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MORBIDITY PATTERNS IN KERALA: LEVELS AND DETERMINANTS

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ABSTRACT

This paper examines the levels, patterns, and determinants of morbidity in Kerala. This study is based on a community survey conducted in 2004, in three districts of the state namely Thiruvananthapuram, Malappuram and Kannur. The survey covers 3320 households having 17071 individuals in all age groups. Reported morbidity was captured for a period of fifteen days prior to the data of survey. Life course analysis was performed to understand the risk of morbidity at various stages, like infancy, early childhood, late childhood, adolescence, reproductive ages and old age, in relation to the impact of socio-economic, demographic and regional factors.

The level of morbidity is high in Kerala. Generally, higher levels of morbidity have been observed among females, schedule castes, and schedule tribes as compared to their counter parts. Socio-economic and demographic determinants of morbidity varies both region and across various stages of life course. Females are at greater risk of morbidity than males. The risk of morbidity is significantly higher for illiterates and non-formal literate than persons with higher education. Among the important socio-economic determinants, education and SES showed a negative relationship with morbidity. The risk of morbidity for females is lower than males till the age of 34 years and thereafter it reverse. Poor are at greater risk of morbidity than the rich. Disease specific prevalence rate are computed according to the classification manual of World Health Organization. Communicable diseases are coming down in the state. However, non-communicable diseases are mounting irrespective of socio-economic conditions. Major ten diseases with their co-existing ailments were analysed in detail.

Most of the diseases prevalent in Kerala warrant constant medical attention and treatment and sustained medical treatment is beyond the wherewithal of the average households. The private health care system cannot be an answer because of the high average cost of treatment. This warrants greater and sustained efforts by the State in widening the scope of public action.

Key words: Health Status, Morbidity, Levels and Determinants, life Course Perspective, Kerala

JEL Classification: I10, I12,

I. Introduction

Kerala is well known for its socio-demographic achievements. The current health status of Kerala, as indicated by levels of mortality rate and life expectancy of its population is more akin to those of countries with much higher levels of per capita income. The estimated life expectancy of Kerala in 2000-04 was 71 years for males and 76 years for females. Kerala's infant mortality rate of 13 per thousand live births in the year 2006 was around four times lower than the rate for India as a whole. Very impressive gains have also been made in reducing the birth rate; the total fertility rate in the state has reached 1.8 in 2000 and is even lower in some parts (Govt. of Kerala, 2006).

While Kerala made remarkable achievements with respect to mortality and fertility, the level of morbidity is reported to be high and this started a debate on the 'low mortality and high morbidity syndrome' in Kerala. This debate concentrated around whether the high morbidity in Kerala was real or perceived given the higher level of literacy, better healthcare infrastructure and higher utilization of health care services (Soman and Panikar, 1984; Kannan et al. 1990, Kumar, 1993). All these debates conclude that higher morbidity in Kerala is real and is not due to perception factors.

Kerala is a state with a widespread system of health care facilities. The western medical system, which evolved during the British rule, has been strengthened in the post-colonial period. State intervention to

provide health care facilities has also been significant in the spread of homeopathic and ayurvedic systems of medicine. Medical facilities in the private sector under the three medical systems have expanded to a great extent. The private sector has now become the largest provider of health care in the state, in terms of number of medical institutions and beds (Kerala Statistical Institute, 2000: 25-26). Higher literacy coupled with better availability and accessibility of health care infrastructure helped the state for attaining a better position in health care utilisation as compared to other States in India (CDS-UN, 1975; Nag, 1983; Krishnan, 1985; Navaneetham and Dharmalingam, 2002).

Meanwhile, some scholars have shown that Kerala's achievements have not been uniform across different geographical locations of the state and have also eluded some of the marginalised sections like fishermen and tribals (Shyjan, 2000; Vimalakumari, 1978). Another study noted the disparity in health status among socio-economic groups, defined in terms of income, education, land ownership and housing and concluded that 'better health status is associated with higher socio-economic status' and that the level of morbidity of the 'poor' was 40 percent higher than that of the 'rich' (Kannan et.al., 1990: 150).

Kerala seems to have entered into the fourth stage of the epidemiological transition and studies have pointed out that lifestyle related diseases are on the rise in Kerala. Therefore age pattern of morbidity seem to have undergone changes in the State. In recent years, no systematic study has been carried out to understand the patterns of morbidity and its variation across socio-economic groups in Kerala. Little is known about the health status and its determinants across different stages in the life course, like infancy, early childhood, late childhood, adolescence, reproductive ages and old age. This paper fills this gap. Specifically, an attempt has been made in this paper to understand the patterns of morbidity and its determinants in Kerala from a life course perspective.

II. Data and Methodology

This study is based on a primary survey, conducted in November 2004, in three districts of Kerala, viz. Thiruvananthapuram, Malappuram and Kannur. The survey covered 3320 households, which consists of 17071 individuals in all age groups. (Details about sampling frame, survey instruments and methods of data collection are given in Navaneetham and Kabir, 2006.) In this paper we have used reported morbidity of all the individuals in the household during the reference period (two weeks prior to the date of the survey). It may be possible that the quality of data on reported morbidity may be influenced by the respondent's knowledge and perception of illness. But, the morbidity profile collected in the survey could be accurate due to greater awareness about the diseases and the utilization of health care services. Again the level of literacy in the state is far better than that of other states in the country. The prevalence of morbidity has been defined as the number of specified disease (reported) prevailing in a population during the reference period to the total population exposed to the risk of that disease. Two weeks prior to the date of the survey has been used as a reference period for computing the prevalence of morbidity.

Wealth index has been constructed for understanding socioeconomic inequalities in health. Measuring economic status based on reported income may often become inaccurate when people have tendencies to underreport their own financial resources. Alternative methodologies are always recommended in such circumstances. The simplest method, which is widely used by the social researchers in this regard, might be constructing a composite index that summarizes the observed wealth characteristics of the households (Filmer and Prichett, 2001; MeKenzie, 2003, Vyas and Kumaranayaka, 2006). In this paper, wealth index has been constructed using number of assets indicators. While constructing the wealth index, different weights are applied to each of the indicators in order to reflect their economic significance and statistical adequacy. Principal component analysis was employed to

assign weights for each of the selected 25 indicators. For details about the indicators used and internal validity of the index, see Navaneetham and Kabir (2006).

III. Levels and Patterns of Morbidity

Table 1 provides the prevalence rate of morbidity expressed per 1000 population in the three districts by various socio-economic and demographic characteristics. The prevalence rate of morbidity was estimated in this study as 242 per 1000 population in the three districts combined. There exists significant difference between rural and urban areas in the level of morbidity rate. The morbidity rate in the urban areas is higher than the rural areas. It is found that prevalence rate of the urban and the rural areas are 252 and 239 respectively. As per the NSSO 60th round (2004), the morbidity rate in the rural and urban area is 255 and 240 respectively per 1000 population. Estimates from both NSSO and the present study indicate that the morbidity rate is high and has increased over the years (Kannan et al. 1990; NSSO, (1995-96; Kunhikannan and Aravindan, 2000).

Among the three districts, the prevalence of morbidity is highest in Thiruvananthapuram. This is surprising given the fact that public and private health care provisions are greater in Thiruvananthapuram compared to Kannur and Malappuram. In Thiruvananthapuram district, the prevalence of morbidity in the rural population is significantly high as compared to the urban folks. On the other hand, in Kannur, the prevalence of morbidity in the urban areas is greater than that of the rural areas, while the difference is negligible in the case of Malappuram.

With regard to sex differential in morbidity in Kerala, the risk is higher among females than males. This is particularly true in Thiruvananthapuram and Kannur districts. The prevalence of morbidity is highest among schedule tribes (ST) in Thiruvananthapuram and Kannur districts. On the other, schedule castes (SC) have higher prevalence

Table 1: Prevalence of morbidity by Socio-Economic and Demographic Characteristics (per 1000 population)

Characteristics	Thiruvanan-thapuram	Kannur	Malapp-uram	Combined
Place of Residence				
Rural	338.0	205.1	208.8	239.4
Urban	281.2	246.9	200.8	252.2
Combined	321.1	212.9	208.0	241.6
Sex				
Male	295.6	182.8	201.3	223.0
Female	343.6	241.4	214.0	258.0
Religion				
Hindu	329.6	217.3	219.5	263.6
Muslim	273.6	201.6	203.8	209.2
Christians	323.6	226.7	194.0	294.6
Caste				
SC	322.1	208.3	232.6	261.5
ST	417.6	217.4	119.6	254.0
Others	319.0	212.9	207.0	240.0
Education				
Illiterate	595.3	516.9	473.7	515.6
Non-formal literate	534.0	393.3	475.7	472.8
Primary	357.1	223.2	204.9	248.6
High School	246.5	163.5	126.0	175.0
Higher Education	192.1	124.6	77.1	142.8
Socio-Economic Status				
Quintile 1	369.4	247.4	211.8	270.9
Quintile 2	334.4	232.4	213.5	250.3
Quintile 3	295.0	215.6	197.1	227.4
Quintile 4	303.5	193.0	214.9	234.4
Quintile 5	293.5	193.1	203.0	225.2

of morbidity in Malappuram. It is important to note that, among STs in Thiruvananthapuram, for every ten persons, four of them are suffering from some kind of ailment.

