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Title of the paper

Morbidity in India: Trends, Patterns and Differentials

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Abstract

India has made significant progress in improving the health conditions of its population in terms of reducing infant mortality rate and increasing life expectancy at birth but what has happened to morbidity is yet to be assessed. This paper presents evidence on levels, differentials and patterns of morbidity prevalence in India and for selected states. Contrary to the gains made through mortality transition in terms of longer life, the part of the expected life seems to have incapacitated due to the rising morbidity prevalence. The reported morbidity prevalence is significantly higher in the socio-economically developed states than in the less developed ones. While the children are at higher risk of suffering from acute diseases, older persons seemed to be more vulnerable due to the rise in the prevalence of chronic diseases. The multivariate analyses suggest that the probability of reporting illness is significantly higher among educated, females and those are from richer households.

Background

The study of health transition in India has occupied a centre stage in the ongoing debate on the relationship between mortality and morbidity (Murray, 1998). While there has been a general decrease in mortality in India, both at the country and state level over the last three decades, what has happened to morbidity is yet to be assessed. The life expectancy has increased considerably in the past few decades but part of the expected life is also incapacitated owing to morbidity. There is a widespread concern among the researchers and health policy planners in India whether the disease burden due to morbidity follows the secular trend of mortality.

Therefore, for making an objective assessment of disease burden of India and its many regions, population level estimates of morbidity are essential. It is also imperative to study the components of differential morbidity within its population. As India is often described as a sub-continent with substantial regional rural-urban and social group differentials in terms of standard of living and quality of life including human health, the purpose of this study is to examine the existing inequalities in non fatal health outcomes between different subsections of population in India.

However, many researchers argued that the quantification of 'inequality' in morbidity prevalence among different population groups may not give a true picture because of the influence of subjectivity in measurement of morbidity. The reporting of ailments depends on the levels of awareness about health problems arising from various individual, household and community level factors in the population (Schultz and Tansel, 1996). Despite these well-recognised problems and difficulties of measurement, the reported information of morbidity obtained in large scale surveys would be extremely useful, especially in the absence of clinically validated surveys (Sen, 1998; Dilip, 2007).

Review of previous studies

Health is a multidimensional concept that is difficult to capture in a single measure. Measurement of health status has always been a multifaceted problem. Conventional indicators such as infant mortality rate or life expectancy at birth, anthropometric measures or nutritional status are generally used to measure the health status of the population since they are comparatively simple to analyse and data is easily available. However, in recent times, many studies have used self-reported illness to measure health status because of its consistent relationships with future mortality in many countries and its direct link to policy changes, e.g., those who did not perceive the need would not be seeking health care even though the health care service is fully available (Nicholson, Bobak, Murphy, Rose and Murmot, 2005; Idler and Benyamini, 1997; Dilip, 2002; Duriasamy 1995; Murray, 1998).

Though a number of agencies in India such as NSSO and NCAER have been conducting national level surveys on 'morbidity and health care' on a periodical basis, fewer and limited attempts have been made in assessing the health status of the population across states using data from these sources. Studies that dealt with the evidence of differentials in morbidity are reviewed below.

The evidence of disaggregated morbidity prevalence in India showed a 'J' shaped relationship between age and morbidity, an indication that elders and children are susceptible to higher prevalence of illness (Kannan, et al, 1991; Shariff, 1995; Gumber, 1997; NSSO, 1998). Gender differences are observed with women reporting significantly lower levels of morbidity than men. This suggests under-reporting of ailments among women (Iyer, 2000; Kannan, et al. 1991; Krishnaswami, 2004).

Studies found contrasting pattern of evidences about disease burden between rural and urban population with some reporting greater burden among rural population than in urban population (Gumber and Kulkarni, 2000; Duggal and Amin, 1989; Dilip 2002; NCAER, 1992; Satya Sekar, 1997 NSSO, 1998) and others suggesting the opposite (Sundar 1995; Mahiwala, et al, 2000). Existing evidence indicate that reported morbidity prevalence is negatively associated with educational attainment (Duraisamy, 1998; Ghosh, 2007; Navaneetham, 2006). It is argued

that better educated take more precautions against diseases which in turn reduces their morbidity. However, the nature of relationship between economic status of household and the risk of reporting morbidity is far from clear. While evidence from national level surveys suggests a positive association between self-reported morbidity prevalence and economic status of an individual (Dilip, 2002; Duraisamy 1998), the reverse is observed in regional studies (Navaneetham, 2006; KSSP 2006; Kunhikannan and Aravindan 2000; Kannan et al. 1991). Such differences can be attributed to the differences in definition, survey design and the level of health consciousness of the population of these studies.

