee once in the forest. Therefore to exploit forest resources, the British 'imported' labourers from Burma (present day Myanmar) and Ranchi (present day state of Jharkhand in mainland India). From Burma, a total of 166 *Karens*, an ethnic group inhabiting its southern parts, were brought to Andaman Islands as labourers in 1925 and settled in Middle Andaman Island. They were employed with the forest department to extract Andaman hardwoods. As the terrain and climate of Andaman Islands was similar to that of Burma, the *Karens* adapted and their number swelled to 263 by 1931 Census. Labourers were also brought from Ranchi as these were 'hardy and capable workers'. The Ranchi labourers too were employed by the forest department and became part of Forest Labour Force in 1925 (Dass, 1937).

The third group of non-convicts consisted of the 'local borns' who dominated the non-tribal population at the time of the Independence in 1947. In A&N Islands, 'local borns' or 'local' is the term used for population born out of convict marriages. The British wanted to create a civil society in Andaman Islands to provide cheap labour for exploiting the forest resource of the Andaman Islands. Therefore in 1871 the British introduced a system of classification of convicts into six classes on the basis of their behaviour and conduct in Andaman Penal Colony (Table 3).

The rank of a 'self-supporter' was the highest rank a convict could attain with good behaviour for ten years. They were given 'ticket-of-leave' which meant that they could live as free individuals in villages, could call wives from mainland India or could marry a female convict, raise a family and live life like normal citizens, but, within the boundary of the Penal Colony only (Dhingra, 2005). In the haste to create a stable society soon, the prison term to obtain 'ticket-of-leave' was shortened for the *Moplahs* and *Bhantus*. British also supported the growth of the non-tribal population and built houses for the self-supporters, relaxed rules of visiting Port Blair, opened schools, hospitals, primary health centres and granted permission to build religious places. The conducive environment led to the growth of the population of 'local borns'. The 'local-borns' belonged to a mix of various castes and religions, and therefore did not strictly adhere to any particular one. Thus, they were looked down upon by other non-convicts, especially the Indian administrators: "the so called local-born community has suffered in numerous ways in the

Table-3
Classification of Convicts in Andaman Penal Colony

Class	Composition	Degree of freedom	Kind of labour	Payment	Duration
VI	Invalids Superannuated convicts Females	-	Did not work	-	-
V	Convicts degraded from higher classes for serious offences or for running away	Work in heavy iron	Severe	No payment	-
IV	Newly arrived convicts Degraded from higher class Promoted from lower class	Work in light iron	Severe	No payment	Six months for new convicts
III	Passed through probationary course	Free movement within sub-division during the day and confinement at night	Hard	No payment	Four and half years
II	Spent five years in penal colony with good conduct	Free movement within sub-division during the day and confinement at night	Employment in petty official positions in hospitals, public office, servants	Paid labour	Five years
I	Spent 10 years in penal colony – were the trustworthy convicts and were given 'ticket-of-leave' or became 'self-supporter'	Free movement within the villages – free living within the penal colony	Given land to cultivate, engage in trade, or craftsmanship	Earn his own living	Till end of sentence

Source : Compiled from Imperial Gazetteer of India (1909), Sen (2000) and Dhingra (2005)

past both from a social and an economic point of view. They were socially boycotted by most of the Indian officials mainly for three reasons: first, for being born to convict parents, second, for not strictly adhering to the orthodox customs of caste and religion, and third, for their moral weakness" (Dass, 1937). The convicts, administrators, labourers and the local borns were the forerunners of the non-tribal society of the A&N Islands. But, the dominant non-tribal population of the islands came after the Independence.

POST-INDEPENDENCE PERIOD (1947 – TILL PRESENT)

India gained Independence in 1947. The country was divided into two sovereign states – India and Pakistan. A&N Islands fell in the basket of India and was given the status of part D state, which meant that it was directly administered by the President of India through a Chief Commissioner. This marked the beginning of the post-independence period in India and the A&N Islands. The post-independence period in A&N Islands was dominated by large-scale resettlement of the non-tribal population.

India, and especially West Bengal, faced a 'refugee problem' in the post-independence period. After the Partition, refugees came into West Bengal from East Pakistan in large numbers, but only a small number of these moved out. This cross-border migration on the eastern border of India continued for the next 10 years. To ease the pressure on the already scarce resources of West Bengal, the 'extra' population was dispersed to Tripura, *Dandakarnya*, Uttarakhand and A&N Islands (Kudiasya, 1996). A&N Islands seemed suitable for resettlement because these were largely 'vacant' as the tribal Andamanese population had dwindled during the colonial period. Again, as the monsoonal climate of A&N Islands was similar to that of Bengal, the administrators believed the families could adjust to it. Moreover, the geostrategic location of A&N Islands along with the claim of China, Myanmar and Indonesia, compelled the Government of India to resettle the islands. Therefore from 1949 onwards the resettlement and growth of the non-

tribal population continued in A&N Islands unabated.

The resettlement scheme was never declared as "closed". However, the year of closure of the scheme is taken as 1975 as the Ministry of Rehabilitation was closed in that year. Thus, the resettlement scheme lasted for 26 years. The resettlement in A&N Islands took place under four schemes – first was resettlement of partition refugees from East Bengal (1949), second was the 'colonization scheme' (1952), third was development of plantation and resettlement of Sri Lankan Tamils (1965) and the fourth was resettlement of ex-servicemen (1969). Under these schemes people from many parts of India came to A&N Islands.

The Bengali refugees

The Bengali refugees were resettled in A&N Islands under the first two schemes. Under the first scheme, the refugees from East Pakistan who were living in the relief camps strewn across West Bengal were resettled in A&N Islands. This scheme lasted for three years only, i.e., from 1949 till 1951 and was replaced with the 'colonization scheme' in 1952. The latter lasted till 1975. In these 26 years, a total of 3695 families were resettled across various islands, namely, North Andaman, Middle Andaman, South Andaman, Neil, Havelock and Little Andaman.

