Morbidity in India: Trends, Patterns and Determinants

Soumitra Ghosh and Perinayagam Arokiasamy

International Institute for Population Sciences, Mumbai

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, 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. Since the data used in this study is based on self reported diseases from cross-sectional survey, differentials observed within a population may or may not be closer to true prevalence. 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. The differentials in hospitalisation among different population sub groups are also studied as the event hospitalisation can be considered relatively free from underreporting of ailments that do not require hospitalisation.

Although the relative burden of non-communicable compared to communicable diseases is increasing in India as a result of the rapid epidemiological transition, a significant component of the burden of disease in the population, however, still remains attributable to communicable disease. The prevalence of communicable and non communicable diseases tends to vary considerably across different subgroups, which will be explored in this study.

Review of previous studies

Measurement of health status has always been a multifaceted problem. The researchers have tried to measure health status of a population with a varied range of indicators such as mortality, morbidity, anthropometric measures, nutritional status or calorie intake. Among these, it is a general practice to use the infant mortality rate or life expectancy at birth in quantifying community or group health status since it is comparatively simple to analyse and data is easily available. However, 'morbidity', a state of ill health, has been increasingly recognized as a measurable indicator of health and well-being and also considered with a potential for replacing mortality rates as indices of social and personal well-being. (Dilip, 2002; Duriasamy 1995; Ghosh, 2005; Murray, 1998).

Of late, many studies have used self-reported illness to measure health status because of its consistent relationships with future mortality in many countries (Nicholson, Bobak, Murphy, Rose and Murmot, 2005; Idler and Benyamini, 1997) 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. However, the information on self reported morbidity collected in various healthcare surveys might be affected by proxy reporting, levels of health care consciousness, standard of living and recall lapse. Despite these well-recognised problems and difficulties of measurement, there can be little doubt that good information on morbidity would be extremely useful (Sen, 1998).

There have been few studies that tried to examine the morbidity pattern across population groups for states and at country level in India using large-scale data from various rounds of National Sample Survey Organisation (NSSO) devoted to morbidity assessment (Dilip, 2002; Duriasamy, 1995; Murray, 1992). These are generally descriptive in nature. A few 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). Morbidity estimates from the surveys in India are biased against the females (Sundar, 1992, Iyer and Sen, 2000; Mahiwala, et al.2000; Krishnaswami, 2004). Gender differentials were insignificant for acute ailments but chronic ailments were significantly lesser in females who were having relatively longer life span than males, which was rather surprising (Kannan, et al. 1991). This is attributed to underreporting of ailments by women since majority of interviewers used in both of these surveys were males.

Surveys also show that morbidity rates are higher in rural areas than in urban areas (Gumber and Kulkarni, 2000; Duggal and Amin, 1989; Sundar 1992; NCAER, 1992; Satya Sekar, 1997 NSSO, 1998). Others found that morbidity rates are higher in urban areas than in rural areas (Duriasamy, 1995; Sundar 1995; Mahiwala, et al, 2000). Studies in India provide varying pattern of evidence about the relationship between household income or consumption expenditure and prevalence of illness. Dilip's (2002) study on Kerala's morbidity pattern and Duggal and Amin's (1989) study in Maharashtra found that prevalence of both acute and chronic diseases was higher in upper income classes than in lower income classes. In contrast, a recent study by Navaneetham (2006) concluded that the probability of ill health for the poor is significantly higher than the rich. An inverse relationship is found between education and morbidity prevalence (Duriasamy, 1998; Navaneetham, 2006). However, other studies found positive association between education and morbidity prevalence (WHO-WHS, 2007). In sum, there is very little information available about the disease profile of different population groups in India.

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.

Methods

The prevalence of ailments and hospitalization rates were calculated with information from the survey on any person who had fallen ill during the 15 days leading up to the survey and on

hospitalization cases during the year up to the date of the survey, respectively. 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

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

$$Annual\ hospitalisation\ rate = \frac{Number\ of\ persons\ hospitalized}{Total\ number\ of\ persons\ alive\ in\ the\ sample\ households} * 1000$$

The morbidity prevalence rate presented in this chapter 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 differences in morbidity prevalence levels by selected background factors will indicate the unequal burden of morbidity in the population. Consequently, attempt is made to examine the differences in morbidity levels by individual characteristics as well as household socio-economic characteristics. For both hospitalized and ailment cases, the percentage distribution

by type of disease is further examined. Logistic regression analyses are performed to study independent effect of various predictor variables on the morbidity prevalence.

Since the various socioeconomic background and demographic characteristics simultaneously affect the disease prevalence pattern, multinomial logistic regression is carried out to estimate the effects of covariates on the reporting of ailments, namely communicable, non communicable, other diagnosed and undiagnosed diseases. The basic comparative scheme of the disease pattern used in this study encompasses four mutually exclusive categories:

1) Whether the person has suffered from any illness and if yes, it is coded as one for suffering from communicable disease,
2) coded as two for having non communicable disease and
3) coded as three for suffering from "Others" diseases
4) no disease

The "others" diseases include other diagnosed and undiagnosed diseases. It should also be noted that the incidents of accidents/injuries/burns/fractures/poisoning and various types of disabilities have been included in the non communicable diseases category for the sake of convenience. In view of previous evidence of considerable variation in terms of health care services provision between rural and urban areas, analysis is being carried out separately for rural and urban areas.

Table1 Trends in morbidity prevalence and hospitalisation rate by sex for rural and urban population, India, 1995-96 to 2004

	Morbidity Prevalence Rate				Hospitalisation Rate			
	Rural		Urban		Rural		Urban	
	1995-96	2004	1995-96	2004	1995-96	2004	1995-96	2004
Male	54	83	51	91	14	23	20	31
Female	57	93	58	108	13	22	20	31
Total	55	88	54	99	13	23	20	31
F/ M Ratio	1.06	1.12	1.14	1.19	0.93	0.96	1.0	1.0

Trends in morbidity and hospitalisation

Table 1 presents the trends in sex specific morbidity prevalence and hospitalisation rates during the period 1995-96 and 2004 for rural and urban population of India. The morbidity prevalence rate per thousand population was 55 in rural areas and 54 in urban areas in1995-96. The morbidity prevalence was marginally higher among females in rural areas and about the same in urban areas. The morbidity prevalence rate has increased significantly from 55 per thousand population to 88 per thousand population in the rural area and it increased from 54 per thousand population to 99 per thousand population in the urban area 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.