However, very little information is available about the disease profile of different population groups in India. The level and prevalent pattern of morbidity in the country show that India has entered into the fourth stage of health transition (NSSO, 1998; 2006). Therefore, understanding changing morbidity patterns and determinants with new data is important for devising appropriate health policy.

Data and Methods

In this study, data was drawn from National Sample Survey Organisation' (NSSO) 52nd (1995-96) and 60th round (2004) survey on 'morbidity and health care'. While for the 52nd round, the data collection period, July 1995-June 1996 was spread in four sub-rounds each comprising three months, in the 60th round, the survey was conducted in two sub-rounds of three months each during the period, January-June 2004. In the 52nd round, the survey covered 120942 households with 71284 in rural areas and 49658 in urban areas. Information was gathered about whether an individual suffered any illness during the last 15 days prior to survey date from 629888 usual residents of these households. However, in the 60th round, the survey conducted interviews in 73868 households with 47302 in rural areas and 26566 in urban areas in West Bengal. Information on whether an individual was ailing during the last 15 days is available for 383338 persons, the usual residents of the households.

The prevalence of ailments was calculated with information from the survey on any person who had fallen ill during the 15 days leading up to the survey. Since both the 52nd (1995) and

60th rounds (2004) of NSS surveys are based on similar survey design, concepts, definitions and reference period, the estimates from these surveys are comparable.

The prevalence of any ailment or its morbidity, is defined as

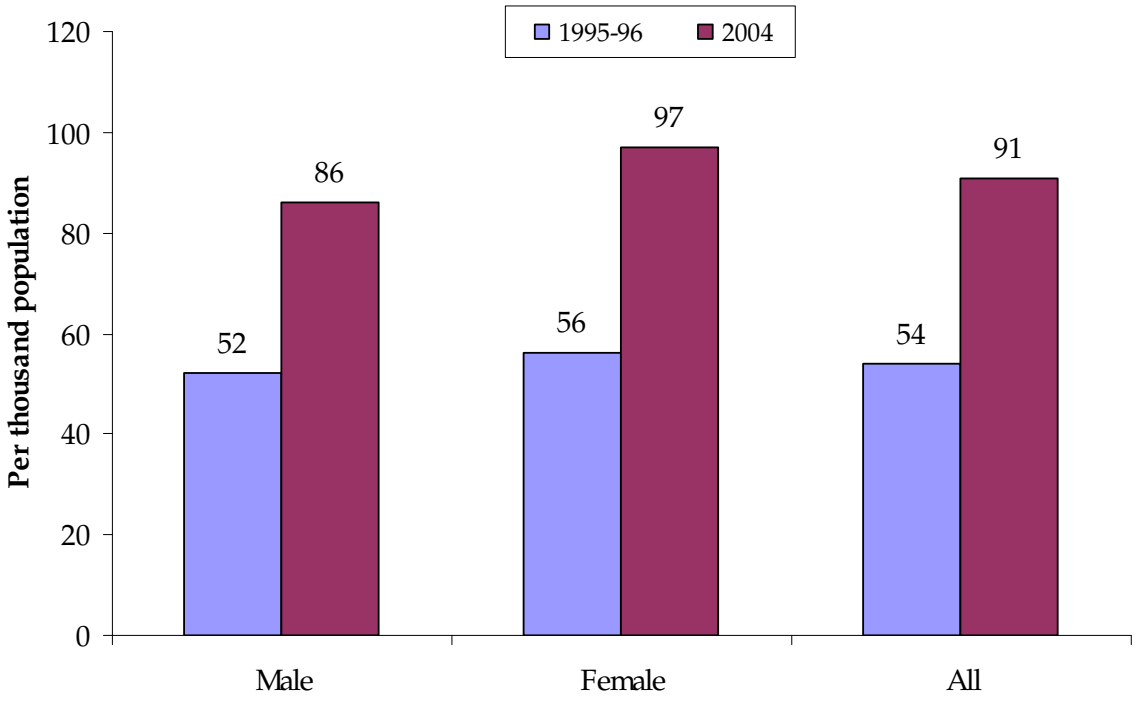
$$Morbidity = \frac{Number\ of\ ailing\ persons}{Total\ number\ of\ persons\ alive\ in\ the\ sample\ households} * 1000$$