Sri Lankan Tamils

In 1965 under the 'Special Area Development Programme', the focus of resettlement in A&N Islands shifted from Bengali refugees to the repatriated Sri Lankan Tamils[3]. An "Inter-Ministerial Team" visited the A&N Islands in 1965 and recommended that rubber plantations could be initiated in these islands by resettling the repatriated Sri Lankan Tamils. Therefore in Katchall Islands (Nicobar district), rubber plantation began with the Sri Lankan Tamils and labourers from Bihar, Tamil Nadu and Kerala which added to the non-tribal population of A&N Islands. The Nicobar Islands were also opened up for the resettlement of the ex-servicemen in 1969.

The Ex-servicemen

The Indo-China War of 1964 provided the

impetus to resettle the ex-servicemen in the A&N Islands. India was defeated in this War, one of the reasons being neglect of the distantly located border areas. Great Nicobar Island, in the Nicobar district is the southernmost island which is only 150 km away from Indonesia while mainland India is about 1200 km away. As the Great Nicobar Island was sparsely populated with tribal population, and Indonesia had put a claim on it at the time of the Independence, the Government of India planned the resettlement of the ex-servicemen in the Great Nicobar Island under the fourth scheme of resettlement in A&N Islands. In 1969-70, the Rehabilitation Reclamation Organization had cleared 1250 acres of land and constructed a temporary jetty. In 1969, a total of 100 families of ex-servicemen from Punjab were resettled in Great Nicobar Island (Dhingra, 2005). The scheme lasted till 1980 and a total of 330 families were resettled during 1969-1980.

The Ranchiwalas

Another group that was "resettled" were the *Ranchiwalas*. The A&N Islands were covered with dense evergreen rainforest before the resettlement schemes were implemented. There was a shortage of labourers to clear the dense forest as the new settlers were agriculturalists and were not adept and clearing the jungle. Therefore tribals from *Chotanagpur* region (present day Jharkhand and Chhattisgarh) were brought in as labourers as they were willing to work and were ready to settle and even bring their families with them. These families came to be known as *Ranchiwalas*. The A&N Administration resettled 197 families of *Ranchiwalas* in Baratang Islands during the mid 1960s.

Apart from these planned resettlements, there was a steady influx of opportunists who came to the A&N Islands in search of "government jobs" which were easily available at that time: "The settlements had brought in a population of approximately 14,000 persons. But the population of the settlement had grown by 30,000 – for every one person settled by the administration, one had come in response to the opportunity or the need for manpower" (Dhingra, 2005).

Thus, in the post-independence period people from all across the country were resettled in the A&N Islands. There were Bengalis, Punjabis, Tamils (both Indian and Sri Lankan), Keralites, Ranchi tribals and many others. The peopling of A&N Islands with the non-tribal population from 1858 till present has brought in irreversible changes.

Impact of Peopling of A&N Islands

The impact of peopling of non-tribal population in A&N Islands is manifold. But the most dominant impact has been in the form of unprecedented population growth, change in the composition of population and, change in the administrative divisions. A brief account of these is given below.

POPULATION GROWTH

There is no record of population of A&N Islands prior to the colonization by the British in 1858. Even in 1858, the only record available was for the Andaman Penal Colony. It is only after 1901 that census records for Andaman Islands and Nicobar Islands separately are available. These records show a rapidly growing population (Fig 2).

At the beginning of the 20th century the population was 24,649 which in 2011 stood at 379,944, registering a staggering growth rate of 1441 per cent. The growth rate has fluctuated throughout the 20th century (Table 4). The A&N Islands had a negative growth rate in the decade 1941-1951. This was related to the Second World War when A&N Islands were occupied by the Japanese during 1942-1945 and suffered great damage. In this decade the population also declined because the Penal Colony was abolished in 1945 and several families moved out of the A&N Islands. The next decade saw an unprecedented increase in population. The population growth rate for A&N Islands was 105.19 per cent. This was the period of resettlement of Bengali refugees. Though the growth rate declined in the successive decades, it remained very high on account of the various resettlement schemes.

Fig 2 — Growth of Non-Tribal Population in A&N Islands
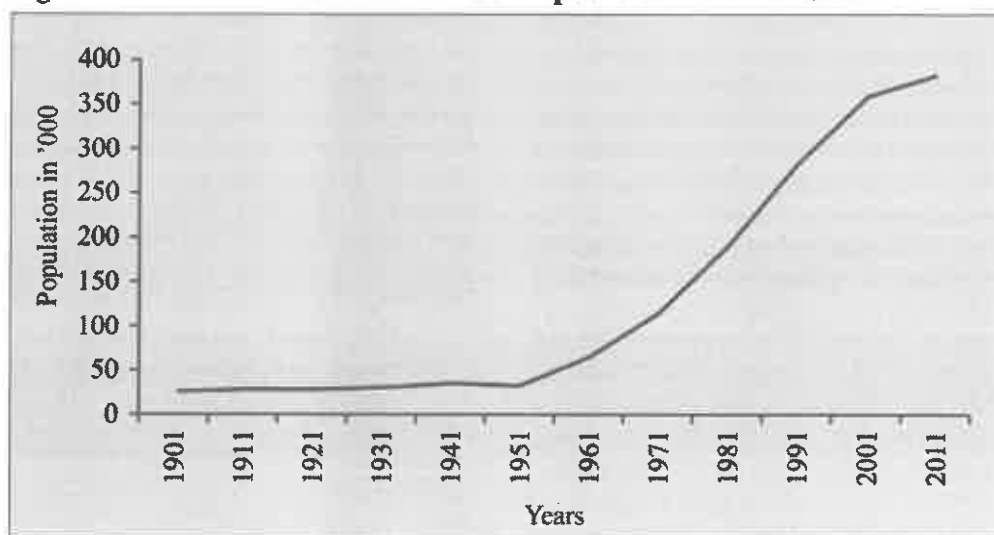
Based on Census of India, 1901-2011