The reported rate of morbidity prevalence was higher among females (93 per thousand) than males (83 per thousand) in the rural and in the urban areas (108 per thousand for females and 91 per thousand for males). In fact, the gender differentials in morbidity prevalence has widened over the period 1995-96 to 2004. During the same period 1995-96 to 2004, the hospitalisation rate has increased from 13 per thousand population to 23 per thousand

population in the rural areas and 20 to 31 in the urban areas. Though the hospitalisation rate for males remained marginally higher compared to females in the rural areas between 1995-96 and 2004, it was same for both sexes in 1995-96 and in 2004 in the urban areas.

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. However, despite the increase in morbidity level among women, many researchers perceive NSS gives a lower estimate of morbidity prevalence among women (Sen, 2000).

Levels and regional variations in morbidity and hospitalisation

The age and sex specific estimates of morbidity and annual hospitalisation rates for rural and urban areas of India are presented in table 2 and 3. The prevalence rate of temporary illness per thousand population was 88 in the rural and 99 in the urban areas. The reported morbidity prevalence rate was higher among females (93 per thousand population) than among males (84 per thousand) in rural areas and urban areas (91 per thousand for males and 109 per thousand for females). The hospitalisation rate for rural area is 23 per thousand population compared to 31 in urban areas. Although the hospitalisation rate for males (23 per thousand) is slightly higher than females (22 per thousand) in rural areas, however, the sex differentials are not in urban areas.

Prevalence of morbidity for males was higher for children 0-4 years, followed by a declining trend till age group 15-24 with a rising trend again at higher ages. On the other hand, the

morbidity prevalence for females followed a similar pattern except that it declined till 5-14 years age group in rural areas. This could be due to the fact that girls are married off at an early age and they are subjected to the risk of ill-health. In both rural areas, female had lower morbidity prevalence in almost all age groups, except for women in the age group 15-59, majority of this time span is the critical age for childbearing. Somewhat similar pattern was observed in urban areas with the higher morbidity prevalence in almost all age groups except 0-4 and 5-9 year age groups.

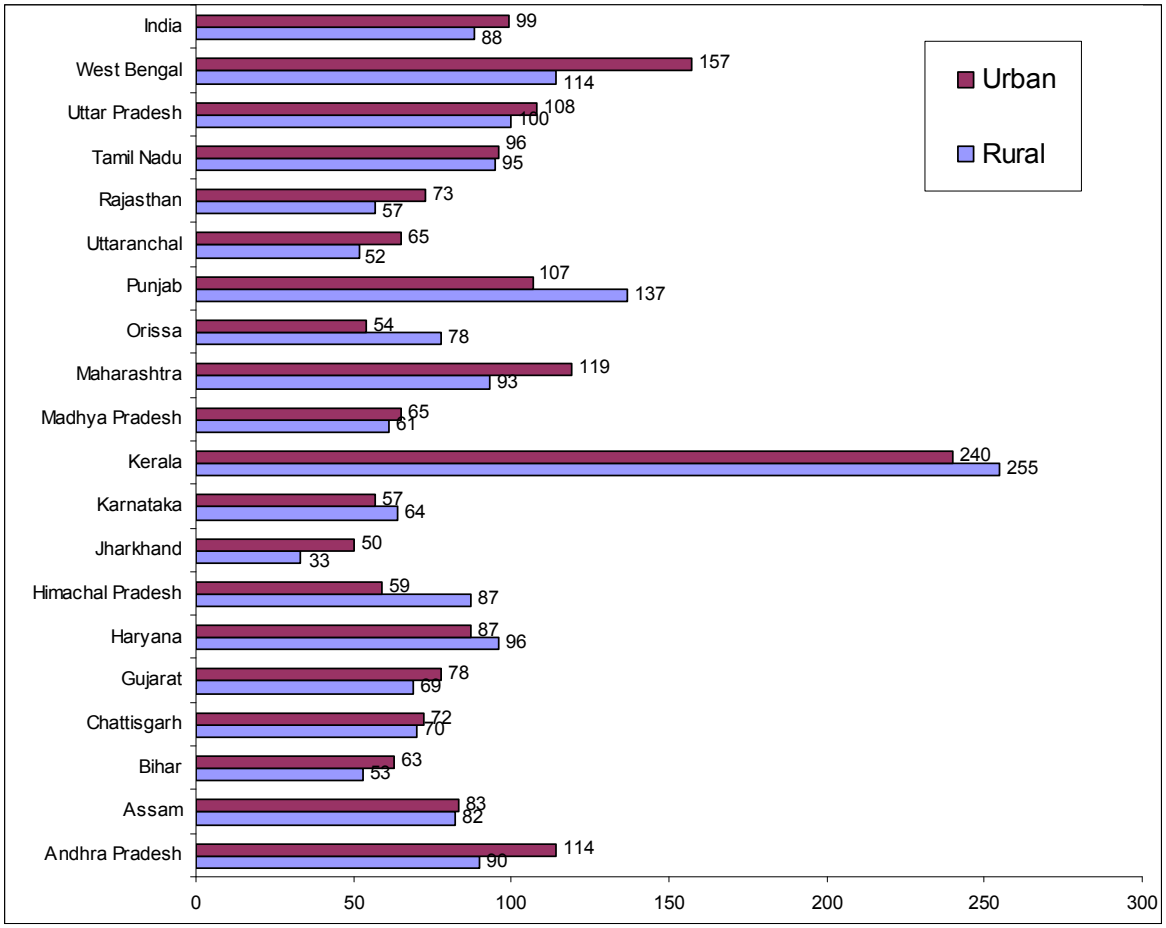
Hospitalised cases also indicate significant age differences, with almost same pattern of age-sex differentials in hospitalisation rate as in the case of morbidity prevalence. The age-sex specific hospitalisation rate followed 'J' shape as the hospitalisation rate is higher in 0-4 age group with a decline in age 5-14 and then it starts increasing. The highest hospitalisation rate is observed for elderly persons aged 60+. Females have lower hospitalisation rate in most age groups compared to males, except in childbearing age group of 15-44 years in both rural and urban areas.