The morbidity prevalence rate presented in this study gives the estimated proportion of persons reporting ailment suffered at any time during the reference period, which is not strictly the *prevalence rate* as recommended by the Expert committee on Health Statistics of the World Health Organisation (W.H.O). The WHO defines prevalence rate as the ratio between the number of spells of ailment suffered at anytime during the reference period and the population exposed to the risk. It measures the *frequency of illnesses* prevailing during the reference period; whereas here we present the *number of persons reporting any ailment during a 15 day period per 1000 persons.*

The variations in the morbidity prevalence rate across the states could be due to the differences in the age structure of different states. This is removed by standardizing the rates for the year 2001 using the population of India as standard. The morbidity prevalence was also studied in terms of disease composition-broadly, acute and chronic. Ailments of less than 30 days duration are treated as 'acute' and those of more than 30 days duration as 'chronic' (NSSO, 1998). Since the differences in reported morbidity prevalence levels by selected background factors will indicate the unequal burden of morbidity in the population, an attempt is made to examine the differences in morbidity levels by individual characteristics as well as household socio-economic characteristics. Probit regression model is applied to study independent effect of various predictor variables on the morbidity prevalence. However, interpreting the relative impact of different variables in a probit model is complicated by the fact that the model is non-linear in the explanatory variables, and as a consequence, the impact of independent variables on the probability of reporting illness depend on the value of that and other independent variables. Nevertheless, in this study, we assess the importance of different explanatory variables by looking at marginal changes in predicted probabilities for a

representative individual controlling the effect of all other independent variables except the one of interest.