Table-4
Population Growth in A&N Islands (1901-2011)

Year	A&N Islands		Andaman Islands		Nicobar Islands	
	Population	Growth rate	Population	Growth rate	Population	Growth rate
1901	24649		18138		6511	
1911	26459	7.34	17641	-2.74	8818	35.43
1921	27086	2.37	17814	0.98	9272	5.15
1931	29463	8.78	19223	7.91	10240	10.44
1941	33768	14.61	21316	10.89	12452	21.60
1951	30971	-8.28	18962	-11.04	12009	-3.56
1961	63548	105.19	48985	158.33	14563	21.27
1971	115133	81.17	93468	90.81	21665	48.77
1981	188741	63.93	158287	69.35	30454	40.57
1991	280661	48.70	241453	52.54	39208	28.74
2001	356152	26.90	314084	30.08	42068	7.29
2011	379944	6.68	343125	9.25	36819	-12.48

Source : Based on Census of India Records (1901-2011)

Population growth rates for Andaman Islands and Nicobar Islands differed during 1901-2011 (Table 4). During the pre-Independence period, the population growth rate was high for Nicobar Islands as compared to Andaman Islands, whereas in the post-independence period, the trend was reversed. Andaman Islands had a negative population growth rate twice; first between 1901-1911 and the second 1941-1951. The decade of 1901 to 1911 saw a decline in growth rate as the mortality rate was very high. The second decline was because of the Second World War. The decade 1911 to 1921 saw a slight increase. The major increase in the following decade was on account of large scale coming in of *Moplah* rebels, *Bhantu* tribes and the *Karens*. It increased in the next decade and in the following decade it declined under the Japanese occupation of the Island. Post 1951, Andaman Islands have had positive population growth rates, highest being in the decade 1951-1961 when the population growth rate was 158.33 percent. It remained high till 2001 census though a deceleration can be noticed. During the decade 2001-2011 the population growth rate was below 10 percent.

Nicobar Islands also had a very high population growth rate all throughout the 20th century, except in three decades. In the decade 1911-1921, the population growth rate was 5.15 percent. Again, during 1941-1951, because of the Second World War, there was a negative population growth rate of (–)3.56 percent. On 26th December 2004, the South Asian Tsunami hit the coast of A&N Islands. In this disaster, Nicobar Islands were completely devastated. The impact is visible in the census decade 2001-2011, when Nicobar Islands recorded a negative population growth rate of (–)12.48 percent. The impact of the resettlement process can also be seen in Nicobar Islands which had very high population growth rate the decades 1961-1971 and 1971-1981.

The massive growth of population also led to the changes in the density of population. Population density of A&N Islands in 2011 was 46 persons per sq km as against the national average of 382 persons per sq km. Though the population density of A&N Islands is the second lowest among the 36 states and union territories of India, it has steeply increased in the post-independence period. The population density of A&N Islands in 1951 was 4 persons per sq km, which doubled to 8 in 1961. It further increased to 14 in 1971, 23 in 1981, 34 in 1991, 43 in 2001 and 46 in 2011.

CHANGING POPULATION COMPOSITION BETWEEN TRIBAL AND NON-TRIBAL

The aboriginal tribal population comprised of the original inhabitants of the A&N Islands. With the colonization of A&N Islands in 1858, non-tribal population came to the islands. Gradually, the non-tribal population increased and in 1864 became equal to the tribal population of Andaman Islands. In mid 1870s, the share of tribal and non-tribal population of A&N Islands was equal and post 1870s the non-tribal population exceeded the tribal population. Ever since, the percentage share of non-tribal population is increasing, whereas, the share of tribal population is decreasing (Fig 3).

At the beginning of 20th century, the tribal population accounted for one-third or 33 percent of the total population of A&N Islands. It slightly increased to 37 percent in 1911, but declined to 35 percent in 1921, remained at 35 percent in 1931 and again plumbed to 33 percent in 1941. In 1951 it increased to 39 percent as a large number of non-tribal population moved back to mainland India after the abolition of the Penal Colony. From 1951 onwards, the share of tribal population has continuously declined – 23 percent in 1961; 16 percent in 1971; 12 percent in 1981; 10 percent in 1991; 8 percent in 2001 and 7 percent in 2011. Thus the population that occupied 100 percent of A&N Islands in 1857 has been reduced to 7 percent during a period of 160 years.

Thus, it can be concluded that even with fluctuating and uneven growth rates, the quantum of people added to A&N Islands was massive. To accommodate the dynamics of the changing and growing population many more changes came about in A&N Islands. Foremost among these was change in the administrative divisions in A&N Islands.

Fig 3
Changing Ratio of Tribal and Non-Tribal Population in A&N Islands (1901 - 2011)
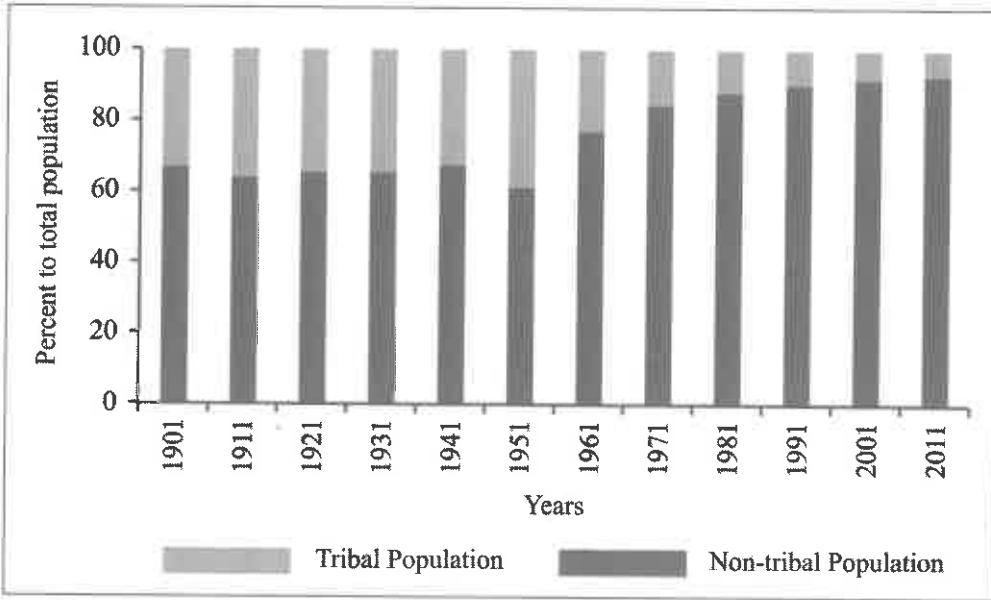
Based on Census of India, 1901-2011