Inter-state Differentials in Morbidity Prevalence

State level morbidity prevalence rates are presented according to place of residence in figure1. It can be seen that relatively higher morbidity prevalence has been reported in the states of Kerala, Punjab, West Bengal, Uttar Pradesh, Tamil Nadu and Maharashtra in the rural areas and Kerala, West Bengal, Maharashtra, Andhra Pradesh, Uttar Pradesh and Punjab in the urban areas. The states where the reported rates of morbidity prevalence are relatively low are Jharkhand, Uttaranchal, Bihar, Rajasthan, Madhya Pradesh and Gujarat.

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 and rural-urban areas. 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 Jharkhand, Bihar, Madhya Pradesh and Rajasthan have reported lowest morbidity rates.

Figure1: Morbidity prevalence rate by residence and major states, 2004



Previous studies suggest that this type of variations occur because of variations in morbidity reporting as a result of awareness, 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 epidemiological transition.

Table 2: Prevalence of ailments during 15 days prior to the survey date by age and sex in India, 2004 (per thousand population)

	Rural			Urban		
Age Group	**Male**	**Female**	**All**	**Male**	**Female**	**All**
0-4	127	112	120	138	129	134
5-14	52	45	49	61	51	56
15-24	41	52	46	43	47	45
25-34	45	71	58	49	78	63
35-44	71	104	87	72	104	87
45-59	107	132	120	127	173	150
60+	285	282	283	352	383	368
Total	83	93	88	91	108	99

Table 3: Hospitalisation rate by age and sex in India, 2004 (per thousand)

	Rural			Urban		
Age Group	**Male**	**Female**	**All**	**Male**	**Female**	**All**
0-4	24	13	19	36	26	32
5-14	11	8	9	15	13	14
15-24	16	18	17	17	23	20
25-34	20	26	23	19	29	24
35-44	25	29	27	33	33	33
45-59	41	37	39	51	45	48
60+	63	49	56	102	81	91
Total	23	22	23	31	31	31

Morbidity and hospitalisation by background characteristics

The evidence of differentials in morbidity by various background characteristics are discussed in this section.

Morbidity

The morbidity rates among the currently married were 96 and 114 per thousand respectively in rural and urban areas and 220 and 276 per thousand respectively among the widowed/divorced/separated. The lowest prevalence (66 and 67 per thousand in rural and urban areas) is reported among the never married. Never married are largely younger persons and therefore, they are less likely to suffer from illness. Moreover, the illness suffered by the never married persons may not get accurately reported because, irrespective of its severity, any reporting of illness might have an unfavourable impact on the marriage prospects of the person (Duriasamy, 1998).

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 104 per thousand in the rural areas and 130 per thousand in the urban areas. However, the prevalence of ailments is about a third lower (69 and 90 per thousand population) among the people with education upto middle school complete or higher.

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

in both rural and urban areas. The prevalence of ailments in the richest quintile (155 and 116 per thousand in rural and urban areas) is much higher compared to the poorest quintile (64 and 75 per thousand).

Corroborative evidence to this is seen in terms of differentials in prevalence of ailments by employment. The unemployed persons and casual workers who are most likely to be from economically poor background reported lower morbidity prevalence rate of 56 and 62 per thousand respectively in rural and urban areas. Nevertheless, the lowest morbidity prevalence rate is reported among the students. It is quite likely because the students must be in the age group 5-24 years and therefore, the probability of suffering from illness is very low. On the other hand, the highest prevalence of illness is recorded among the pensioners/remittance receivers as many of them are aged and therefore prone to illness. As anticipated, morbidity prevalence rate is observed second highest among the employers (231 per thousand and 142 per thousand respectively in the rural and urban areas). The morbidity rate is also significantly higher among the 'others'. Persons belonging to the category 'others' are neither working nor they are available for any work. It also includes the 'not reported' cases. It is difficult to assess the reason for the higher prevalence of morbidity and hospitalisation among persons of 'others' category.

Surprisingly, the reported morbidity prevalence rate among the ST is considerably lower than other social groups. The morbidity prevalence rate of 58 per thousand in rural areas and 62 per thousand in urban areas among the scheduled tribes is almost half compared to "Others" group (102 per thousand and 113 per thousand in rural and urban areas respectively). 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.

An inverse relationship is observed between household size and morbidity prevalence rates. Small families consisting of four members or less experienced higher rate of morbidity than large families having seven or more members. This finding is consistent with the results of another study in which the larger households reported fewer illness episodes compared to smaller households (Dror, 2006).

The burden of ailments was higher during January-March (92 and 109 per thousand population in rural and urban areas respectively) compared to the period April-June (84 and 89 per thousand population in rural and urban areas) 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 have reported highest morbidity prevalence and hospitalisation rate of 112 and 113 per thousand respectively. Compared to this, the morbidity rate in the states of eastern region is 77 per thousand in the rural areas. The lowest morbidity prevalence in the urban areas (63 per thousand) is recorded in the states of Northern region.

Hospitalization

The hospitalisation rate was substantially higher in urban areas (34 per thousand) compared to rural areas (22 per thousand). Since the health care infrastructure, especially the curative health care facilities which are mainly located in urban areas, the urbanities had greater access to

inpatient treatment than their rural counterparts. The hospitalisation rate was high in the 0-4 age group, showed a decline for age up to 14 years and then an increase for higher ages displaying the commonly reported 'J' shaped relationship. Although the hospitalisation rate for females (22 per thousand population) was marginally lower for males (23 per thousand) in rural areas, no sex difference was reported in urban areas (23 per thousand both for males and females).

The relationship between hospitalisation rate and level of education is not very clear. However, the illiterates continued to be the worst hit as the hospitalisation rate (32 per thousand) was the highest among them in the urban areas. On the other hand, hospitalisation rate is lower among illiterates (21 per thousand) and highest among the middle school complete or higher (30 per thousand) in the rural areas. This might arise because of inaccessibility of health care services for illiterate and poor people in rural areas. A wide gap is found between the poorest and the richest MPCE quintile in terms of utilizing curative services in rural areas. Individuals of highest expenditure quintiles were thrice more likely to seek inpatient treatment than their counterparts belonging to lowest expenditure quintiles.