Figure1. Trends in Morbidity prevalence rate by sex in India, 1995-96 to 2004



Levels, trends and regional variations in morbidity prevalence

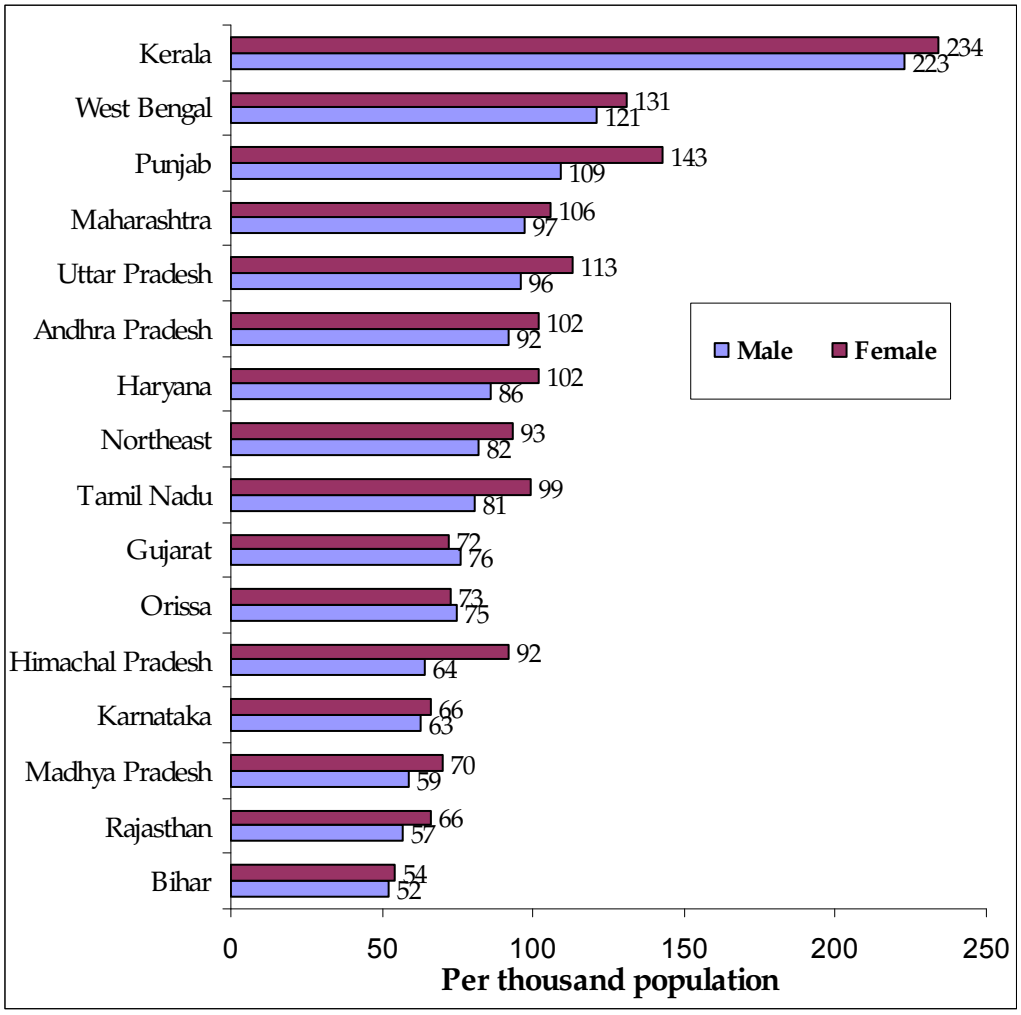
Figure1 presents the trends in sex specific morbidity prevalence rates during the period 1995-96 and 2004. The morbidity prevalence rate has increased significantly from 54 to 91 per thousand population during the period 1995-96 to 2004. The increase in the prevalence of morbidity could be due to increased health consciousness among the people and better reporting by the respondents. Morbidity prevalence by sex indicate that although the morbidity prevalence has increased both for males and females, a greater increase in morbidity prevalence is seen among females compared to their male counterparts during the period 1995-96 to 2004.

Inter-state differentials in morbidity prevalence

State level sex-specific age-adjusted morbidity prevalence rates are presented in figure2. It can be seen that even after the standardization of age, the morbidity prevalence is reported

relatively higher for both sexes in the states of Kerala, West Bengal, Punjab, Uttar Pradesh, Maharashtra and Andhra Pradesh but sex differentials are greater and considerably higher among females in Punjab, Himachal Pradesh, Tamil Nadu and Haryana. The states where the reported rates of morbidity prevalence are relatively low are Bihar, Rajasthan, Madhya Pradesh and Karnataka.

Figure2: Age standardized Morbidity prevalence rate by major states, 2004



Note: The population of India in 2001 is taken as standard population.

However, it is not possible to establish any association between levels of socio-economic development and the prevalence of morbidity by looking at the levels and differentials of morbidity prevalence rate between states. Contrary to the anticipation, it is observed that

states like Kerala, Punjab and West Bengal known for their achievements in improving social and economic conditions have recorded the highest morbidity prevalence in the country. On the other hand, the socio-economically poorer states like Bihar, Madhya Pradesh and Rajasthan have reported lowest morbidity rates.

Previous studies suggest that this type of variations occur because of variations in morbidity reporting as a result of health ideals, accessibility of health services and the socioeconomic background of the population or it could be due to variation in disease profile between the populations arising from varying levels of demographic and epidemiologic transition.

Morbidity by background characteristics

The evidence of differentials in morbidity by various background characteristics are discussed in this section. The reported morbidity prevalence rate was higher among females (97 per thousand population) than among males (86 per thousand). Prevalence of morbidity was higher for children 0-9 years, followed by a declining trend till age group 10-19 with a rising trend again at higher ages.

Level of education and morbidity prevalence are found to be inversely related. The reported morbidity prevalence is highest among the illiterates with the prevalence rate of 110 per thousand population. However, the prevalence of ailments is about a third lower (79 per thousand population) among the people with post-middle education.