CHANGES IN THE ADMINISTRATIVE BOUNDARIES

Administrative boundaries change for various reasons. One of the important reasons for the change is to accommodate the needs of the growing population. When population in remote areas grows, new administrative divisions are needed for the ease of administration so that the distance between the district headquarters and remote areas is shortened. This, in turn, helps with a better monitoring of government schemes and maintaining law and order in remote areas. Therefore, to accommodate the needs of the growing non-tribal population, administrative boundaries within A&N Islands have undergone changes. These changes differ for the colonial period and the post-independence period.

Changes in Administrative Divisions in the Colonial Period

In 1858 when the first batch of convicts arrived, the entire area was covered with dense forest. Therefore after clearing of forests only two administrative divisions were made – the

administrative headquarter which was Ross Island and, second the convict stations in the remaining part that included the islands of Chatham, Viper and parts of South Andaman Island. The classification of prisoners in 1871 led to the formation of the convict villages where self-supporters lived and carried out cultivation. Thus by 1909 the settlement had spread and different administrative units were made. In 1901 there were two districts and four subdivisions. Each of the subdivisions had "stations" and "villages". The labouring convicts were kept in the stations and the other group of self-supporters and free settlers lived in the villages. In 1901 together there were 63 stations and villages. This number increased to 124 in 1911, 212 in 1921, 239 in 1931 and 182 in 1941. This system of administrative divisions prevailed till the end of the colonial period.

Changes in Administrative Divisions in the post-Independence Period

At the time of Independence in 1947 the A&N Islands consisted of one district. The territory became a Part D state, i.e., it was under the

direct administration of the Centre. After State Reorganization Act of 1st November 1956, A&N Islands became a Union Territory, directly under the control of the President. In 1974, the one district of A&N Islands was bifurcated into two – Andaman district and Nicobar district. In 2006, Andaman district was further bifurcated into North & Middle Andaman district and South Andaman district. At all levels of administration, the boundaries have changed. Table 5 presents the changes in various levels of administrative units during 1951-2011.

As revenue villages were established after the resettlement, *tehsils* came into existence in A&N Islands from 1965 onwards. Six *tehsils* were demarcated in A&N Islands – Diglipur, Mayabunder, Rangat, South Andaman, Car Nicobar and Nancowry. The first four were in Andaman Islands and the latter two in the Nicobar Islands. In 1975, the South Andaman *tehsil* was bifurcated into Ferrargunj and Port Blair *tehsil* and thus the number of *tehsils* increased to seven in 1981 census. Again, in 2006 two more *tehsils* were carved out – Little Andaman *tehsil* was carved out from Port Blair *tehsil* and Great Nicobar *tehsil* was carved out from Nancowry *tehsil*. Thus in 2011 total number of *tehsils* was nine. But it is the growth in the number of villages which is staggering. During 1951 to 1961, a total of 198 villages came up in A&N Islands and total number of villages increased from 201 in 1951 to 399 in 1961. However, in the following decade of 1961–1971, the number of villages came down to

390. This was due to the closure of the forest camps. In the next decade, 1971–1981, number of villages increased by 101 and stood at 491. In the following decade 56 villages were added and the number of villages remained unchanged in the ensuing decade too. But in 2001–2011, the number of villages increased by 8, because of the regularization of the encroached settlements. Even though number of villages increased continuously, the number of towns remained the same i.e., one, till 2001 when the number of towns increased to three. However, two of these were census towns. In 2011 two more census towns were identified raising the total number to five. However, Port Blair has been the only statuary urban area of A&N Islands during 1951-2011.

The city of Port Blair has also undergone several changes. Port Blair was the nodal point of the Andaman Penal Colony, and therefore was the focus of all the development initiatives. At the time of Independence there was no urban area in the entire A&N Islands. In 1950 Port Blair town was formed by clubbing together nine villages of the colonial period. In 1951, it had an area of 7.87 sq km and a population of 7789. It had the status of a Class V town[4]. The Port Blair Municipal Board came into existence on 2nd October 1957. In 1961 and 1971 it became a Class IV and Class III town with population of 14,075 and 26,218 respectively. With the inclusion of 5 full villages and part of 2 other villages the boundary of Port Blair Municipal Board was expanded in 1975. The area of the Municipal Board increased from 7.87 sq km in

Table-5
Changes in the Administrative Divisions in A&N Islands (1951-2011)

Year	District	Tehsil*	Villages	Towns
1951	1	NA	201	1
1961	1	NA	399	1
1971	1	6	390	1
1981	2	7	491	1
1991	2	7	547	1
2001	2	7	547	3
2011	3	9	555	5

* First time the tehsils were demarcated in 1965
Source : Based on Census of India Records (1951-2011)

1971 to 14.14 sq km in 1981. Even though it remained a Class III town, its population increased to 49,634 in 1981. In 1991, Port Blair became a Class II town. The second boundary change of Port Blair Municipal Board was initiated in 1994 and the peripheral areas were brought under the Board. Its geographical area increased to 17.74 sq km. The Port Blair Municipal Board also changed to Port Blair Municipal Council in 1994. In 2001 Port Blair remained a Class II town with a population of 99,984. In 2011, it became a Class I city as its population increased to 108,058. The boundary of Port Blair was again changed in 2015 and its geographical area increased to 44.22 sq km. The influx of population has not only prompted a change in the administrative boundaries, it also led to a growth in basic infrastructure of A&N Islands.