By caste, as in the case of ailments, the hospitalisation rate was also higher (25 per thousand) among the SC, OBC and 'others' than ST population (14 per thousand) in rural areas. But no caste difference was observed in hospitalisation rate in the urban areas. The hospitalization rate was also higher in smaller sized households than in larger sized households. Substantial regional differences were observed but seasonal differences were insignificant. The lowest hospitalisation rate is recorded for the North-central region (14 per thousand), with the highest hospitalisation rate for the Southern region (39 per thousand) followed by West (30 and 36 per

thousand in rural and urban areas respectively), North (28 and 22 per thousand in rural and urban areas respectively) and East (16 and 27 per thousand in rural and urban areas respectively). This is not surprising since the hospital bed-population ratio is lowest in the North-Central region, followed by East and North with the highest in the Western and Southern regions. The hospitalisation rates are significantly higher in Kerala, Tamil Nadu, Himachal Pradesh, Maharashtra and Gujarat compared to other states (Figure 2).

Figure2: Hospitalisation rate by residence and major states, 2004

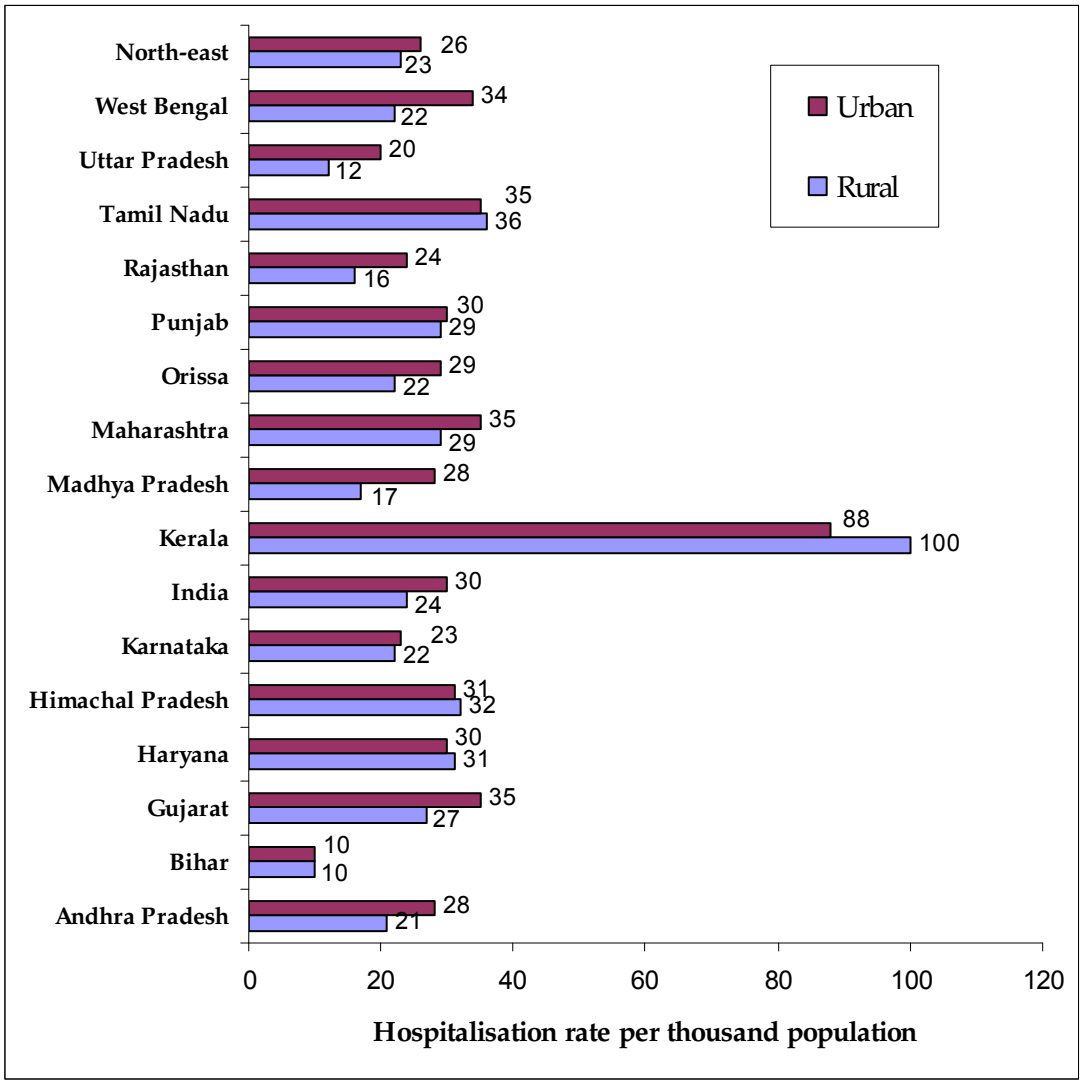


Table 4: Prevalence of ailments and hospitalisation rates by selected background characteristics in India, 2004 (Per thousand population)

Background Characteristics	Morbidity Prevalence and Hospitalisation Rate			
	Rural		Urban	
	Any ailment	Hospitalization	Any ailment	Hospitalization
Sex				
Male	84	23	91	31
Female	93	22	109	31
Age				
0-4	120	19	134	32
5-14	49	9	56	14
15-24	46	17	45	20
25-34	58	23	63	24
35-44	87	27	87	33
45-59	120	39	150	48
60+	283	56	368	91
Marital Status				
Never Married	66	13	67	19
Currently married	96	30	114	38
Widowed/divorced/separated	220	41	276	62
Education				
Illiterate	104	21	130	32
Literate, <middle complete	74	21	88	28
Middle complete or higher	69	30	90	30
Caste				
Scheduled tribe	58	14	62	29
Scheduled caste	88	20	86	29
Other backward caste	87	23	91	30
Others	102	25	113	29

Table 4: Prevalence of ailments and hospitalisation rates by selected background characteristics in India, 2004

Background Characteristics	Morbidity Prevalence and Hospitalisation Rate			
	Rural		Urban	
	Any ailment	Hospitalization	Any ailment	Hospitalization
Household size				
<=4	114	29	121	32
5-6	84	21	91	30
7+	73	18	82	27
Per capita monthly cons. expenditure				
Q1	64	14	75	21
Q2	82	18	84	24
Q3	92	24	83	26
Q4	116	33	96	30
Q5	155	45	116	34
Employment				
Self-employed	96	27	92	31
Salaried/wage employed	65	33	85	31
Employer	231	88	142	47
Casual-worker	66	21	67	25
Unemployed	56	46	62	28
Student	49	10	52	14
Pensioners/remittance receiver	307	72	344	86
Others**	141	26	177	46
Season				
January-March	92	24	109	33
April-June	84	21	89	28
Region				
East	77	16	107	27
West	85	30	106	36
North-central	82	14	90	23
North	102	28	63	22
South	112	39	113	39

*** working in the household enterprises; ** includes beggars, prostitutes and 'not reported cases'**

Regression Analysis of Factors Affecting Morbidity and Hospitalisation

Table5 presents the results of the logistic regression analysis which provide the independent effects of different background variables on the reported health status of the population. The odds ratios indicate the probability of persons suffering from any ailment and being hospitalised 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 or being hospitalised in the last one year or zero otherwise. The explanatory variables included in this model are: age, sex, marital status, place of residence, caste, household size, education, per capita consumption expenditure, employment, season and region.