The study also noted that there seems to be a negative relationship between education and morbidity in Kerala. The morbidity rate among the illiterates is 515 as compared to 142 among the persons having higher education. Further, it was noted that morbidity seems to be negatively associated with socio-economic status (SES) in the districts of Trivandrum and Kannur. In other words, poor has greater risk for morbidity than rich in the districts of Trivandrum and Kannur.

IV. Age-Sex Pattern of Morbidity

Age is a key determinant of health. An examination of age differentials of morbidity gives an understanding about how morbidity varies across various life cycles. Age of individuals has been classified into 10 categories which respectively represent the life stages of infant (< 1 years), childhood (1-4 years), pre adolescent (5-12 years), adolescent (13-18 years), young adult (19-34 years), adult (35-44 years), old adult (45-54 years), young old (55-64 years) and middle old (65-74 years) and oldest old (75+ years).

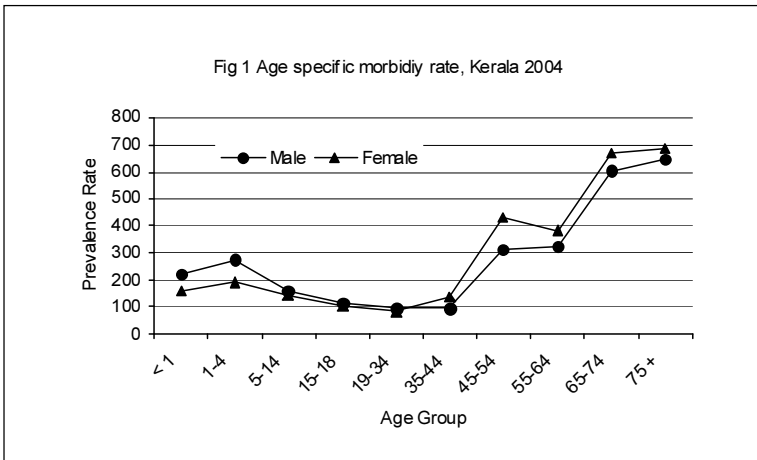Fig 1 Age specific morbidiy rate, Kerala 2004

Figure 1 shows the age-sex patterns of morbidity rate in the three districts combined. The prevalence rate of morbidity was lower for the infants (less than 1 year) compared to child populations (1-4 year age group). After this age group, prevalence of morbidity declines till the age group 19-34 and thereafter it has increased rapidly. In other words, the risk of morbidity is greater among the children compared to pre adolescents, adolescent, and young adults. Though the pattern of morbidity rate is similar for both sexes, it is interesting to note that the risk of ill-health for females was lower than males till the age group 19-34 and thereafter females have greater risk than males. Also for females, the prevalence rate of morbidity is higher in the age group of 45-54 than that in the following age group 55-64. Generally, females seem to be vulnerable for ill-health in old age as compared to males. The age pattern of gender differences in ill-health is similar in all the three districts.

V. Determinants of ill-health

The risk of morbidity is determined by the individual and household characteristics like age, education, caste, religion and socio-economic status as well as environmental and community level characteristics. The effect of these characteristics on morbidity may vary according to the level of access to and availability of health care services. In this section, we investigate the effect of selected individual and household characteristics on the ill-health in the context of Kerala. We ran a set of multivariate logistic regression models to estimate the effects of individual and household characteristics on the reported morbidity. The result of the logistic regression models is given in Table 2.

The results of logistic regression model confirm that persons residing in Thiruvananthapuram have 74 percent higher risk for ill-health than persons living in Kannur or Malappuram district. Females have 11 percent higher risk of ill-health than that of males. As expected, age of person is a significant predictor for ill-health. Education seems to be having an independent effect on the morbidity. Illiterates and

those with educational attainment up to high school are likely to have higher risk of ill-health compared to persons with higher education. The probability of ill-health is more than 50 percent greater for illiterates and education up to primary level education than persons with high school education or above. Therefore findings of the present study does not support the 'cultural conditioning' hypothesis (Johansson, 1991) that morbidity would be expected to be higher among the educated. However, our finding supports another study which found that morbidity is high among the illiterates than the educated persons in rural India (Duraisamy, 2001).

The study revealed that SES category is a significant predictor for ill health even after controlling age and socio-demographic characteristics. The differential in health between poor and rich is statistically significant. For instance, bottom 20 percent of SES group (ie poor) population is 1.2 times more likely to be ill-health compared to top 20 percent of the (the rich) population. However, the risk of ill-health from 2nd through 5th quintiles is the same. The place of residence (rural-urban), religion and caste are not significant predictors for ill-health when controlled for other covariates in the model.

Among the explanations for the reasons of wide variation in the levels of morbidity status across the districts of Kerala, the roles of socio-economic and demographic characteristics of the population deserve prime concern. In this section we examine how the covariates vary across the district. The likelihood for experiencing an ailment during the last 15 days prior to the survey has been examined by employing logistic regression models separately for the three districts, namely Thiruvananthapuram, Kannur and Malappuram. Table 3 gives estimated odd ratios for the three districts separately.

Age is a significant predictor for the ill-health eventhough its magnitudes varies between the districts. The place of residence classified into rural and urban is found significant in Thiruvananthapuram and

Table 2: Results of logistic regression on the determinants of ill health, Kerala, 2004

Independent variables	Unadjusted		Adjusted	
	Odds ratio	SE	Odds ratio	SE
Demographic variables				
Age				
<1®	1.000	-	1.000	-
1-4	1.353	0.173*	1.334	0.174
5-12	0.864	0.167	0.841	0.181
13-18	0.540	0.174**	0.577	0.191**
19-24	0.434	0.176 **	0.520	0.196**
25-34	0.604	0.169**	0.717	0.198*
35-44	1.452	0.166 *	1.654	0.201*
45-54	2.706	0.166 **	3.010	0.200**
55-64	4.844	0.168**	5.224	0.201**
65-74	7.844	0.174**	7.957	0.205**
75+	8.921	0.189**	8.516	0.220**
Sex				
Male ®	1.000	-	1.000	-
Female	1.209	0.036**	1.111	0.042*
Socio-economic variables				
Education				
Illiterate	2.876	0.076 **	1.533	0.108**
Non-formal literate	5.383	0.113**	1.645	0.130**
Primary	1.963	0.068**	1.539	0.079**
High School	1.274	0.082**	1.321	0.089**
Higher Education®	1.000	-	1.000	-
SES				
Quintile1	1.278	0.056**	1.192	0.068**
Quintile 2	1.148	0.057*	1.093	0.065

Quintile 3	1.012	0.058	1.021	0.065
Quintile 4	1.053	0.058	1.034	0.063
Quintile 5®	1.000	-	1.000	-
Geographic variables				
Region				
Coastal ®	1.000	-	1.000	-
Low Land	1.302	0.093 **	1.558	0.104**
Mid Land	1.111	0.089	1.526	0.100**
High Land	0.993	0.113	1.278	0.128*
District				
Trivandrum	1.800	0.041	1.742	0. 057**
Kannur	1.030	0.046	0.982	0.056
Malappuram®	1.000	-	1.000	-
Constant			0.353	0.088
-2 loglikelihood			16135.441	
Model chi-square			2743.737	
N			17071	

Note: Place of residence, religion, caste and marital status are also controlled but not found significant. Children of age less than 7 are also included in the category of illiterates. It would be appropriate to use parents' education as a determinant of morbidity among children. ® is a reference category.

Kannur districts. However, the nature of relationship is different in the two districts. For instance, people who resides in urban Thiruvananthapuram are 27 percent less likely to suffer from ill-health than their rural counterparts. But in the case of Kannur, persons living in the urban areas are 29 percent more likely to ill health than their rural counter parts. The risk of ill health is same for rural and urban residents in Malappuram district. Differential in access to health care services between districts may be the reason for variation in the pattern of morbidity between rural and urban areas and this needs further investigation.

Further, gender differential is found to be significant in Thiruvananthapuram and Kannur, whereas it was not significant in Malappuram district. As expected, females are more likely to report ailments compared to the males. Religion is significant only in Kannur district- Muslims in the district have 27 percent more chances for ill health compared to Hindus. Similarly caste is significant in Malappuram district- scheduled castes in Malappuram have 30 percent more likely to report ailments than other caste group. The variation of religion and caste as determinants of morbidity between the districts indicate that socio-economic, cultural, environmental, community characteristics and access to health care services may be mediating factor for observed relationship between caste and morbidity rather than caste per se.