INCREASE IN INFRASTRUCTURE

Table 6 shows the growth of infrastructure in A&N Islands during 1951-2011.

In 1951 the metalled road was limited to areas around Port Blair only. But after resettlement roads were constructed to connect the newly settled villages. In 1951, the length of the metalled road was 190 km which increased to 648 km in 1981 and to 1052 in 2011. It was an increase of 458 km in the first 30 years and another 404 km in the next 30 years. Similarly, wharves and jetties, the lifeline of A&N Islands, increased from only five in 1951 to 40 in 1981 and 54 in 2011. The power generation capacity has increased from 1.1 MW in 1951 to 7.5 MW in 1981 and to 83.71 MW in 2011.

This is an increase of 11 times in 30 years period. During this time the Kalpong Hydro Power Project was started which has 5.25 MW capacity. In 1951 there were two airstrips, one at Port Blair and the other in Car Nicobar Island. Two more airstrips were added in 1990s, one at Diglipur in North Andaman Island and another in Campbell Bay in Great Nicobar Island. Thus, in 2011 there were four airstrips. Similarly, the social infrastructure such as educational institutions and medical institutions have grown in the last 60 years to cater to the growing population. The increase in the number of people, population density and in the infrastructure has altered the population composition of tribal and non-tribal population.

Conclusion

The far flung A&N Islands have been peopled time and again throughout history. The first group to come to these islands were the tribal population, who came on their own accord and thus are the original inhabitants of A&N Islands. This situation changed after the A&N Islands were colonized in 1858 and the Andaman Penal Colony was established. This time the people, i.e. the convicts, were forcefully "settled" here. This was just the beginning. Forceful settlement became a norm for A&N Islands, be it the "problematic population" of convicts, Bengali refugees or the repatriated Sri Lankan Tamils, all were sent to the A&N Islands.

However, with the passage of time this group of non-tribal population have made A&N

Table - 6: Infrastructure in A&N Islands (1951-2011)

Infrastructure type	Number		
	1951	**1981**	**2011**
Metalled road (in km)	190	648	1052
Wharves and jetties	5	40	54
Power generation capacity (in MW)	1.1	7.5	83.71
Air port/ air strip	2	2	4
Schools/ colleges/ training institutes	40	252	415
Hospitals/ health centres	18	80	157

Source ; Based on Directorate of Economics and Statistics (1965), Census of India (1981) and Directorate of Economics and Statistics (2011)

Islands their "home" and have grown in leaps and bounds. They have evolved, created a cultural *milieu* that is unique to the A&N Islands. But, this growth has adversely affected the aboriginal tribal population. The tribal population has been reduced to a mere 7 percent of the total population. Not only have their numbers declined, they have been exploited too. During the colonial period the Great Andamanese were exploited to the extent that the entire race has almost dwindled. They have reduced from about 7000 individuals in 1858 to only 44 in 2011. In the Tsunami of 26th December 2004, it were the tribal Nicobarese who accounted for about 85 percent of the total population got killed. The tribal population which survives today is under continuous threat of extinction.

The peopling of A&N Islands was largely a response to resolve the problems of mainland India. In order to accommodate the needs of the people from mainland India, the development model pursued for A&N Islands emulated that of the mainland. Thus, in the whole process of peopling and marginalization of the original inhabitants, the uniqueness of A&N Islands is gradually being eroded as it is becoming a replica of mainland India.

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Endnotes

1. Kitchen middens are accumulations of refuse, mostly from kitchens. It consists of animal bone, pottery, feces, shell, botanical material and debris dumped near the site of settlement. The middens are used by archaeologists for their study. These are rich source of information regarding the diet pattern of a population. These are the best source to authenticate the studies about the people in the remote past.

2. The islands of Andaman archipelago have been grouped into the Great Andaman Island and the Little Andaman Island. All islands of the Andaman Islands except Little Andaman Island lie close to each other. Together they are known as Great Andaman Island. The Great Andaman Island and the Little Andaman Island are separated by the Duncan Passage.

3. During 19th and early 20th centuries the British recruited a large number Tamils of Indian origin to work in tea, coffee, rubber and coconut plantations in Sri Lanka. After the Independence of Sri Lanka in February 1948, the government of Sri Lanka passed the 'Ceylon Citizenship Act' in August 1948 and declared the Tamil plantation workers as "stateless" and their citizenship is a subject of continuous dispute between Sri Lanka and India. In 1964, an agreement known as Indo-Ceylon Agreement or the Sirima-Shastri Pact was signed between Sri Lanka and India under which large number of Sri Lankan Tamils were repatriated to India.

4. The Census of India classifies the urban areas and towns into five different classes based on the size of the population:

Class	Population
Class I	100,000 and above
Class II	50,000 to 99,999
Class III	20,000 to 49,999
Class IV	10,000 to 19,999
Class V	5,000 to 9,999
Class VI	less than 5000

NEW MAP SERIES: 6
COUNTRY EQUIVALENTS OF INDIAN STATES
AND UNION TERRITORIES

GOPAL KRISHAN
Chandigarh, India

One notable feature of Indian states today is that none of them was in the nature of a sovereign state at the time of independence in 1947. These were as a whole or part of the British provinces, princely states or Portuguese or French colonies. Sikkim had the status of a protectorate of India till 1975 when it became one of its states. The new nation-state had to reform its internal territorial arrangement for administration, more than once. Two primary considerations involved in this process were to ensure integrity of the nation-state and to honour regional aspirations. The issue of administrative cost and management were treated as a part of the game or were given incidental consideration.