The results indicate that age is an important indicator. The odds ratios by age are highly significant and confirms a 'J' shaped relationship between age and morbidity. The dummy variable sex shows significant effect on morbidity prevalence as the females 0.96 times less likely to report ailments than the males.

The likelihood of reporting an ailment is significantly higher (17 percent) among currently married persons than the never married persons. The widowed/divorced/separated persons are 16 percent more likely to report ailments than the never married people. Contrary to the finding of the bivariate analysis, it is observed that persons living in urban areas are 12 percent less likely to report morbidity than the rural people. Interestingly, persons from the scheduled caste community are 66 per cent more likely to report as sick compared to scheduled tribes people. On the other hand, persons of 'other backward caste' and 'others' category are 50 and

62 percent respectively more likely to report morbidity than the scheduled tribes. The inverse relationship observed by the bivariate analysis between household size and morbidity prevalence, is also confirmed by logistic regression. A positive association is also found between MPCE and morbidity prevalence. Persons belonging to the highest expenditure quintile are 68 percent more likely to report illness than persons in the lowest MPCE. On the other hand, there is a negative association between education and prevalence of morbidity since the people having middle school or higher education were at lower risk of suffering from diseases (OR= 0.84*) than the illiterates.

People who fall in the "others" category comprising of 'not reported' cases, beggars and prostitutes, are 2.70 times more likely to report from illness than the self-employed people, followed by the pensioners/remittance receivers (OR=1.91*) who are mostly the older persons and therefore are prone to sickness. Persons belonging to 'Employers' category are also 1.75 times more likely to report illness than the self-employed people. As expected, persons in the 'casual workers' category have the least likelihood (OR=0.91) to report any illness.

The seasonal variations in morbidity prevalence are found to be significant. As compared to months of January-March, the probability of becoming ill is 13 per cent less for the months of April-June. Persons living in southern states are 62 percent more likely to report an ailment than their counterparts in eastern region. Persons from the western, north-central and northern regions are 30 per cent, 34 percent and 5 percent more likely to reveal any sickness compared to the people living in the eastern region.

The effect of age on hospitalisation is positive and statistically significant implying that the chance of getting hospitalised increases with age. Females are 21 percent less likely to seek hospitalised treatment than their male counterparts. The effect of marital status on the risk of hospitalisation is significant with the currently married people having 72 percent more likelihood to seek inpatient treatment than the never married persons. Even the widowed/divorced are 51 percent more likely to be hospitalised than the never married people. Interestingly, it is found that urbanities are 9 percent less likely to seek hospitalised care than their rural counterparts after controlling other socioeconomic factors. Similar to the pattern observed in morbidity prevalence by caste, scheduled castes are having higher odds of hospitalisation (OR=1.22*) compared to the scheduled tribes. The odds of hospitalisation are 1.12 and 1.10 times higher for other backward castes and 'others' than the scheduled tribes.

MPCE shows a robust positive association with hospitalisation with a greater likelihood of seeking inpatient treatment for those belonging to the upper MPCE quintile. Hospitalisation is about 1.42 times more likely for those belonging to the highest MPCE quintile than for those in the lowest MPCE quintile. The likelihood of hospitalisation is 4 per cent less during the period April-June than in the period of January-March. Household size and hospitalisation is found to be inversely related. The larger the size of the household, lower is the likelihood of getting hospitalized. The households with 7 or more members are 33 percent less likely to get inpatient treatment compared to the small households with 4 or less members.

The likelihood of being hospitalised are 0.91, 1.17, 1.28, 1.91, 2.58 and 1.47 for casual workers, unemployed, student, pensioners/remittance receivers, others and employer compared to the self employed people. The lowest risk of being hospitalised (OR=0.91) is observed among the

casual workers and self-employed. The odds of hospitalisation for southern states is found to be higher (OR=1.26) than their counterparts in eastern region. Persons in the western region are also having greater likelihood (OR=1.17) of being hospitalised than people belonging to eastern region.

Table 5: Logistic regression analysis of determinants of ailments and hospitalization in India, 2004

Background Characteristics	Odds Ratio	
	Any ailment	Hospitalization
Age (years)		
0-4 (ref)		
5-14	0.65*	1.01
15-24	0.72*	1.58*
25-34	0.92**	1.65*
35-44	1.41*	2.20*
45-59	2.19*	2.84*
60+	4.45*	2.27*
Sex		
Male (ref)		
Female	1.00	0.84*
Marital Status		
Never Married (ref)		
Currently married	1.17*	1.72*
Widowed/divorced/separated	1.16*	1.51*
Place of residence		
Rural (ref)		
Urban	0.88*	0.91*
Caste		
Scheduled tribe		
Scheduled caste	1.66*	1.22*
Other backward caste	1.50*	1.12*
Others	1.62*	1.10*
Household size		
<=4 (ref)		
5-6	0.82*	0.83*
7+	0.69*	0.67*

Table 5: Logistic regression analysis of determinants of ailments and hospitalization in India, 2004

Background Characteristics	Odds Ratio	
	Any ailment	Hospitalization
Education		
Illiterate (ref)		
Literate, <Middle complete	1.10*	1.08*
Middle complete or higher	0.84*	0.92*
Quintile (MPCE)		
Q1(ref)		
Q2	1.19*	1.07*
Q3	1.24*	1.16*
Q4	1.43*	1.28*
Q5	1.68*	1.42*
Employment		
Self-employed ®		
Salaried/wage employed	0.98	0.99
Casual-worker	0.91*	0.91*
Unemployed	1.24*	1.17*
Student	1.43*	1.28*
Pensioners/remittance receiver	1.91*	1.91*
Others**	2.70*	2.58*
Employer	1.75*	1.47*
Season		
January-March (ref)		
April-June	0.87*	0.96*
Region		
East		
West	1.28*	1.15*
North-central	1.32*	0.99
North	1.04**	0.92*
South	1.60*	1.24*

Type of illness

The variation in the estimates of morbidity prevalence rates by type of diseases and place of residence are provided in table 5. The share of communicable diseases in rural and urban areas is 12 and 10 percent of total ailment cases. The non-communicable diseases accounted for about 56 and 70 percent of the ailment cases in the rural and urban areas respectively. About 4 percent of the ailments were due to disabilities in rural and urban areas.