The monthly per capita consumption expenditure (MPCE) quintile which represents the economic condition of the household showed a positive relationship with prevalence of morbidity. Stark difference is noticed in the prevalence of ailments by the expenditure quintiles. The prevalence of ailments in the richest quintile (124 per thousand population) is almost twice than the poorest quintile (70 per thousand).

Surprisingly, the reported morbidity prevalence rate among the ST is considerably lower than other social groups. The morbidity prevalence rate of 58 per thousand among the scheduled tribes is almost half compared to "Others" group (106 per thousand). It is worth mentioning that their socio-economic conditions are very poor than other social groups in India. The

lower prevalence of morbidity among them is plausible due to the fact that the awareness about health problems among the scheduled castes may be very low leading to poor reporting of ailments. The morbidity prevalence rate was reported higher in the urban areas than in the rural areas.

The burden of ailments was higher during January-March (97 per thousand population) compared to the period April-June (85 per thousand population) suggesting marginal seasonal variations. The spatial distribution of ailments provides some interesting results. The Southern region constituting the states of Kerala, Tamil Nadu, Andhra Pradesh and Karnataka reported highest morbidity prevalence (112 per thousand population). Compared to this, the morbidity rate in the states of eastern region is 82 per thousand population.

Acute, chronic and 'others' ailments

Both acute and 'others' ailments indicate significant age differences, with almost same pattern of age differentials in the prevalence of 'acute' and 'others' ailments as in the case of any morbidity prevalence. However, the results show a positive relationship between age and prevalence of 'chronic' morbidity. Clearly, the aged are suffering from a disproportionate burden of chronic diseases. While sex differentials are marginal for acute and other diseases, the reported prevalence of chronic diseases is found to be considerably greater among females than males. Though the differences in the prevalence of acute ailments by education are not noted, the prevalence of chronic ailments is very high among the illiterates than the educated. Caste differences are also observed with the highest prevalence of 'acute', 'chronic' and 'other' diseases in 'others' and lowest in scheduled tribes. However, the caste differences are more striking for the prevalence of 'chronic' diseases with the prevalence rate being reported more than three times in 'others' than in the scheduled tribes. The analyses indicate that the prevalence of both acute and chronic disease differ marginally across income groups. Contrary to this, the prevalence of chronic ailments is reported three times greater in the highest income

Table 1: Prevalence of ailments by selected background characteristics in India, 2004 (Per thousand population)

	Any ailment	Acute	Chronic	Others
Sex				
Male	86	44	30	15
Female	97	43	40	18
Age				
0-9	89	69	5	14
10-19	45	28	8	9
20-49	71	30	26	16
50-59	139	48	73	23
60+	310	80	218	42
Education				
Illiterate	110	44	52	20
Literate upto middle complete	85	44	29	15
Middle complete or higher	79	41	27	14
Caste				
Scheduled tribe	58	34	15	10
Scheduled caste	88	45	28	16
Other backward caste	88	43	32	16
Others	106	44	48	19
MPCE				
Q1	70	36	22	13
Q2	82	43	25	16
Q3	90	46	31	15
Q4	105	49	41	18
Q5	124	45	66	22
Place of residence				
Rural	88	44	31	16
Urban	99	40	47	18
Region				
East	82	40	27	16
West	93	42	43	14
North-central	84	46	24	14
North	88	40	35	14
South	112	44	54	22
Season				
January-March	97	46	37	17
April-June	85	41	37	16

Note: Sum of prevalence of acute, chronic and 'other' ailments may not add up to prevalence of any ailment because of co-morbidity.

quintile than in the lowest income quintile. The prevalence of acute ailments is reported more in the rural areas but it is the reverse for chronic ailments. The regional variations are marginal for acute ailments. On the other hand, stark regional variations are found in case of chronic ailments with the highest prevalence in south and lowest in east.

Regression Analysis of Factors Affecting Morbidity

Table5 presents the results of the probit regression analysis which provide the independent effects of different background variables on the reported health status of the population. The results indicate the probability of persons suffering from any ailment compared to the reference category during the reference period, when the effects of other variables are controlled. The dependent variables are dichotomous in nature taking the value of one if it was reported that an individual had suffered from any kind of ailments during the 15 days prior to the survey. The explanatory variables included in this model are: age, sex, place of residence, caste, education, per capita consumption expenditure, season and region.