At the first go, the internal administrative map of the country was recast to consolidate the patchwork of political territories inherited at the time of independence. A system of 28 states of Part A, B, C and D categories was designed on the eve of commencement of the Constitution of India in 1950. Part A states were the former governor's provinces of British India; Part B states were the earlier big princely states or group of princely states; Part C states were the erstwhile chief commissioner's provinces of princely states; and Part D category had only Andaman and Nicobar Isles. In 1956, the 14 states and 6 union territories defined the new administrative map of India primarily on linguistic basis. Soon it became essential to carve out additional states on considerations of historical legacy, such as Sikkim and Telangana; tribal identity, as in the case of Nagaland, Mizoram or Meghalaya; or

development issues, as represented by Jharkhand, Chhattisgarh and Uttarakhand. The segmentation of linguistically homogeneous states like Bihar, Uttar Pradesh, Madhya Pradesh and Andhra Pradesh became a reality. A rationalization process of the country's internal political map has been a regular feature since independence. Today India has 29 states and 7 union territories.

There is an increasing recognition of the role of the state in shaping the destiny of India. The state governments are responsible for development of their territorial jurisdiction. They enjoy considerable powers in respect of the subjects on state and concurrent lists enshrined in the Seventh Schedule of the Constitution of India. They are the ones to implement all the programmes, schemes and projects formulated at the national level, in addition to their own. The centre may have framed a uniform development agenda but the specific priorities, implementation style, and performance levels do differ by states.

An upsurge of healthy *stateism* is observed on the political landscape of India. Different states are in competition with each other on development agenda. Some of them have acquired brand identities. That is how we talk about Gujarat model of development or of Kerala, and of Punjab for that matter.

The governance responsibilities and work load of state governments in India are, thus, massive. The task emerges as all the more formidable when one realizes that several states in India are equivalent of major countries in the world in terms of population and area. They also draw our

attention to their comparative *per capita* Gross Domestic Product or income *vis-à-vis* other countries. To demonstrate this reality, three maps were devised to depict country equivalents of various Indian states and union territories in terms of population, area and *per capita* income (Maps 1, 2, and 3).

Most exciting is the huge population size of several Indian states. Uttar Pradesh rivals with Brazil, Maharashtra with Mexico, and Bihar with Philippines on this count. All of them are demographic giants each with a population size of more than 100 million. Not to fall much behind are West Bengal as an equivalent of Vietnam, Tamil Nadu of Iran and Madhya Pradesh of Turkey. Rajasthan vies with Thailand, Karnataka with United Kingdom, and Gujarat with Italy. Each of these aforementioned six states accommodates a population which ranges from 50 to 100 million (Table 1).

Even the small Indian states and union territories make a bold appearance on this reckoning. Sikkim is Bhutan, Goa Mauritius, and Manipur Mongolia. These carry population numbers of less than three million each. Meanwhile the National Capital Territory of Delhi is an equivalent of Netherlands and Chandigarh Union Territory of Fiji Islands. The average population size of an Indian state is about 40 million. This figure is larger than the total population of Canada, a country which is well nigh three times in area of India.

A similar pattern goes well for the area size of Indian states and union territories. Rajasthan is comparable to Germany, Madhya Pradesh to Poland, Maharashtra to Italy, and Uttar Pradesh to the United Kingdom. Here our big states are in the company of large countries in Europe. Going down the list, Gujarat corresponds to Kyrgyz Republic, Karnataka to Syria, Odisha to Bangladesh, and Tamil Nadu to Greece. Each of the states mentioned above cover an area of more than

100,000 sq. kms. each. On the other, India is not without some small states each with an area of less than 20, 000 sq. kms. Included here are Nagaland in the company of Kuwait, Sikkim of Puerto Rico, and Goa of Cape Verde. All the union territories are smaller than 10, 000 sq. kms. each. National Capital Territory of Delhi has an area in equivalence of Mauritius, Puducherry of Seychelles, and Lakshadweep of Bermuda. The average area size of an Indian state is in the proximity of one hundred and thirteen thousand sq. kms. This significantly exceeds the area of South Korea (Table 2).

While several Indian states stand parallel to countries in Europe and Latin America in population and area, this is not the case in respect of their *per capita* income. Among the highest *per capita* income states of India, Goa goes with Jordon, Sikkim with Indonesia, Haryana with Morocco, and Maharashtra with Congo. Further, Gujarat comes close to Bhutan, Kerala to Honduras, and Punjab to Vietnam. West Bengal and Rajasthan are comparable to Pakistan on this count. Among the low income states, Odisha shows similarity with Bangladesh, Uttar Pradesh with Nepal, and Bihar with Uganda. National Capital Territory of Delhi is no better than Fiji Islands and Chandigarh than Philippines. Evidently none of the states or union territories of India comes close to any European country in terms of *per capita* income. These bring to mind Asian and African countries, by and large, on this score (Table 3).

The demographic and geographic size of several Indian states demands a management capability reserved for large countries. A need for their territorial reform in favour of smaller states is not without a rationale. An authentic and acceptable optimal size of an Indian state is an issue of serious research. At the same time, an economic upliftment of every state, especially the less fortunate ones, is also to be on cards.