Among communicable diseases, diarrhoeal disease accounted for the largest share of ailment cases for both rural and urban areas. Whooping cough is widely prevalent in both rural and urban areas. People in the rural areas are more affected by malaria and Tuberculosis than their urban counterparts. Among the ailments, fevers of unknown origin are the most predominant. They accounted for 20 and 15 percent for rural and urban areas. About 7 and 4 percent people of rural and 7 and 3 percent people of urban areas are affected by respiratory and bronchial asthma.

Hypertension, diabetes and heart disease are the most widely prevalent non communicable diseases in the urban areas. The prevalence of hypertension is higher among females but the prevalence of heart disease is higher among males. Both rural and urban populations suffer from respiratory diseases. Gastritis, Bronchial asthma, disorder of joints and bones, Neurological disorders, diseases of skin diseases of kidney and urinary system, cataract and cancer were more prevalent in both rural and urban areas. Among the non-communicable diseases, fevers of unknown origin invariably affected the rural and urban people. The females are at greater risk of suffering from unknown fever than the males. Among the disabilities,

Table 1. Morbidity prevalence by type of disease and disability (per 100,000 persons), India, 2004

	Rural population			Urban population		
Ailments	*Male*	*Female*	*All*	*Male*	*Female*	*All*
Communicable Diseases	1210	1320	1230	1130	910	1000
Diarrhoea/Dysentery	480	510	500	410	380	390
Whooping cough	210	260	240	300	170	240
Malaria	190	190	190	100	110	100
Conjunctivitis	30	40	40	50	40	50
Tuberculosis	130	110	120	110	40	80
Other communicable diseases[1]	170	210	140	160	170	140
Non communicable diseases	5160	5990	5570	6230	7930	7030
Gastritis/Gastic or peptic ulcer	320	420	370	240	340	280
Cancer and other tumors	40	50	50	50	70	60
Hypertension	230	410	320	770	1230	990
Heart disease	180	160	170	530	470	500
Bronchial asthma	430	260	350	350	310	330
Diabetes mellitus	200	210	210	740	700	720
Neurological disorders	160	190	170	220	270	250
Respiratory including ear/nose/throat	660	610	640	790	740	760
Diseases of skin	240	200	220	170	200	190
Diseases of kidney/urinary system	110	60	80	120	120	120
Cataract	140	160	150	110	190	150
Fevers of unknown origin	1780	1950	1870	1460	1720	1580
Disorder of joints and bones	460	720	590	490	970	720
Other non communicable diseases[2]	210	590	380	190	600	380
Disabilities	420	390	400	360	410	390
Locomotor	200	170	180	160	180	170
Visual including blindness	100	120	110	60	100	80
Speech	30	10	20	40	40	40
Hearing	90	90	90	100	90	100
Accidents/Injuries/Burns/Fractures	340	160	250	360	180	270
Other diagnosed ailments	1200	1460	1330	1330	1790	1550
Other undiagnosed ailments	240	270	260	180	260	220

1 Hepatitis/ Jaundice, Ameobiosis, sexually transmitted diseases, eruptive, mumps, diphtheria, filariasis/ elephantiasis and others.

2. Prostatic disorders, gynecological disorders, goiter, tetanus, diseases of mouth/ teeth/ gum, anaemia

locomotor was the most widely prevalent, followed by visual including blindness and hearing. Injuries or accidents account for three percent of ailments both in rural and urban areas.

Figure 3 and 4 show the percent distribution of communicable, non communicable and other diseases by education and per capita monthly consumption expenditure among the persons who reported being sick.

Figure3: Prevalence of communicable, non communicable and other diseases by education, India among the ill persons, India, 2004 (Percent)