Age is found to be an important indicator. The predicted probabilities by age confirm positive relationship between age and morbidity. The dummy variable sex shows that females are more likely to report ailments than the males. The analysis also confirmed the caste differences observed in the bivariate analysis with the lowest probability for scheduled caste and highest probability for the 'others'. Contrary to the finding of the bivariate analysis, it is observed that persons living in rural areas have greater probability to report morbidity than the urban people. The inverse relationship observed by the bivariate analysis between education and morbidity prevalence, is also confirmed by probit regression. A positive association has emerged between MPCE and morbidity prevalence. While persons belonging to the highest expenditure quintile have the highest probability (Pr=0.11) to report illness, persons belonging to lowest quintile (Pr=0.07) have lowest probability of reporting sickness.

The seasonal variations in morbidity prevalence are found to be significant. As compared to months of January-March, the probability of becoming ill is lower for the months of April-June. Persons living in southern states have the highest probability to report an ailment, followed by their counterparts in north, north-central, west and eastern region.

Table 2: Change in predicted probabilities at means for changes in determinants of morbidity prevalence, India, 2004

Background Characteristics	Predicted probability	Confidence Interval	Background Characteristics	Predicted probability	Confidence Interval
Age (years)			**MPCE**		
0-9	0.043	(0.042, 0.044)	Q1	0.068	(0.066, 0.069)
10-19	0.067	(0.066, 0.068)	Q2	0.076	(0.075, 0.077)
20-49	0.098	(0.097, 0.099)	Q3	0.085	(0.084, 0.086)
50-59	0.140	(0.138, 0.142)	Q4	0.095	(0.094, 0.096)
60+	0.192	(0.188, 0.195)	Q5	0.106	(0.104, 0.108)
Sex			**Residence**		
Male	0.084	(0.082, 0.085)	Rural	0.087	(0.086, 0.088)
Female	0.086	(0.085, 0.088)	Urban	0.081	(0.079, 0.083)
Caste			**Region**		
Scheduled tribe	0.078	(0.077, 0.079)	East	0.069	(0.068, 0.070)
Scheduled caste	0.080	(0.079, 0.081)	West	0.078	(0.077, 0.079)
Other backward caste	0.082	(0.081, 0.083)	North-central	0.087	(0.086, 0.088)
Others	0.094	(0.092, 0.095)	North	0.097	(0.096, 0.099)
Education			South	0.108	(0.106, 0.110)
Illiterate	0.099	(0.098, 0.102)	**Season**		
Literate upto middle	0.086	(0.085, 0.087)	January-March	0.091	(0.089, 0.092)
higher	0.073	(0.071, 0.074)	April-June	0.079	(0.078, 0.081)

Note: Predicted probabilities at population means for all variables except the one indicated.

Summary

We presented evidence on levels, differentials and determinants of morbidity prevalence in India. The country has achieved significant gains in life expectancy in the last few decades but the overall health conditions of the population appear to have worsened as it is having very high level of morbidity prevalence with considerable inter-state differences in morbidity prevalence. Though the demographically and socially advanced states like Kerala, Punjab and West Bengal have lower infant mortality and greater life expectancy, the reported morbidity prevalence rates in these states are highest in the country. Contrary to this, socio-economically

poorer states like Bihar, Madhya Pradesh and Rajasthan have reported lowest morbidity rates. Some researchers, commenting on this, have suggested that there may be serious flaw in the health care surveys, which is primarily dependent on the self-reported illness of the respondents (Sen 2002; Dilip 2002; Visaria 1994; Murray 1992). The other common argument for the rise in reported morbidity prevalence is that the people with higher level of education and media exposure are more conscious in these states, which may lead to better reporting of ailments. These findings and the arguments warrant an immediate attention of the survey designers to adopt more appropriate methodologies to address the above issues.