Map 1

INDIA
Country Equivalents of States and Union Territories in Population Size 2011

JAMMU & KASHMIR
GREECE

HIMACHAL PRADESH
SWITZERLAND

PUNJAB
MALAYSIA

Chandigarh
Qatar Islands

UTTARAKHAND
HUNGARY

HARYANA
AUSTRALIA

Delhi
Netherlands

ARUNACHAL PRADESH
QATAR

SIKKIM
BHUTAN

ASSAM
NEPAL

NAGALAND
MACEDONIA

RAJASTHAN
THAILAND

UTTAR PRADESH
BRAZIL

BIHAR
PHILIPPINES

MEGHALAYA
ARMENIA

MANIPUR
MONGOLIA

JHARKHAND
MOROCCO

WEST BENGAL
VIETNAM

TRIPURA
MOLDOVA

MIZORAM
ESTONIA

GUJARAT
ITALY

MADHYA PRADESH
TURKEY

CHHATTIS-GARH
GHANA

Diu   Daman
Vanuatu

Dadra Nagar Haveli
Belize

MAHARASHTRA
MEXICO

ODISHA
ARGENTINA

TELANGANA
ALGERIA

GOA
MAURITIUS

KARNATAKA
UNITED KINGDOM

ANDHRA PRADESH
SOUTH KOREA

Lakshadweep
Bermuda

Puducherry
Bahrain

TAMIL NADU
IRAN

KERALA
CANADA

Andaman & Nicobar Islands
Bahamas

Population size in million

Uttar Pradesh (199.6)

More than 100

50 to 100

20 to 50

Less than 20

0.6 (Sikkim)

Data source:
Census of India, 2011 and World Population Statistics, 2015.

• Population of several states of India approximately equals the population of a number of major countries in the world; Uttar Pradesh is Brazil, Gujarat is Italy, and Kerala, Canada.

Table-1

Country Equivalents of Indian States and Union Territories of India in Population: 2011

Sr. No.	States/U.Ts	Population in 2011 (in million)	Equivalent Country	Population in 2011 (in million)
1	Uttar Pradesh	199.6	Brazil	203.4
2	Maharashtra	112.4	Mexico	113.7
3	Bihar	103.8	Philippines	101.8
4	West Bengal	91.4	Vietnam	90.5
5	Tamil Nadu	72.1	Iran	77.9
6	Madhya Pradesh	72.6	Turkey	78.8
7	Rajasthan	68.6	Thailand	66.7
8	Karnataka	61.1	United Kingdom	62.7
9	Gujarat	60.4	Italy	61.0
10	Andhra Pradesh	49.4	South Korea	48.8
11	Odisha	42.0	Argentina	41.8
12	Telangana	35.3	Algeria	35.0
13	Kerala	33.4	Canada	34.0
14	Jharkhand	33.0	Morocco	32.0
15	Assam	31.2	Nepal	29.4
16	Punjab	27.7	Malaysia	28.7
17	Chhattisgarh	25.5	Ghana	24.4
18	Haryana	25.4	Australia	21.8
19	Jammu & Kashmir	12.6	Greece	10.8
20	Uttarakhand	10.1	Hungary	10.0
21	Himachal Pradesh	6.9	Switzerland	7.6
22	Tripura	3.7	Moldova	4.3
23	Meghalaya	3.0	Armenia	3.0
24	Manipur	2.7	Mongolia	3.1
25	Nagaland	2.0	Macedonia	2.1
26	Goa	1.5	Mauritius	1.3
27	Arunachal Pradesh	1.4	Qatar	0.9
28	Mizoram	1.1	Estonia	1.3
29	Sikkim	0.6	Bhutan	0.7
	Union Territories			
1	Delhi	16.8	Netherlands	16.8
2	Puducherry	1.2	Bahrain	1.2
3	Chandigarh	1.1	Fiji Islands	0.9
4	Andaman & Nicobar Islands	0.4	Bahamas	0.3
5	Dadra & Nagar Haveli	0.3	Belize	0.3
6	Daman & Diu	0.2	Vanuatu	0.2
7	Lakshadweep	0.06	Bermuda	0.08
	INDIA	**1210.2**	**4 times of the U.S.**	**313.2**

Source: Census of India, 2011 and World Statistics, 2015.

Map 2

INDIA
Country Equivalents of States/Union Territories in Area Size 2016

JAMMU & KASHMIR
LAOS

HIMACHAL PRADESH
SRI LANKA

PUNJAB
COSTA RICA

Chandigarh

UTTARAKHAND
CROATIA

HARYANA

Delhi
Mauritius

RAJASTHAN
GERMANY

UTTAR PRADESH
UNITED KINGDOM

ARUNACHAL PRADESH
UNITED ARAB EMIRATES

SIKKIM
PUERTO RICO

ASSAM
CZECH REPUBLIC

NAGALAND
KUWAIT

BIHAR
HUNGARY

MEGHALAYA
ISRAEL

MANIPUR
TRIPURA
LEBANON

JHARKHAND
AUSTRIA

WEST BENGAL
JORDAN

MIZORAM
ISLANDS

GUJARAT
KYRGYZ REPUBLIC

MADHYA PRADESH
POLAND

CHHATTIS-GARH
NICARAGUA

Diu Daman
San Marino (Italy)

ODISHA
BANGLADESH

Dadra & Nagar Haveli
Andorra

MAHARASHTRA
ITALY

TELANGANA
SOUTH KOREA

GOA
CAPE VERDE

KARNATAKA
SYRIA

ANDHRA PRADESH
TUNISIA

Lakshadweep
Bermuda

Puducherry
Seychelles

TAMIL NADU
GREECE

KERALA
BHUTAN

Area size in sq. kms.

342,239 (Rajasthan)
More than 100,000

50,000 to 100,000

Less than 50,000

3702 (Goa)

Andaman & Nicobar Islands
Cyprus

Data source:
United Nations Statistics Division, New York and *India 2016*, Government of India, New Delhi.

● An average Indian state is larger than South Korea in area, three times of Bhutan, and five times of Israel.