The nature of relationship between education and ill health is also vary across districts in Kerala. Illiterates have higher risk for ill health as compared to educated in Thiruvananthapuram and Malappuram districts. However, education is not a significant predictor for ill health in Kannur district. The effect of topography of residence on the risk of ill health also varies across the districts. Region of residence is significant predictor for ill-health in Thiruvananthapuram district whereas this was not significant in Malappuram and Kannur districts. People residing in low land and mid land of Thiruvananthapuram district have around twice the risk of ill-health compared to the people who live in coastal areas.

Further, the influence of socioeconomic status on the ill health is also varying between the districts. Socio-economic status (SES) is significant in both Trivandrum and Kannur and not significant in Malappuram district. Interestingly, the magnitude and nature of relationship are also different between Trivandrum and Kannur district. In Trivandrum district, the poor are 20 percent more likely to experience ill health than the rich, whereas this effect was 55 percent in Kannur district. Further, the risk of ill health is similar from 2nd to 5th quintile in

Trivandrum and risk is 36 percent and 31 percent more for the 2nd and 3rd quintile group respectively than the rich in Kannur district.

The above analysis revealed that the covariates of ill health and their magnitude vary within Kerala. The differences in the socioeconomic and environmental characteristics and availability and access to health care services might be the mediating factors for the observed variations in the determinants of ill health in the three districts.

Table 3: Results from the logistic regression on the determinants of ill health in the three districts of Kerala, 2004

	TVPM		KNR		MLPRM	
	Exp(B)	S.E.	Exp(B)	S.E.	Exp(B)	S.E.
Demographic variables						
Age						
<1[@]	1.000		1.000		1.000	
1-4	2.311	0.361*	0.900	0.366	1.167	0.238
5-12	1.317	0.373	0.656	0.379	0.726	0.251
13-18	0.813	0.390	0.411	0.404**	0.537	0.265**
19-24	0.856	0.396	0.334	0.414**	0.477	0.276**
25-34	0.975	0.398	0.304	0.419**	0.939	0.282
35-44	2.026	0.401*	0.962	0.423	2.095	0.288**
45-54	3.683	0.400**	1.888	0.420	3.737	0.284
55-64	6.306	0.402**	2.983	0.424**	7.250	0.285**
65-74	9.832	0.409**	4.738	0.431**	10.422	0.293**
75 +	11.390	0.430**	4.746	0.451**	12.005	0.327**
Sex						
Male[@]	1.000		1.000		1.000	
Female	1.171	0.072**	1.257	0.087**	1.006	0.065
Socio-economic variables						
Education						
Illiterate	1.713	0.178**	1.185	0.224	1.797	0.211**
Non-formal literate	1.614	0.247*	0.792	0.289	2.349	0.227**
Primary	1.598	0.116**	1.068	0.156	2.002	0.181**
High School	1.206	0.129	1.243	0.171	1.772	0.198**

Higher Education@	1.000		1.000		1.000	
Marital Status						
Never Married@	1.000		1.000		1.000	
Currently Married	1.021	0.154	0.970	0.189	0.674	0.142**
Divorced/ Separated	1.148	0.266	2.015	0.353**	0.964	0.256
Widowed	1.346	0.206	1.482	0.242	0.779	0.191
Religion						
Hindu@	1.000		1.000		1.000	
Christian	1.114	0.090	1.266	0.166	0.974	0.348
Muslim	0.964	0.115	1.266	0.100**	1.130	0.083
Caste						
Others@	1.000		1.000		1.000	
SC	0.995	0.133	0.880	0.282	1.301	0.129*
ST	1.308	0.248	1.126	0.338	0.574	0.355
SES						
Quintile 1	1.240	0.118*	1.552	0.145**	1.005	0.105
Quintile 2	1.028	0.118	1.365	0.137**	1.015	0.098
Quintile 3	0.957	0.118	1.317	0.128**	0.960	0.100
Quintile 4	1.047	0.111	1.053	0.125	1.051	0.101
Quintile 5@	1.000		1.000		1.000	
Geographic Variables						
Place of Residence						
Rural@	1.000		1.000		1.000	
Urban	0.734	0.089**	1.296	0.111**	0.912	0.111
Region						
Coastal@	1.000		1.000		1.000	
Low Land	2.017	0.149**	1.068	0.277	1.105	0.185
Mid Land	1.894	0.148**	1.215	0.264	0.877	0.170
High Land	1.283	0.211	1.026	0.291	0.948	0.231
Constant	**0.073**	**0.412**	**0.131**	**0.479**	**0.108**	**0.353**
-2 loglikelihood	5238.878		3847.274		6923.527	
Model chi-square	899.719		632.490		1169.342	
N	4890		4326		7855	

Note: Significance Level: ** <0.05, * <0.1; @ Reference Category

Table 4: The odds ratio showing the socio-economic and demographic effect on morbidity status across the life course in Kerala, 2004

Characteristics	0-4	5-18	19-34	35-54	55+
DEMOGRAPHIC VARIABLES					
Sex					
Male ®	1.000	1.000	1.000	1.000	1.000
Female	0.610**	0.876	1.263**	1.601	1.230**
SOCIAL VARIABLES					
Education					
Illiterate		1.705*	3.260**	1.480**	1.029
Primary		1.263	1.728**	1.513**	1.131
High School		1.449	1.246	1.246	1.222
Higher Education ®		1.000	1.000	1.000	1.000
Religion					
Hindus®	1.000	1.000	1.000	1.000	1.000
Christians	1.081	1.498**	1.031	1.145	0.980
Muslims	1.059	0.826*	1.038	1.497**	1.003
Caste					
SC/ST	1.402	1.014	1.319*	1.093	0.897
Others ®	1.000	1.000	1.000	1.000	1.000
ECONOMIC VARIABLES					
SES					
Quintile 1	1.630**	1.152	1.493**	1.244*	1.255
Quintile 2	1.532**	1.121	1.267	1.098	1.001
Quintile 3	0.947	0.898	1.087	1.339*	0.984
Quintile 4	1.116	1.017	0.939	1.259*	0.934
Quintile 4 ®	1.000	1.000	1.000	1.000	1.000
GEOGRAPHICAL VARIABLES					
Place of residence					
Rural®	1.000	1.000	1.000	1.000	1.000
Urban	1.341	0.575	1.002	0.873	1.128

Region					
Coastal ®	1.000	1.000	1.000	1.000	1.000
Low land	1.112	1.610	2.579	1.564**	1.174
Mid land	1.227	1.400	2.370	1.727**	1.075
High land	0.612	1.010	2.082	1.383	1.140
District					
Thiruvananthapuram	2.260**	1.573	1.866	1.978**	1.354**
Kannur	1.318	1.037	0.892	1.101	0.825
Malappuram ®	1.000	1.000	1.000	1.000	1.000
Constant	0.182**	0.109**	0.019**	0.062**	0.735
-2LL	1466.799	3507.735	3104.555	4274.786	3057.438
Model chi square	64.71	108.149	116.629	191.622	77.667
N	1437	4489	4745	3632	2309

Note: Age is controlled in all the models except for 0-4 age group;
Significance level **<0.05, *<0.1; ® Reference Category.

VI. Determinants of ill-health Across Various Stages of Life Course

In this section, an attempt is made to understand the risk of ailment across various stages of life among individuals. The surveyed population has been classified into five life stages. These are 0-4, 5-18, 19-34, 35-54 and 55+ that respectively stand for the life course stages of childhood, adolescents, young adult, adult, and old age population. The analysis has been carried out for the combined sample data of the three districts. Table 4 gives the odd ratios obtained from the logistic regression model which indicates the effect of socio-economic, demographic and geographic factors on the morbidity status across various stages of life. Age has been controlled in all the logistic regression models except for the age group 0-4 years.

The result indicates that females have greater risk of ill health in all their life stages except during the childhood as compared to males. Social class such as religion and caste do not have significant influence on the risk of ill-health in the age group 0-4. However, in the age group 5-18, Christians have greater risk for ill-health followed by Hindus as

compared to Muslims. Further, Muslims have 50 percent more risk than Hindus in the age group 35-54. Caste is found significant only in the age group 19-34 and showed that SC/ST population have 30 percent greater risk than other castes.

We have noted earlier that the overall risk of morbidity is greater in Thiruvananthapuram district. This is also true over the life course ages. The risk of ill health is significantly higher in Thiruvananthapuram district in the age groups of 0-4, 34-54 and 55+ years. For instance, children living in Thiruvananthapuram are 2.3 times more likely to the risk of ill-health as compared to the children residing in Malappuram while controlling for other socio-demographic and economic indicators. Also older adults' who belong to 35-54 age groups have greater risk of ill health if they live in low land or mid land compared to coastal land or high land.