The analyses clearly indicate that various demographic, social and economic characteristics are important determinants of ill health in India. Significant gender inequality is observed in morbidity prevalence with females at greater risk of ill health than males. This is inconsistent with the findings of other studies which had used the earlier rounds of NSS. This means that the present round of NSS gives better estimates of morbidity for females than the earlier rounds. However, it could be possible that even the present level of morbidity is under-reported.

It is observed that prevalence of illness increase with age. While acute ailments is responsible for high morbidity prevalence among the children, chronic ailments has caused the rise in morbidity prevalence among the elderly. The high prevalence rate of chronic illness among the aged population points to the need for special targeting of health care services for the elderly.

Prevalence of ailments varied significantly among different social groups. People from the scheduled tribes and scheduled castes communities reported lower prevalence of ailments than people belonging to all other social groups. The scheduled tribe communities are mostly concentrated in areas where the availability of health care services is minimal, even non-existent. Therefore, low literacy, limited exposure to media and lack of health care services may lead to underreporting of ailments among the SC/ST people.

Surprisingly, it is found that the burden of the ailments is reported to be higher among better-off sections than the poor. This could be again largely due to underreporting of morbidity by the poor people. Furthermore, the higher reported prevalence of chronic diseases resulting

from higher prevalence of life-style related diseases among the rich people could also have contributed to the greater burden of illness among them. Seasonal variations are observed, with morbidity being highest between January and March. Regional differences are striking, as the reported prevalence of ailments is higher in southern region followed by northern states compared to other regions in India. The greater social and economic development, coupled with greater accessibility of health care services could be responsible for the regional variations observed during the study. The rural-urban differences in reporting illness indicate that health conditions of the rural people are poorer than their urban counterparts. It is imperative that the health system needs to be expanded to the rural interior areas to provide health care access to these people.

References

Dilip T.R. (2002). Understanding levels of morbidity and hospitalisation in Kerala, India. *Bulletin of World Health Organisation*, 80 (9), 746-751.

Dror, David M (2006). Health Insurance for the Poor: Myths and Realities. *Economic and Political Weekly*, 41(43 & 44), 4541-4544.

Duggal, R. and S. Amin (1989). Cost of Health Care: An Household Level Survey in an Indian district. Bombay: Foundation for Research in Community Health.

Duriasamy, P (1998). Morbidity in Tamil Nadu. *Economic and Political Weekly*, 33(17), 982-990.

Krisnaswami, P (2004) 'Morbidity Study - Incidence, Prevalence, Consequences, and Associates', *Discussion paper*, Kerala Research Programme on Local Level Development, Centre for Development Studies.

Gumber, A. and Kulkarni (2000). Health Insurance for Workers in Informal Sector, Detailed Results from a pilot study. New Delhi: National Council for Applied Manpower Research.

International Institute for Population Sciences (IIPS) and World Health Organisation. 2006. Health System Performance Assessment: World Health Survey, 2003, West Bengal, International Institute for Population Sciences, Mumbai, India.

Murray CJL, Chen LC (1992). Understanding morbidity changes. *Population and Development Review*, 18:481-503.

Navaneetham K., M. Kabir and C.S. Krishnakumar (2006) 'Patterns and Determinants of Morbidity in Kerala' paper presented at the International Conference on Emerging Population Issues in the Asia Pacific Region: Challenges for the 21st Century, International Institute for Population Sciences, Mumbai, India, December 10-13, 2006.

Peters, David H., Yazbeck Abdo S., Sharma Rashmi R., Ramana G.N.V., Pritchett Lant H. (2002). Better Health Systems for India's Poor: Findings, Analysis and Options. The World Bank

Registrar General of India. (2001). Final Population Totals, New Delhi, Office of Census Commissioner.

Sen, A. (2002). Health: perception versus observation- Self reported morbidity has severe limitations and can be extremely misleading. *British Medical Journal 324(7342)*, 860-861.

Sen, Gita and Aditi Iyer (2000). Health sector changes and health equity in the 1990s, In Raghuram, Sobha (eds.) Health and Equity-Effecting Change. Technical Report Series 1.8. Humanist Institute for Cooperation with Developing Countries, Netherlands.

Sundar (1995). Household Survey of Health Care Utilisation and Expenditure. Working Paper No.53, NCAER, March