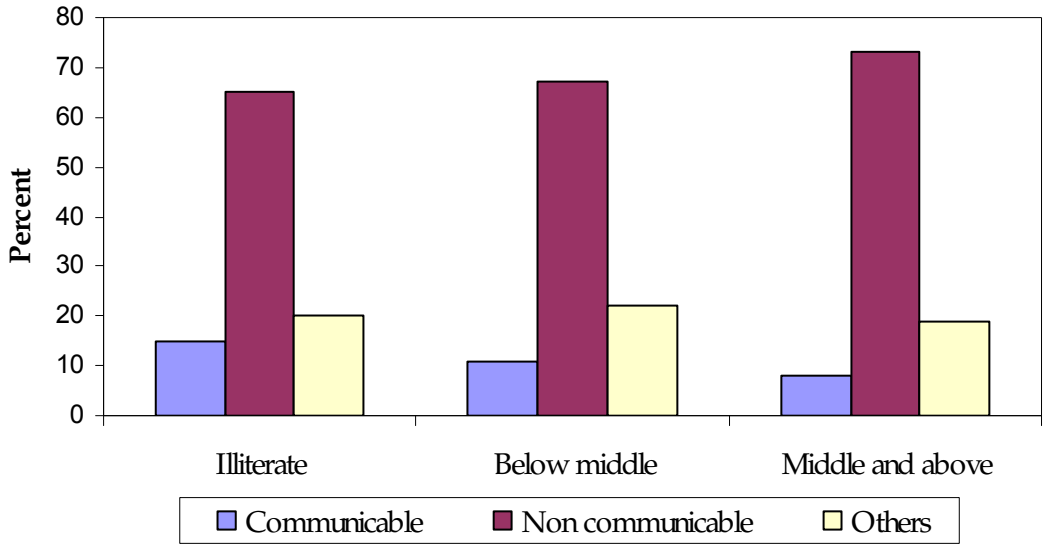
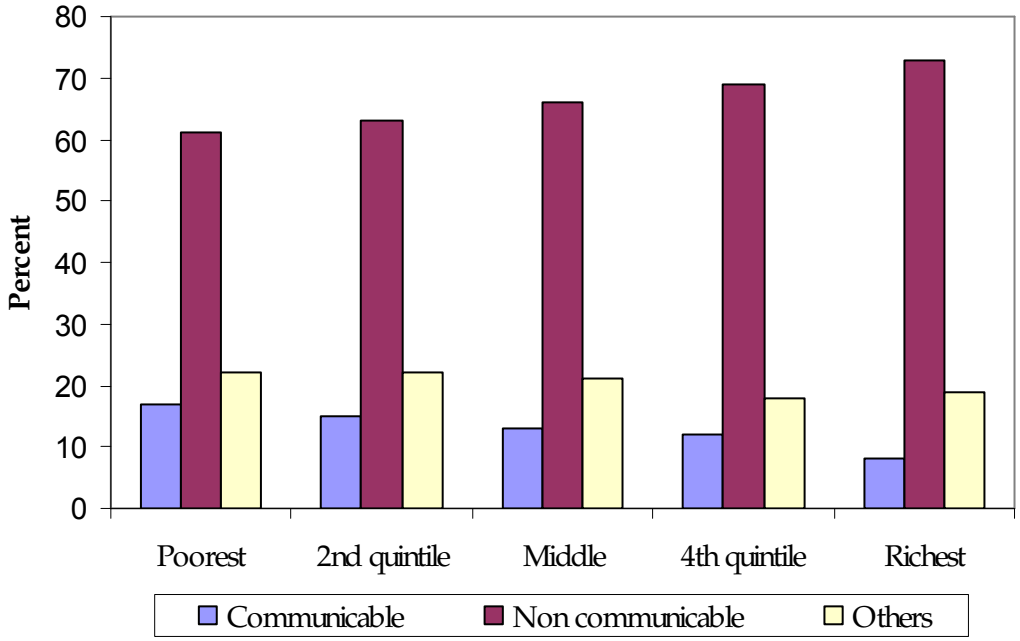


Figure 3 clearly shows the prevalence of communicable diseases rises with education. However, the relationship with education is reversed in case of non communicable diseases. Figure 4 shows there is an inverse relationship between the prevalence of communicable diseases and consumption expenditure. On the other hand, prevalence of non communicable diseases increases with monthly per capita consumption expenditure.

Injuries or accidents account for three percent of ailments both in rural and urban areas. Thirteen percent of ailments in rural areas and 16 percent of ailments in urban areas of the ailments are reported in 'other diagnosed' category. Three percent and two percent of ailments in rural and urban areas are reported in 'other undiagnosed' category. Among the disabilities, locomotor is the most widely prevalent, followed by visual including blindness and hearing.

Figure 4: Prevalence of communicable, non communicable and other diseases by mpce, India among the ill persons, India, 2004 (Percent)



Communicable and non-communicable diseases

Multinomial logistic regression analysis is carried out for the sample population who reported as sick within the reference period to understand the independent effects of socio-economic and demographic variables on the reported disease prevalence pattern, namely communicable, non communicable, other diseases which include diagnosed and undiagnosed diseases and

injuries. The predicted probabilities of multinomial logistic regression analysis are presented in Table7.

The probability of suffering from communicable diseases is lower among the females (p=0.09) than the males (p=0.11). On the other hand, females (p=0.71) are more likely to suffer from non communicable diseases than the males (p=0.68). The effect of age on predicted probability of suffering from communicable, non communicable and 'other diseases' in the event of an illness is quite significant. An inverse relationship is observed between age and probability of suffering from communicable diseases. However, results show the probability of suffering from non communicable diseases increases with age.

Although the impact of marital status on communicable diseases is almost negligible, it has significant effect on non communicable diseases. The never married and currently married are at higher risk of suffering from communicable and non-communicable diseases (Pr=0.72 & 69 respectively) compared with widowed/divorced/separated (Pr=0.67) people. The predicted probabilities for the widowed/divorced/separated (Pr=0.22) suggest that risk of having "others" diseases is higher among them compared to never and currently married people. As expected, education shows an inverse relationship with the risk of communicable diseases. However, the relationship between education and non communicable diseases is positive as the probabilities are 0.72, 0.69 and 0.67 for illiterates, literate (up to middle school) and the middle complete (or higher) people.

'Others' are found to have advantage over all other social groups with lower risk (Pr=0.09) of suffering from communicable diseases. Contrary to this, scheduled tribes are having the lowest

probability (Pr=0.68) of suffering from non communicable diseases. This is not surprising because of the fact that a significant contribution comes from the life-style related diseases in the overall burden of non communicable diseases and scheduled tribes are yet to be influenced by the life-style related diseases. Surprisingly, there is hardly any impact of household size on communicable, non communicable and 'others' diseases. Though the per capita monthly consumption expenditure shows a positive association with non communicable, it is negatively associated with communicable and 'others' diseases. Monthly per capita consumption expenditure has a strong effect on non communicable diseases as the people of highest quintile are more likely to suffer from non communicable diseases compared to the people belonging to the lowest quintile.

Persons from the 'self-employed' and 'salaried/wage earner' categories (Pr=0.12) are most likely to suffer from communicable diseases. On the other hand, the probabilities of having non communicable diseases are significantly higher (Pr=0.75, 73, 72 respectively) for people belonging to 'others', 'employers' and 'pensioners/remittance receivers' category. The rural-urban difference is minimum on the probability of suffering from communicable, non communicable and others diseases. Region has a significant impact, such that while persons residing in the southern region have the lowest probability for communicable diseases (Pr=0.07) than the eastern region (Pr=0.15), they are considerably more likely to suffer from non communicable diseases (Pr=0.72) than their counterparts from eastern region (Pr=0.66). The North also shows a greater probability (OR=1.66) of suffering from non communicable diseases than the eastern region.