In the case of education, it has significant inverse relationship with ailment status in the age group 5-18, 19-34 and 35-54. The relationship is stronger in the young adult ages (19-34) as compared to the adolescents and adult period. However, education is not found a significant predictor during the old ages. Further, the analysis reveals that the socioeconomic inequality in health is significant among the children and adult ages. Poor have greater risk of ill health as compared to rich in the age groups of 0-4, 19-34 and 35-54 years. The magnitude of SES effect varies between the age groups. Children born in the poor household have 64 percent more likely to be ill health compared to children born in the rich household. However, this effect was 50 percent and 24 percent respectively in the age groups of 19-34 and 35-54 years.

From the above analysis, we can infer that the risk of morbidity and its determinants varies across the life course in Kerala. This analysis facilitated us to understand which population sub groups and at which stages of life course have greatest risk of morbidity. The analysis clearly

shows that the poor are at greater risk for ill health than the rich in Kerala. This is in contrast to findings observed using NSSO data of 52nd round conducted in 1995-96 (Dilip, 2002). We have found that our findings are consistent with the other community health survey conducted in Kerala (Kannan et al. 1990, KSSP, 2006). Further, we have also found that illiterates, agricultural labourers, casual workers and scheduled castes/tribes have all reported higher morbidity confirming our findings that poor in Kerala have greater risk for morbidity. With regards to hospitalisation also, the risk of hospitalisation is greater among the poor than rich (see for details, Navaneetham and Kabir, 2006).

VII. Disease Specific Patterns of Ill Health

The prevalence of morbidity for specific diseases and its share to the total spells of diseases reported by the individuals is given in Table 5. The disease specific prevalence rate is defined as the ratio of number of spells of specific disease and the population exposed to the risk of that disease. The rate is expressed per 1000 population. Further, an attempt is also made to understand what diseases are commonly coexists with other diseases in Kerala. This analysis in this section has been carried out for the combined data of three districts together. We have classified the diseases into 48 categories based on the classification manual of World Health Organization. According to this survey, the top 10 major diseases prevalence in Kerala are (i) diseases of bones and joints (ii) hypertension (iii) viral fever/influenza and non-specific fevers of short duration (iv) diabetes (v) common cold (vi) Asthma and Esnophelia (vii) diseases of nerve system (viii) cardiovascular diseases (ix) cough and acute bronchitis and (x) other diseases which include Encephalitis, High Cholesterol, Low Blood Pressure, Other Diseases of the Respiratory Tract, Meningitis, Tetanus (See table 5). This top 10 diseases account for 75 per cent of the total morbidity spell in the population. It was also found that females have almost twice the risk of males for diseases of bones and joints, and hypertension.

Table 5: Disease Specific Prevalence Rate and Distribution

Diseases	Prevalence Rate (per 1000 pop)			Share (%)		
	Male	Female	Total	Male	Female	Total
Diseases of bones and joints	30.12	59.64	45.63	10.22	16.71	13.94
Hypertension	28.76	51.73	40.83	9.76	14.50	12.47
Viral Fever/Influenza/Non specific fevers of short duration	36.66	32.78	34.62	12.44	9.18	10.58
Diabetes	30.37	33.33	31.93	10.31	9.34	9.75
Common Cold	22.34	22.41	22.38	7.58	6.28	6.84
Asthma,Esnophelia	18.02	19.40	18.75	6.12	5.44	5.73
Diseases of nerve system	14.20	19.06	16.75	4.82	5.34	5.12
Cardiovascular diseases	14.07	12.71	13.36	4.78	3.56	4.08
Cough and Acute Bronchitis	14.69	11.93	13.24	4.99	3.34	4.04
Other Diseases*	8.39	12.93	10.78	2.85	3.62	3.29
Ulcers of the digestive system/ Non specific Stomach Ache	8.15	9.59	8.90	2.76	2.69	2.72
Other Skin Diseases	7.41	8.70	8.08	2.51	2.44	2.47
Allergy	7.53	8.36	7.97	2.56	2.34	2.43
ENT and URTI	7.28	6.91	7.09	2.47	1.94	2.17
Dysentery, Diarrhoea,Cholera/ Gastroenteritis	7.04	5.24	6.09	2.39	1.47	1.86
Mental Illness	3.95	4.12	4.04	1.34	1.16	1.23

Table 5 Cont'd

Diseases	Prevalence Rate (per 1000 pop)			Share (%)		
	Male	Female	Total	Male	Female	Total
Other diseases of the eye	2.96	4.24	3.63	1.01	1.19	1.11
Injury due to other accidents/						
Violence/Burns	3.46	3.01	3.22	1.17	0.84	0.98
Diseases of Teeth and Gum	2.10	4.12	3.16	0.71	1.16	0.97
Urological infection	3.46	2.12	2.75	1.17	0.59	0.84
Cataract	0.49	3.57	2.11	0.17	1.00	0.64
Kidney Problems	2.35	1.90	2.11	0.80	0.53	0.64
Piles	2.84	1.34	2.05	0.96	0.37	0.63
Goitre	0.62	2.56	1.64	0.21	0.72	0.50
Cancers	1.60	1.56	1.58	0.54	0.44	0.48
Gynaecological diseases	0.00	2.90	1.52	0.00	0.81	0.47
Injury due to road accidents	1.98	1.00	1.46	0.67	0.28	0.45
Non malignant Tumors	0.99	1.67	1.35	0.34	0.47	0.41
TB Other than Pulmonary TB	2.10	0.67	1.35	0.71	0.19	0.41
Varicose Veins	0.74	1.45	1.11	0.25	0.41	0.34
Anemia	0.12	1.67	0.94	0.04	0.47	0.29
Pulmonary TB	1.48	0.33	0.88	0.50	0.09	0.27
Chicken Pox	0.74	0.78	0.76	0.25	0.22	0.23
Appendicitis	1.36	0.11	0.70	0.46	0.03	0.21

Table 5 Cont'd

Diseases	Prevalence Rate (per 1000 pop)			Share (%)		
	Male	Female	Total	Male	Female	Total
Congenital Disorders	0.62	0.56	0.59	0.21	0.16	0.18
Hernia	1.11	0.00	0.53	0.38	0.00	0.16
Jaundice	0.86	0.11	0.47	0.29	0.03	0.14
Liver Cirrhosis	0.62	0.33	0.47	0.21	0.09	0.14
Insect /Snake/Animal Bites	0.49	0.45	0.47	0.17	0.12	0.14
Mumps	0.37	0.33	0.35	0.13	0.09	0.11
Pneumonia	0.37	0.33	0.35	0.13	0.09	0.11
Measles	0.49	0.11	0.29	0.17	0.03	0.09
Worm Infestation	0.37	0.22	0.29	0.13	0.06	0.09
Typhoid	0.37	0.11	0.23	0.13	0.03	0.07
Other Malnutrition diseases	0.25	0.22	0.23	0.08	0.06	0.07
Whooping Cough	0.37	0.00	0.18	0.13	0.00	0.05
Diphtheria	0.00	0.11	0.06	0.00	0.03	0.02
Filariasis	0.00	0.11	0.06	0.00	0.03	0.02
Total Number of Spells	**2387**	**3201**	**5588**	**100.00**	**100.00**	**100.00**

* Other diseases include Encephalitis, High Cholesterol, Low Blood Pressure, Other Diseases of the Respiratory Tract, Meningitis, Tetanus and Others.

Diseases of Bones and Joints

The disease of bones and joints is found as major problem for both males and females. The prevalence rate of this disease is found to be 30 for males and 57 for females per 1000 population. Among the total spell of the diseases in the population, 19 percent of them are diseases of bones and joints. This is due to ageing of the population in Kerala. As expected, the prevalence rate for diseases of bones and joints increases as age increases (see Fig 2). Females are more likely to suffer from this disease than males and this is true in all the age groups.

Fig 2. Age pattern of morbidity: Diseases of Bones and Joints, Kerala, 2004
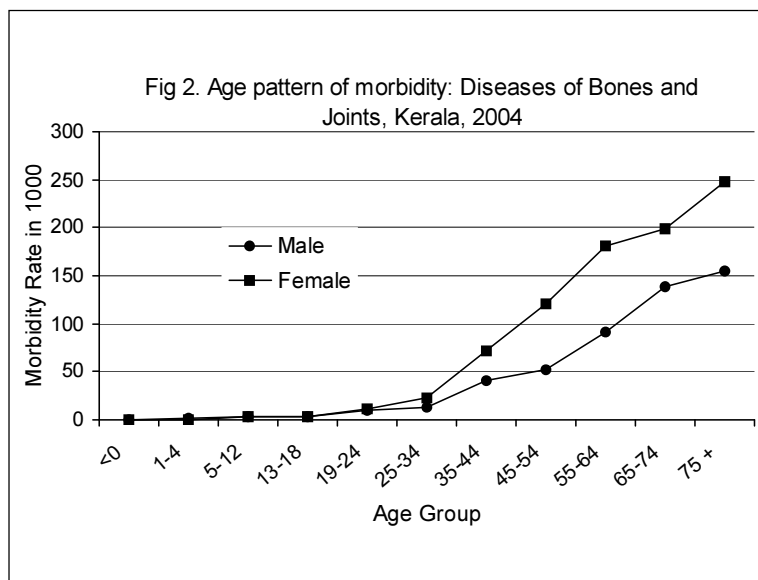
Many diseases co-exist with the disease of bones and joints. More than half of the people reported that they have one or more ailments in addition to the problem of bones and joints. The two major co-existing problems reported by them are hypertension and diabetes (Table 6).