Table-2

Country Equivalents of Indian States and Union Territories of India in Area Size: 2016

Sr.No.	States/U.Ts	Area in km²	Equivalent country	Area in km²
1	Rajasthan	342239	Germany	357114
2	Madhya Pradesh	308245	Poland	312679
3	Maharashtra	307713	Italy	301336
4	Uttar Pradesh	240928	United Kingdom	242495
5	Jammu & Kashmir	222236	Laos	236800
6	Gujarat	196024	Kyrgyz Republic	199951
7	Karnataka	191791	Syria	185180
8	Andhra Pradesh	160205	Tunisia	163610
9	Odisha	155707	Bangladesh	147570
10	Chhattisgarh	135191	Nicaragua	130373
11	Tamil Nadu	130058	Greece	131990
12	Telangana	114840	South Korea	100,210
13	Bihar	94163	Hungary	93028
14	West Bengal	88752	Jordan	89342
15	Arunachal Pradesh	83743	United Arab Emirates	83600
16	Jharkhand	79714	Austria	83871
17	Assam	78438	Czech Republic	78865
18	Himachal Pradesh	55673	Sri Lanka	65610
19	Uttarakhand	53483	Croatia	56594
20	Punjab	50362	Costa Rica	51100
21	Haryana	44212	Denmark	43094
22	Kerala	38863	Bhutan	38394
23	Meghalaya	22429	Israel	20770
24	Manipur	22327	Slovenia	20273
25	Mizoram	21081	Fiji Islands	18272
26	Nagaland	16579	Kuwait	17818
27	Tripura	10486	Lebanon	10452
28	Sikkim	7096	Puerto Rico	9104
29	Goa	3702	Cape Verde	4033
	Union Territories			
1	Andaman & Nicobar Islands	8249	Cyprus	9215
2	Delhi	1483	Mauritius	2040
3	Dadar & Nagar Haveli	491	Andorra	468
4	Puducherry	479	Seychelles	452
5	Chandigarh	114	Liechtenstein	160
6	Daman & Diu	112	San Marino (Italy)	61
7	Lakshadweep	32	Bermuda	54
	INDIA	**3287240**	**1/3ʳᵈ of the US**	**952067**

Source: United Nations Statistics Division, New York and India 2016, Government of India, New Delhi.

Map 3

INDIA
Country Equivalents of States and Union Territories in Per Capita Income 2014-15

JAMMU & KASHMIR
MYANMAR

HIMACHAL PRADESH
NICARAGUA

PUNJAB
VIETNAM

UTTARAKHAND
PAPUA NEW GUINEA

HARYANA

Delhi

RAJASTHAN
PAKISTAN

UTTAR PRADESH
NEPAL

ARUNACHAL PRADESH
ZAMBIA

SIKKIM
INDONESIA

ASSAM
CAMBODIA

NAGALAND
LAOS

BIHAR
UGANDA

MEGHALAYA
KENYA

MANIPUR
TANZANIA

JHARKHAND
SENEGAL

WEST BENGAL
PAKISTAN

TRIPURA
PAKISTAN

MIZORAM
GHANA

GUJARAT

MADHYA PRADESH
TAJIKISTAN

CHHATTIS-GARH
KYRGYZ REPUBLIC

ODISHA
BANGLADESH

Diu*   Daman*

Dadra & Nagar Haveli*

MAHARASHTRA

TELANGANA

GOA
JORDAN

KARNATAKA
SUDAN

ANDHRA PRADESH
LAOS

Lakshadweep*

Puducherry
Egypt

TAMIL NADU

KERALA
HONDURAS

Per capita income in $ U.S.

4903 (Goa)

More than 2000

1500 to 2000

Less than 1500

682 (Bihar)

Andaman & Nicobar Islands
Honduras

* Data not available

Data source:
Statistics Times 2015 and the *World Development Indicators*, World Bank, 2016.

* The per capita income of Indian states and union territories aligns with that of countries in Asia and Africa; and none approaches that of any country in Europe.

Table-3
Country Equivalents of States and Union Territories of India in Per Capita Income: 2014-15

Sr. No.	States/ U.Ts	Per capita GDP in US $	Equivalent Country	Per capita GDP in US $
1	Goa	4903	Jordan	5160
2	Sikkim	3861	Indonesia	3630
3	Haryana	2919	Morocco	3070
4	Maharashtra	2561	Congo	2720
5	Tamil Nadu	2464	Moldova	2560
6	Gujarat	2337	Bhutan	2370
7	Kerala	2271	Honduras	2270
8	Uttarakhand	2269	Papua New Guinea	2240
9	Telangana	2086	Uzbekistan	2090
10	Punjab	2020	Vietnam	1890
11	Himachal Pradesh	2019	Nicaragua	1870
12	Karnataka	1959	Sudan	1710
13	Arunachal Pradesh	1870	Zambia	1680
14	Andhra Pradesh	1780	Laos	1660
15	Nagaland	1696	Laos	1660
16	Mizoram	1665	Ghana	1590
17	West Bengal	1532	Pakistan	1400
18	Tripura	1525	Pakistan	1400
19	Rajasthan	1443	Pakistan	1400
20	Meghalaya	1346	Kenya	1290
21	Jammu & Kashmir	1297	Myanmar	1270
22	Chhattisgarh	1281	Kyrgyz Republic	1250
23	Odisha	1150	Bangladesh	1080
24	Madhya Pradesh	1133	Tajikistan	1080
25	Jharkhand	1009	Senegal	1050
26	Assam	968	Cambodia	1020
27	Manipur	909	Tanzania	920
28	Uttar Pradesh	793	Nepal	730
29	Bihar	682	Uganda	670
Union Territories				
1	Delhi	4642	Fiji Isles	4870
2	Chandigarh	3433	Philippines	3500
3	Puducherry	3143	Egypt	3210
4	Andaman & Nicobar Islands	2350	Honduras	2270
5	Dadra &Nagar Haveli	*	*	*
6	Daman &Diu	*	*	*
7	Lakshadweep	*	*	*
	INDIA	**1570**	**1/35 of the U.S.**	**55,230**

Source: Statistics Times 2015 and the World Development Indicators, World Bank, 2016
* Data not available