Table 7: Predicted probabilities from multinomial logistic regression analysis of determinants on communicable, non communicable and other diseases

Background Characteristics	Communicable diseases	Non communicable diseases	Other diseases
Sex			
Male	0.11	0.68	0.20
Female	0.09	0.71	0.20
Age			
0-4	0.22	0.52	0.26
5-14	0.18	0.57	0.25
15-24	0.15	0.62	0.23
25-34	0.12	0.67	0.21
35-44	0.09	0.71	0.19
45-59	0.07	0.75	0.17
60+	0.06	0.78	0.15
Marital Status			
Never Married	0.10	0.72	0.18
Currently married	0.10	0.69	0.20
Widowed/divorced/separated	0.11	0.67	0.22
Education			
Illiterate	0.12	0.68	0.20
Literate, <middle complete	0.10	0.70	0.20
Middle complete or higher	0.08	0.72	0.20
Caste			
Scheduled tribe	0.12	0.68	0.20
Scheduled caste	0.11	0.69	0.20
Other backward caste	0.11	0.69	0.20
Others	0.09	0.71	0.20

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

Table 7: Predicted probabilities from multinomial logistic regression analysis of determinants on communicable, non communicable and other diseases

Background Characteristics	Communicable diseases	Non communicable diseases	Other diseases
Household size			
<=4	0.10	0.70	0.20
5-6	0.10	0.70	0.20
7+	0.10	0.70	0.20
Per capita Expenditure			
Q1	0.11	0.66	0.22
Q2	0.11	0.68	0.21
Q3	0.10	0.69	0.20
Q4	0.10	0.71	0.19
Q5	0.09	0.72	0.18
Employment			
Self-employed	0.12	0.62	0.25
Salaried/wage employed	0.12	0.64	0.23
Casual-worker	0.11	0.66	0.22
Unemployed	0.11	0.68	0.21
Student	0.10	0.70	0.20
Pensioners/remittance receiver	0.10	0.72	0.19
Others**	0.09	0.75	0.16
Employer	0.09	0.73	0.18
Sector			
Rural	0.11	0.69	0.20
Urban	0.10	0.70	0.20
Season			
January-March	0.10	0.71	0.19
April-June	0.11	0.68	0.21
Region			
East	0.15	0.66	0.19
West	0.13	0.68	0.19
North-central	0.10	0.70	0.20
North	0.08	0.71	0.20
South	0.07	0.72	0.21

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 and hospitalisation rate in India. The country has achieved significant gains in life expectancy in the last few decades; consequently, it is having very high level of morbidity prevalence with considerable inter-state differences in morbidity prevalence. The demographically and socially advanced states like Kerala, Punjab and West Bengal have lower infant mortality and greater life expectancy and with the rise in the elderly population, the reported morbidity prevalence rates in these states are highest in the country. Contrary to this, socio-economically poorer states like Jharkhand, Bihar, Madhya Pradesh and Rajasthan have reported lowest morbidity rates, plausibly as a result of younger population. 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 assess the true levels of morbidity prevalence.

Both disparities in terms of morbidity prevalence and incidence of hospitalisation-between rural and urban areas can be attributed to the lack of access to health care services (Chakraborty and Mukherjee, 2003). Morbidity prevalence for females is reported higher than males in both rural and urban areas whereas in case of hospitalisation, females have less probability of receiving inpatient treatment in the rural areas but no sex differences are found in the urban areas. In rural India, females receive a low priority when it comes to accessing

curative health care services. The prevalent patriarchal norms in the rural poor settings provide a greater priority to the health care needs of the males.

Prevalence of illness is higher among children aged 0-4 and persons above 60 years compared to other age groups, confirming the 'J' shaped pattern between age and morbidity prevalence. The prevalence of illness is higher among women in the reproductive age groups being another vulnerable group arising from complications of pregnancy and child-birth. The high prevalence rate of 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. Since this contradicts the perception that these disadvantaged groups are more vulnerable than 'others', consequently the question arises 'Are SC/ST communities healthier than the other social groups in India?' Caution is required in making any such inference because the backward communities are less likely to report ailments, due to lack of education and awareness about various ailments. 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. As expected, it is observed that the hospitalisation rates among the SC/ST are lowest compared to all other social groups in the rural areas. However, no such differences are found in the urban areas.

The prevalence of ailments is found to be inversely related with household size in rural areas. Dilip (2002) suggests that this might arise due to the underreporting by larger sized households. Surprisingly, it is found that the people who are better in terms of their economic well-being are at a higher risk of having health problems than the poor. 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. The inequality is starker in case of hospitalisation with the richer people having the highest hospitalisation rate. The hospitalisation rate is three times higher amongst the people of the richest quintile compared to those from the poorest quintile in the rural areas. This again proves that the curative health care services are mainly used by the richer sections of the society while the poor people are left out, especially in the rural areas. Such a pattern reiterates the need for better targeting of the curative health care services for the poor, the elderly and the women.

The disparities in terms of incidence of hospitalisation-between rural and urban and among socio-economic groups can be attributed to the lack of access (Chakraborty and Mukherjee 2003). Rural hospitals in India share only 15 per cent of the total hospital beds (Health Information of India 2004), although rural population contributes 72 percent in India (Registrar General of India, 2001).

Sseasonal variations are marginal, 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 western 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.

It is also found that various demographic, social and economic characteristics are important determinants of ill health in India. The prevalence of ailment and hospitalisation rates increase with age of individuals. The prevalence of ailments is greater in rural areas compared to urban areas. Significant gender inequality is observed in morbidity prevalence with females at greater risk of ill health than males. Individual's educational achievement appears to be negatively associated with ailment prevalence and hospitalisation even after controlling for other predictors. The probability of reported ill health for the rich is also significantly higher than the poor.

The distribution of diseases for ailment cases in India clearly showed that the country is passing through the advanced phase of epidemiological transition in which the contribution of non-communicable diseases to the total disease burden is increasing. In other words, the communicable diseases are being steadily replaced by the non-communicable diseases. It also presents a familiar picture of most developing countries where preventable diseases like diarrhoea, malaria, tuberculosis etc. still co-exist with modern life-style related diseases diabetes, heart disease and hypertension. These evidences suggest the need to adopt a double-edged strategy to combat the present epidemiological scenario of the country. India needs to upscale its investment more in public health programmes in order to eradicate the highly prevalent communicable diseases. At the same time, the health system should be prepared to face the challenges posed by the emerging burden of non-communicable diseases, especially among the growing elderly population.

References

Chakraborty, Achin and Subrata Mukherjee (2003). Health Care in West Bengal-What is Happening? *Economic and Political Weekly,*vol….No…,5021-5023.

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

_____(2001) Health status and illness burden in Kerala since mid 1980s.Mumbai. International Institute for Population Sciences (Unpublished PhD thesis).

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