Table 6: Diseases of Bones and Joints with other Ailments

Coexisting Ailment	Percent share with other ailment
None	40.6
Hypertension	14.9
Diabetes	8.2
Diseases of Nerve System	4.8
Asthma, Esnophelia	4.6
Other Diseases	3.6
Cardiovascular Diseases	2.7
Ulcers of the Digestive System/ Non Specific Stomach Ache	2.3
Cough and Acute Bronchitis	2.1
Others	16.3
Total	**779**

The prevalence of diseases of bones and joints greatly vary by socio-economic characteristics. The prevalence rate for this disease is 58 and 36 per 1000 population respectively for poor and rich (see Figure 3).

Fig. 3. Diseases of Bones and Joints by SES, Kerala 2004
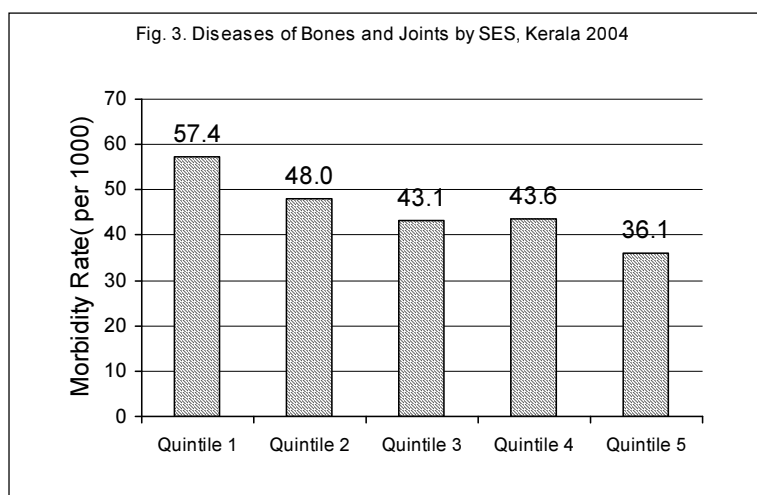
Hypertension

It was estimated from the survey that the prevalence rate of hypertension was 41 per 1000 population. The share of this disease among the total morbidity spell was 17 percent- a second highest share among the total spell of diseases in the population. The prevalence of hypertension was higher among females (52) than males (29). As regards to age patterns of hypertension, the risk of this disease starts at age 35 and increases rapidly thereafter (see figure 4). Further it was noted that the prevalence rate of hypertension among females was significantly higher than males. For instance, in the age group 45-54, the number of spells of hypertension among females was 115 per 1000 female population whereas this was only 65 for males. Similarly, in the age group 65-74, the prevalence rate was 253 for females and only 143 for males. It is well known that prolonged hypertension is high risk factor for cardiovascular diseases at a later stage and therefore it is important to control this disease at the initial stage.
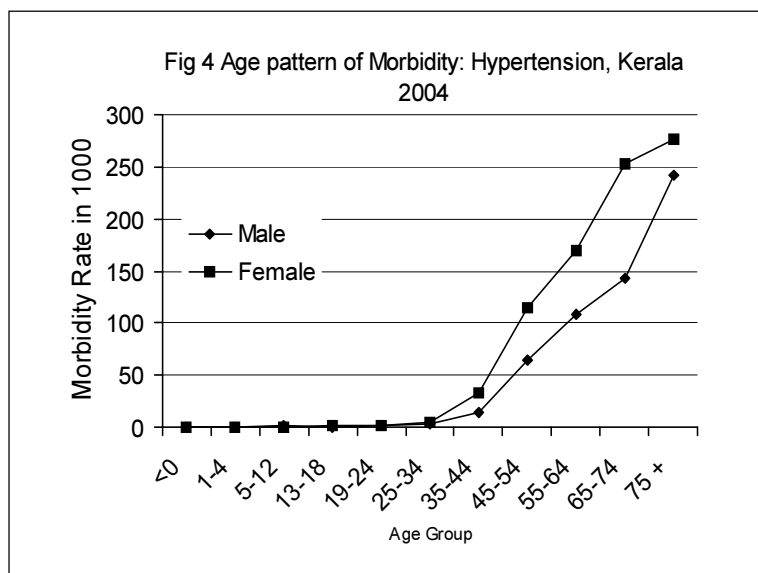

Fig 4 Age pattern of Morbidity: Hypertension, Kerala 2004

Table 7: Hypertension with other Ailments

Coexisting Ailment	Percent share with other ailment
None	9.9
Diabetes	33.0
Diseases of Bones And Joints	16.6
Cardiovascular Diseases	8.5
Asthma, Esnophelia	6.6
Other Diseases	4.9
Diseases of Nerve System	3.6
Cough and Acute Bronchitis	1.9
Cataract	1.4
Others	13.6
Total	**697**

Table 7 shows the coexistence of hypertension with other ailments. It is interesting to note that people who suffer from hypertension are also suffering from other diseases along with it. Among those who reported hypertension, only 10 percent of them were suffering from this disease alone. Interestingly, of those reported hypertension, 33 percent of them are also suffer from diabetes. It shows that hypertension and diabetes are coexisting morbidity prevalence in the population. Moreover, it was also noted that 8.5 percent of the population suffer from cardiovascular diseases and 6.6 percent of them from asthama/esnophelia together with hypertension.

Also we have found that there is a clear socio-economic gradient in the prevalence of hypertension in Kerala. Unlike diseases of bones and joints, the prevalence of hypertension increases from poor to rich (see figure 5).

Fig 5 Prevalence rate of Hypertension among people aged 30 years by SES in Kerala, 2004
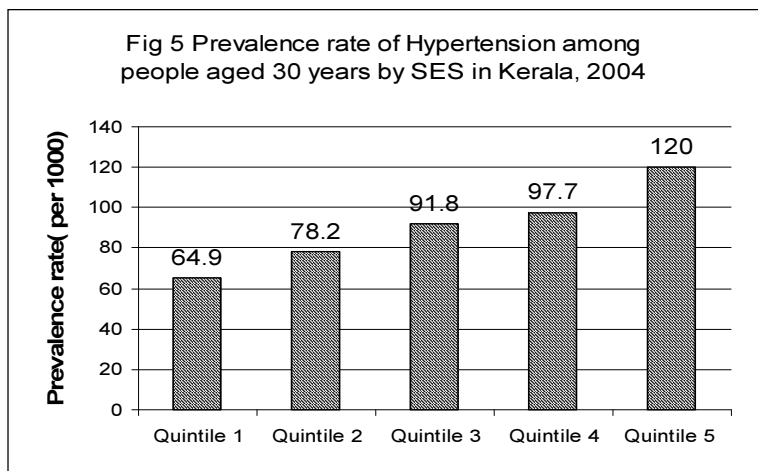
Viral fever/Influenza/Non-Specific Fevers

The diseases of viral fever/ influenza/ non-specific fevers of short duration accounted for 14 percent of the total spells of diseases reported in the three districts. The prevalence of this disease was around 35 per thousand populations. As regards the age pattern of this disease, the risk of this disease is highest amongst the children (see Figure 6). It was also found that, male children are more vulnerable to this disease than female children.

Fig 6 Viral fever/Influenza/Non specific fever, Kerala 2004
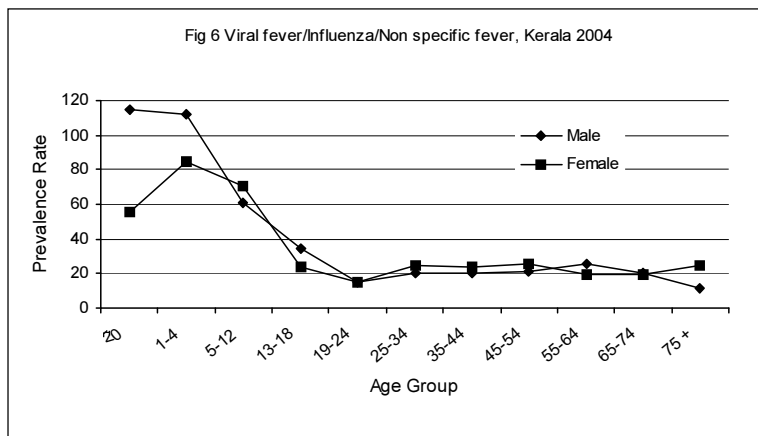
The risk of diseases for viral fever or influenza decreases when we move from low SES to high SES group. For instance, the prevalence of viral fever/influenza was 47 per 1000 population for low SES groups whereas this was 27.7 per 1000 population for high SES category, indicating the diseases of poor.

Fig. 7 Viral fever/Influenza by SES, Kerala 2004
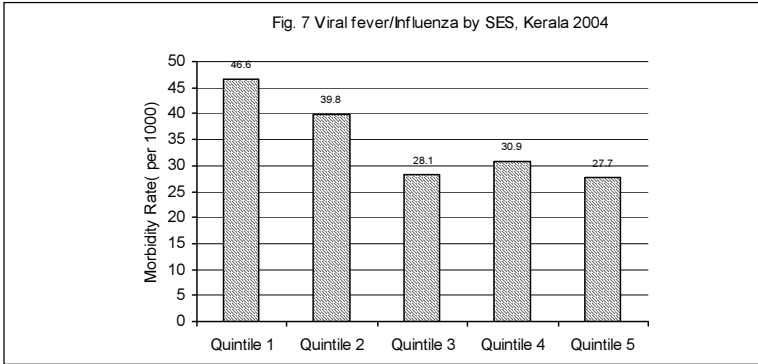
Diabetes

Diabetes seems to be another major life threatening disease in Kerala which ranked fourth in the rate of prevalence. The prevalence of diabetes was 32 per 1000 population. The prevalence rate is marginally higher for females (33 per 1000) than males (30 per 1000). This disease

Fig 8 Morbidity Rate of Diabetes, Kerala 2004
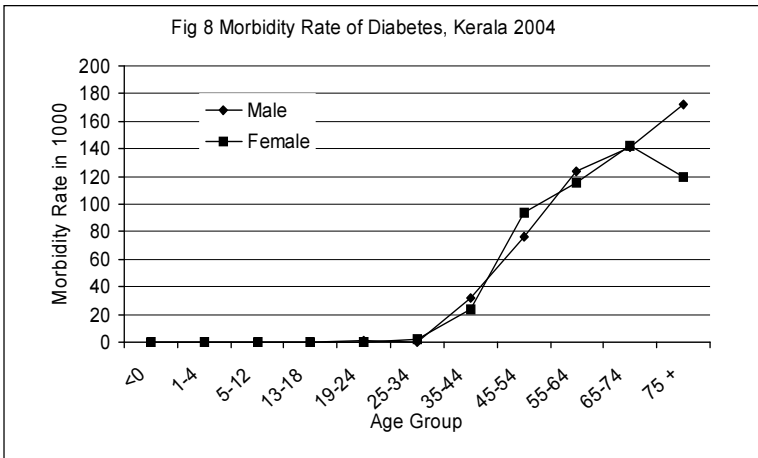
is accounted for 13 percent of total spells of the diseases reported during the reference period. The risk of this disease seems to be greater among the older age group. From age 35, the prevalence of diabetes increases as increase in age. For every 10 old persons of age 60+, one is suffering from diabetes.

Diabetes coexists with several other diseases and mostly with hypertension. 42 percent of the diabetes population also reported having hypertension. This indicates that for those having hypertension, the risk of getting diabetes seems to be higher. It is important to note that 12 percent of them also suffer from diseases of bones and joints and 8 percent suffer from cardiovascular diseases along with diabetes.

Table 8: Diabetes with other Ailments

Coexisting Ailment	Percent share with other ailment
None	2.6
Hypertension	42.2
Diseases of Bones and Joints	11.7
Other Diseases	9.4
Cardiovascular Diseases	8.3
Asthma, Esnophelia	5.3
Diseases of Nerve System	3.1
Viral Fever/Influenza/Non Specific Fevers of Short Duration	1.7
Dysentery, Diarrhea, Cholera/ Gastroenteritis	1.7
Others	14.1
Total	**545**

The prevalence of diabetes also varies significantly between SES categories. As improvement in SES, the prevalence of diabetes is also increasing. The rich has around three times greater risk for diabetes than the poor.

Fig 9 Prevalence rate of Diabetes among people aged 30 years by SES in Kerala 2004
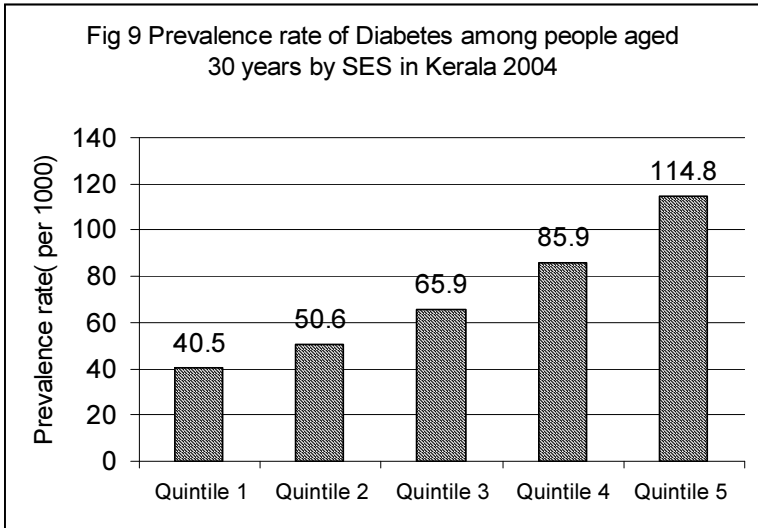
Cardiovascular Disease

For every 100 persons, more than 1 suffers from cardiovascular disease. Given the nature of this diseases and the cost required for treatment and its implication at the household, the rate seems to be very high. Men suffer more on this disease than women. This could be due to highest prevalence of behavioural risk factors like smoking and consumption of alcohol among males in Kerala. The risk of cardiovascular disease starts from age 35 and it is increasing as the age goes up. The prevalence of cardiovascular diseases was high among males than females for the age from 45 onwards; however, it is high among females in their reproductive ages. It is also important to note the reported cardiovascular diseases even among childhood and young ages.
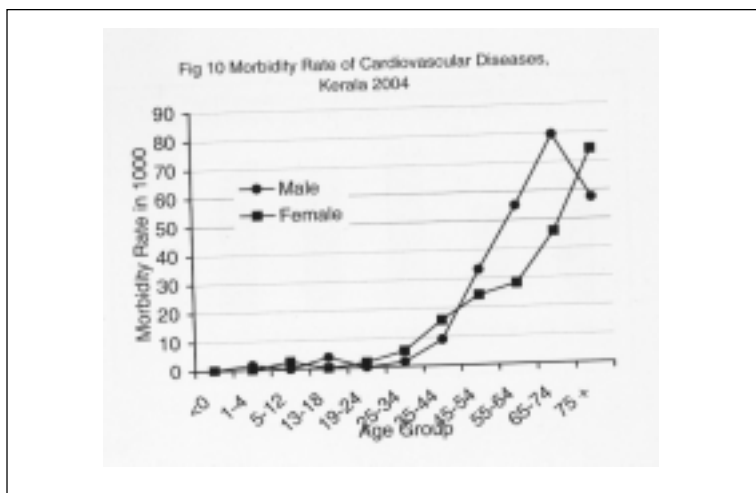
Fig 10 Morbidity Rate of Cardiovascular Diseases, Kerala 2004

Table 9 shows that cardiovascular disease coexists significantly with hypertension and diabetes. Around 26 percent of the population

Table 9: Cardiovascular Disease with other Ailments

Coexisting Ailment	Percent share with other ailment
None	8.8
Hypertension	25.9
Diabetes	19.7
Other Diseases	10.1
Diseases of Bones and Joints	9.2
Asthma, Esnophelia	7.0
Diseases of Nerve System	4.0
Ulcers of the Digestive System / Non Specific Stomach Ache	2.2
Viral Fever/Influenza/Non Specific Fevers of Short Duration	1.8
Others	11.4
Total	**228**

who have reported cardiovascular disease also suffer from hypertension. Further 20 percent of the persons who have reported cardiovascular disease also reported diabetes. This means that diabetes and hypertension could be the major risk factors for cardiovascular disease.

It is also important to note that the risk of cardiovascular diseases is higher for the poor and it decreases as increase in the socioeconomic status (see Figure 11). This may have greater socioeconomic implications among the poor.

Common Cold

During the last 15 days prior to the date of the survey, the prevalence of common cold was 22 per 1000 population. As regards the age patterns of this disease, almost all age groups reported common cold, however, it was significantly high among the children.

Asthma and Esnophelia

Asthma and Esnophelia accounted for around 8 percent of the total spell of diseases during the reference period. The prevalence of this morbidity was around 18 per 1000 population in the three districts surveyed. Asthma and Esnophelia seems to be a risk factor in all age groups, however, old aged population is more vulnerable than the younger one.

Diseases of Nerve System

The prevalence of diseases related to nerve system was 17 per 1000 population during the reference period. The risk of this disease is higher among females than males. The disease of nerve system is not reported among children below age 5 years. But, as age increases, the prevalence of this disease also increases for both males and females; however, females have significantly greater risk than males in the older ages. The coexistence of this disease with other ailments is given in Table 10. The disease mostly coexist with diseases of bones and joints (12.9%) followed by hypertension (8.7%).

Table 10: Diseases of Nervous System with other Ailment

Coexisting Ailment	Percent share with other ailment
None	33.9
Diseases of bones and joints	12.9
Hypertension	8.7
Viral Fever/Influenza/Non specific fevers of short duration	8.4
Diabetes	5.9
Other Diseases	3.5
Cardiovascular diseases	3.1
Asthma, Esnophelia	2.8
Cough and Acute Bronchitis	2.8
Others	17.8
Total	286

Cough or Acute Bronchitis

The prevalence of cough or acute bronchitis was around 13 per 1000 population in Kerala. The prevalence rate of cough or acute bronchitis

is marginally greater among males (15 per 1000 population) than females (12 per 1000 population). As regards the age patterns of this disease, the risk is also higher among the children and old age and lower among the adult population. As expected, this disease is mostly coexist with viral fever/influenza/ fever of non-specific duration (see Table 11)

Table 11: Cough and Acute Bronchitis Disease with other Ailments

Coexisting Ailment	Percent share with other ailment
None	26.1
Viral Fever/Influenza/Non specific fevers of short duration	20.8
Common Cold	7.5
Diseases of bones and joints	7.1
Asthma, Esnophelia	6.2
Hypertension	5.7
Allergy	3.5
Diseases of nerve system	3.5
Ulcers of the digestive system/ Non specific Stomach Ache	2.6
Others	16.8
Total	**226**

Ulcers of Digestive System/non Specific Stomach Ache

The disease ulcers in the digestive system or non-specific stomach ache is reported in almost all the age groups except among infants and children aged 1-4 years. For this disease, the highest morbidity rate is observed in the age group of 55-64 years. It has been observed that the prevalence of this disease is high among the old age population as compared to the economically active population. As regards the coexisting of this disease, around 45 percent of them reported having

this disease alone and 14 percent reported along with diseases of bones and joints.

Table 12: Ulcers of the digestive system/ Non specific Stomach Ache with other ailments

Coexisting Ailment	Percent share with other ailment
None	45.4
Diseases of bones and joints	13.8
Asthma, Esnophelia	5.3
Hypertension	4.6
Cough and Acute Bronchitis	3.9
Viral Fever/Influenza/Non specific fevers of short duration	3.3
Cardiovascular diseases	3.3
Other Skin Diseases	2.6
Diseases of nerve system	2.6
Others	15.1
Total	**152**

Preventable Diseases through Immunization

The coverage of immunization is relatively better in Kerala compared to other states in India. However, several cases of immunization preventable diseases were reported in the survey. For instance, 5 cases of measles, 6 cases of mumps, 13 cases of chicken pox, 3 cases of whooping cough and one case of diphtheria were reported during the reference period in the three districts. This seems to indicate that immunization programme needs to be further strengthened in the state.

Communicable Diseases

Many communicable diseases were also reported in the survey apart from cough or bronchitis as discussed earlier. It was reported during the reference period that 104 cases of dysentery, diarrhea, cholera/

gastroenteritis (2.5 percent of total disease spells), 4 cases of typhoid, 15 cases of pulmonary TB, 6 cases of pneumonia and 23 cases of TB other than pulmonary TB in the three districts. The prevalence of Pulmonary TB is significant in the age groups 45-54 and 55-64 years.

Other Diseases

The diseases of ENT and URTI are also reported in all the age groups. 36 cases of kidney problems (0.9 percent of the total spell of diseases), 47 cases of Urological infections (1.1 %) were also reported. It is important to note that 27 cases of cancer (0.7%) and 23 cases of non-malignant tumors (0.6%) were also reported. For every 1000 persons, around 2 of them suffer from cancer. The diseases of allergy (3.3 percent) and other skin diseases (3.4 %) were also reported in the survey. The prevalence of morbidity for this disease was 8 per 1000 population during the reference period. 26 cases of gynecological diseases which account for 0.63 % of total spells of diseases were also reported in the survey. It is alarming to note that for every 1000 persons, 4 of them suffer from mental illness. This disease accounts for 1.7 percent of the total spells of diseases in Kerala. Injury due to accidents including snake bites, burns, road accidents etc accounts for 2 percent of total spell of diseases reported in the three districts.

VII. Summary and Conclusions

This paper discussed the levels, pattern and determinants of morbidity in Kerala. One of the important achievements of Kerala has been the continuous improvement in life expectancy due to decline in mortality in all the ages. Despite the reduction in mortality, Kerala continues to have high prevalence of morbidity. One in every four persons reported themselves to be sick during the reference period of fifteen days. The prevalence rate of 242 per 1000 population found by the survey is consistent with the results of the 60th round (2004-05) of the National Sample Survey. The prevalence of morbidity for India as a whole was only 91 per 1000 population. It may be noted that both the

surveys were undertaken during the same year and in both the surveys the morbidity reporting was obtained from the informant, who was often the head of the household.

The demographic, social and economic determinants of ill-health in Kerala vary between regions (districts) and across various stages of life courses. There exists significant gender inequality in morbidity. Females are at a greater risk of ill-health than males. The age pattern of morbidity shows that the prevalence of ailments increases at a faster rate after age 35 years and also females are more vulnerable to morbidity in the old age. Education seems to be an important determinant of ill-health in Kerala. The risk of ill-health is significantly higher for illiterates and non-formal literate than persons with higher education even after controlling other covariates. The study found that the probability of ill-health for the poor is significantly higher than the rich, controlling other covariates. The magnitude of the effect of socio-economic gradient in health also varies within Kerala.

The major diseases prevalent in the study population are: diseases of bones and joints, hypertension, viral fever, diabetes, common cold, asthma, diseases of the nerve system, cardiovascular diseases, and cough and acute bronchitis. These diseases account for about 75 percent of the total illness in the population. Females are found to have higher risk for diseases of bones and joints, and hypertension than males- females being two times prone for these diseases compared to the males. The morbidity patterns among the rich and the poor show considerable differences. The risk of diabetes and hypertension are significantly higher among the rich than the poor. On the contrary, the poor show greater risk for viral fever/influenza and diseases of bones and joints. The average age for the onset of diabetes, hypertension, diseases of bones and joints and cardiovascular diseases in the surveyed population is found to be 35 years. The prevalence of these diseases increases after the age 35 years and females are found to have higher prevalence of hypertension and diseases of bones and joints than males.

Among those reported ill health, 71.2 percent of the them are suffering from single disease, 21.3 percent of them with two diseases and the remaining 7.5 percent of them with more than two diseases. This is partly due to the higher incidence of diabetes, hypertension and cardiovascular diseases. Among those reported hypertension, around 33 percent of them have also reported diabetes. Similarly, around 42 percent of those inflicted by diabetes have also reported hypertension. The main co-existence morbidity for cardiovascular disease is hypertension (26%) and Diabetes (20%). The incidence of infectious and communicable diseases seems to be very low, though dysentery, diarrhoea, and tuberculosis are still prevalent. It is paradoxical that Vaccine preventable diseases like measles, mumps, diphtheria and whooping cough are still prevalent though their incidence is very low.

The paradox of low mortality and high morbidity, first brought out by the NSS survey in 1974, has been corroborated by the present study. The high morbidity in the state cannot be overlooked by any policy prescription by attributing it to 'perception factors' (Sen, 1995). The higher incidence of illness among the poor and among the illiterates would indicate that the high levels of morbidity in Kerala is more real than apparent and does not arise from high degree of perception supported by education and availability of health care services.

Though the present study is based on information from three districts in the state, the pattern of morbidity that we have observed is indicative of the epidemiological transition in Kerala. The prevalence of communicable diseases has been lowered to some extent and non-communicable diseases dominate the morbidity profile. Most of these diseases warrant constant medical attention and treatment and sustained medical treatment is beyond the wherewithal of the average households. The private health care system cannot be an answer because of the high average cost of treatment. This warrants greater and sustained efforts by the State in widening the scope of public action.

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Appendix 1. Descriptive statistics of independent variables, Kerala Health Survey, 2004 (Percentage distribution)

Characteristics	District			Combined
	Thiruvanan-thapuram	Kannur	Malappuram	
Age				
<1	1.2	1.2	2.0	1.6
1-4	5.7	5.7	8.2	6.9
5-12	12.5	14.0	16.1	14.5
13-18	9.7	10.7	13.7	11.8
19-24	10.2	11.4	14.2	12.3
25-34	16.2	16.8	14.7	15.7
35-44	13.7	13.2	9.9	11.9
45-54	12.0	11.6	8.8	10.4
55-64	9.1	7.8	6.5	7.6
65-74	6.3	5.0	4.2	5.0
75 +	3.4	2.6	1.7	2.4
Sex				
Male	46.9	48.7	47.1	47.5
Female	53.1	51.3	52.9	52.5
Education				
Illiterate	13.5	12.6	18.3	15.5
Non-formal literate	2.1	2.1	3.4	2.7
Primary	49.7	54.1	59.4	55.3
High School	16.0	17.1	12.3	14.6
Higher Education	18.7	14.1	6.6	12.0
Marital Status				
Never Married	41.2	46.8	50.1	46.7
Currently Married	48.8	45.2	43.1	45.3
Divorced/ Separated	2.1	1.3	1.5	1.6

cont'd....

Characteristics	District			Combined
	Thiruvanan-thapuram	Kannur	Malappuram	
Widowed	7.9	6.7	5.3	6.4
Religion				
Hindu	66.8	60.1	27.3	46.9
Christians	20.2	7.4	0.9	8.1
Muslim	13.0	32.5	71.8	45.0
Caste				
SC	7.9	2.2	8.0	6.5
ST	1.9	1.6	1.2	1.5
Others	90.3	96.2	90.8	92.0
SES				
Quintile 1	23.1	15.6	20.5	20.0
Quintile 2	18.9	17.1	22.3	20.0
Quintile 3	18.2	20.5	20.9	20.0
Quintile 4	20.3	23.2	17.8	19.9
Quintile 5	19.5	23.6	18.6	20.1
Place of Residence				
Rural	70.2	81.3	90.6	82.4
Urban	29.8	18.7	9.4	17.6
Region				
Coastal	8.6	2.7	3.1	4.6
Low Land	41.1	18.3	16.0	23.8
Mid Land	45.4	66.3	76.8	65.1
High land	4.8	12.7	4.1	6.5
Number	**4890**	**4326**	**7855**	**17071**

References

Caldwell (1986). 'Routes to Low Mortality in Poor Countries,' *Population and Development Review*, 12.

CDS-Government of Kerala. (2006). *Kerala Human Development Report 2005*, State Planning Board, Thiruvananthapuram, Government of Kerala.

CDS-UN. 1975. *Poverty, Unemployment and Development Policy: A Case Study of Selected Issues with Reference to Kerala,* Centre for Development Studies, Trivandrum.

Chen, L. and Murray, C. (1992). 'Understanding Morbidity Change,' *Population and Development Review*, Vol. 18, September.

Dilip, T.R. (2002). 'Understanding Levels of Morbidity and Hospitalization in Kerala, India,' *Bulletin of the World Health Organisation*, 80(9).

Duraisamy, P. (2001). 'Health Status and Curative Health Care in Rural India,' Working Paper No. 78, National Council of Applied Economic Research, New Delhi.

Filmer, Deon and Lant H Pritchett (2001) 'Estimating Wealth Effects without Expenditure Data- or tears: An Application to Educational Enrollments in States of India,' *Demography*, Volume 38, Number 1, pp. 115-132.

Gumber A. Berman P. (1997). 'Measurement and Pattern of Morbidity and Utilization of Health Services: Some Emerging Issues from recent Health Surveys in India,' *Journal of Health and Population in Developing Countries*, Vol.1.

IIPS. (2000). National Family Health Survey, India, 1998-99: Kerala, Mumbai.

Johansson, S.R. (1991). 'The Health Transition: The Cultural Inflation of Morbidity during the Decline of Mortality,' *Health Transition Review*, Vol.1. No.1.

Kabir, M. and Krishnan, T.N. 1996. 'Social Intermediation and Health Changes: Lessons from Kerala,' in Monica Dasgupta et al. (eds) *Health, Poverty and Development in India*, Oxford University Press, New Delhi.

Kannan K. P. *et al.* (1990). *Health and Development in Rural Kerala: A Study of the Linkages Between Socio-Economic Status and Health Status,* Kerala Sasthra Sahitya Parishad.

Kerala Statistical Institute, 2000. Handbook Statistics 2000, Trivandrum, 2001.

Krishnan, T.N. (1985). 'Health Statistics in Kerala State, India,' in Halstead et al. (ed.) *Good Health at Low Cost,* Rockefeller Foundation, New York.

Krishnan, T.N. (2000) 'Access to Health Care and Burden of Treatment in India: An Interstate Comparison,' in Rao (eds.) *Investing in Health*: New Delhi, Sage Publications: 212-230.

Kumar, B.G. (1993). 'Low Mortality and High Morbidity Reconsidered,' *Population and Development Review*, Vol. 19.

Kunhikannan, T.P and K.P.Aravindan (2000*), '*Changes in Health Status of Kerala: 1987-1997,' Kerala Research Programme on Local Level Development, Research Paper No. 20, Centre for Development Studies, Trivandrum.

MeKenzie, D.J. (2003). 'Measuring Inequality with Asset Indicators,' BREAD Working Paper No. 042, Bureau of Research and Economic Analysis of Developmnt.

Nag, M. (1983). 'The Impact of Social and Economic Development on Mortality: A comparative study of Kerala and West Bengal,' *Economic and Political Weekly*, 18-21.

Nag, M. (1989). 'Political Awareness as Factor in Accessibility of Health Services,' *Economic and Political Weekly*, 24(8).

Navaneetham, K and Dharmalingam, A. (2002). 'Utilization of Maternal Health Care Services in Southern India,' *Social Science and Medicine*, Volume 55 pp.1849-1869.

Navaneetham, K. (2005). 'Demographic Transition, Economic Growth and Human Development in Kerala,' Background paper prepared for the Kerala Human Development Report, Centre for Development Studies, Trivandrum.

Navaneetham, K. and M. Kabir (2006). *Health Status of Kerala: A Life Course Perspective,* Project Report submitted to Indo-Dutch Programme on Alternatives in Development (IDPAD), Centre for Development Studies, Trivandrum.

NSSO (1991). Socio Economic Profile of the Aged Persons: NSS 42nd Round (1986-87) in Sarvekshana, Vol 15. No.2 (49).

NSSO (1998). The Aged in India: A Socio-Economic Profile (52nd round, 1995-96), Department of Statistics, Govt. of India

Panikar P.G.K and C.R. Soman (1984*). Health Status of Kerala: Paradox of Economic Backwardness and Health Development,* Centre for Development Studies, Trivandrum, Kerala, India.

Panikar, P.G.K. (1999). 'Health Transition in Kerala,' Discussion Paper No. 10. KRPLLD, Centre for Development Studies, Trivandrum.

Rajarathnen J. *et al.* (1996) 'Morbidity Pattern Health Care Utilisation and Per Capita Expenditure in Rural Population of Tamil Nadu,' *National Medical Journal of India,* 9(6): 91-96.

Raman Kutty, V.R. (2000). 'Historical Analysis of Development of Health Care Services in Kerala,' *Health Policy and Planning*, Vol. 15.

Ratcliffe, John. (1978). 'Social Justice and the Demographic Transition; Lessons from India's Kerala State,' *International Journal of Health Services*, Vol.8, No.1.

Satya Sekar P. (1997). 'Levels of Morbidity in Andhra Pradesh,' *Economic and Political Weekly,* XXXII(13): 663-72.

Sen, Amartya. (1995). *Health, Inequality and Welfare Economics*, B.G Kumar Memorial Lecture at CDS, December 29, 1995.

Shyjan, (2000). Health Status of Fisher Folk in Kerala: A Case Study of the Fishing Village of Poovar, Trivandrum.

Vimala Kumari, T.K (1991) *Infant Mortality among Fishermen***,** Discovery Publishing House, New Delhi.

Visaria, Pravin, et al. (1996). 'Morbidity, Health Care, Utilization and Expenditure Pattern in Andhra Pradesh, Kerala, Madhya Pradesh and Punjab: 1986-87,' Ahmedabad: Gujarat Institute of Development Research.

Vyas, Seema and Kumaranayake, L. (2006). 'Constructing Socio-Economic Status Indices: How to use Principal Components Analysis,' *Health Policy and Planning,* Vol. 26, No. 6.

Wagstaff, Adam. (2002). Poverty and Health Sector Inequalities, *Bulletin of the World Health Organisation*, Volume 80, Number 2.

Walker, A.E. and Becker, N.G. (2005) 'Health Inequalities Across Socio-economic Groups: Comparing Geographical –area-based and Individual-based Indicators,' *Public Health*, Vol. 199.

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