

Understanding levels of morbidity and hospitalization in Kerala, India

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Abstract The prevalence of ailments and hospitalization in Kerala was examined using data from the 52nd National Sample Survey Data on Health Care in Kerala in 1995-6. The survey included 24 401 people from 4928 households. Age and seasonality had considerable effects on the morbidity of individuals. The burden of ill health was higher in rural areas than in urban areas. People who were more likely to have a better lifestyle had a higher level of morbidity and hospitalization. Regional differences were seen, with levels of morbidity and hospitalization higher in the comparatively developed regions of Southern Kerala than in Northern Kerala. Factors like physical accessibility of health care services and capacity to seek health care services could create artificial differences in morbidity and hospitalization among different subgroups of the population in Kerala.

Keywords Hospitalization; Morbidity; Acute disease/epidemiology; Chronic disease/epidemiology; Prevalence; Socioeconomic factors; Rural population; Seasons; Cost of illness; Regression analysis; Health care surveys; India (*source: MeSH, NLM*).

Mots clés Hospitalisation; Morbidité; Maladie aiguë/épidémiologie; Maladie chronique/épidémiologie; Prévalence; Facteurs socio-économiques; Population rurale; Saison; Coût maladie; Analyse régression; Enquête système de santé; Inde (*source: MeSH, INSERM*).

Palabras clave Hospitalización; Morbilidad; Enfermedad aguda/epidemiología; Enfermedad crónica/epidemiología; Prevalencia; Factores socioeconómicos; Población rural; Población urbana; Estaciones; Costo de la enfermedad; Análisis de regresión; Encuestas de atención de la salud; India (*fuentes: DeCS, BIREME*).

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Voir page 750 le résumé en français. En la página 750 figura un resumen en español.

Introduction

The concept of “good health at a low cost” has made Kerala — a state with a relatively low per capita income — popular, because its population has a good health status. This view is based on the health status as measured with indicators of mortality, but the picture is different if we look at estimates of morbidity for Kerala. Morbidity, or a feeling of being sick, is a subjective phenomenon, and its measurement is characterized by conceptual limitations and by limitations in available measurement methods. Although concrete evidence of a relation between mortality and morbidity is lacking, morbidity reported for regions with high mortality is lower than that for regions with low mortality. National-level surveys show that the morbidity in Kerala is higher than elsewhere in India (1–3). All of these surveys depended on reported morbidity or on perceived morbidity, which, to a large extent, is based on an individual’s perception of illness (4). Universal literacy, coupled with extended medical facilities, has resulted in earlier diagnosis and detection of diseases than ever before, and this is often cited as a reason for the high morbidity seen in Kerala (5, 6). Explanations that treat this high morbidity as a statistical artefact or relate it to differences in perception do not consider the effect that the decline in mortality in younger people has on the morbidity level of the state’s population. The large differences in reported

morbidity can also be attributed to the real burden of morbidity within the populations of the states concerned (7).

Patterns of morbidity seen within the state are rather complicated, because they include a mixture of diseases of poverty and diseases of affluence (8). Large-scale surveys undertaken in Kerala showed that morbidity was higher in people from poor economic and educational backgrounds than in those with good economic and educational backgrounds (2, 5). This resembles epidemiological polarization, which is a critical feature of health transition (9). When mortality is low, noncommunicable diseases will be more prominent, with infectious diseases and malnutrition more concentrated among the poor than the rich. A recent survey showed, however, that the prevalences of chronic and acute ailments were marginally higher among high-income groups in the state (3). If Kerala has reached a stage where it has to undergo epidemiological polarization, then absolute mortality should also have been low for a long time; this is not true for Kerala. The now much-hyped existence of a low mortality and high morbidity situation in Kerala was first pointed out in the early 1980s (8), when mortality in the state had just gone down drastically and was lower than that of the other states of India.

The limitations of collecting data on morbidity as well as measuring morbidity with data available from health interview surveys in India are well documented (6). It is well known that

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demographic transition paves the way for health transition, and the task of studying morbidity is particularly difficult in Kerala, where experiences of demographic transition are considered to be paradoxical and not replicable. We have to be cautious about analysing and interpreting the rates of self-reported morbidity in Kerala.

In this study, we examined the differences in prevalences of ailments and hospitalization within the population of Kerala state. Information on ailments from population-based surveys is mostly a measure of perceived morbidity, which is influenced by reporting errors. These kinds of errors arise because of differences in peoples' willingness to accept illness and the ignorance of informants (during the survey) about illnesses of other members of their household. On the other hand, hospitalization is a major non-fatal health outcome that is considered to be relatively free from the errors associated with reporting of ailments described above. In the case of hospitalization, underestimates could arise only because of underutilization of health care services. We examined the differences in levels of morbidity and hospitalization by various background characteristics of the population and physical environment.

Methods

The present study is based on data collected by the National Sample Survey Organization during its 52nd survey on health care between July 1995 and June 1996 (3). This survey covered a sample of 2850 and 2078 households in rural and urban areas, respectively; the results were combined to get the overall picture for Kerala. Our study therefore is based on the health status of 24 401 people who lived in 4928 households covered in the survey. Respondents were the head of the household or, in the absence of the head, any other adult staying in the household. We analysed information recorded during the survey about whether any member of the household had suffered from any ailment during the last 15 days and about hospitalization of any member of the household during the last year. An ailment — that is, an illness or injury — was defined as any deviation from a state of physical and mental well-being. A person was considered to have been hospitalized if he or she had used medical services as an inpatient in any hospital. Since the data collection was spread over a year, this data set is free from seasonal variations in morbidity.

Analytical methods

The prevalences of ailments and hospitalization were determined 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. The prevalence of any ailment, or its morbidity, was defined as:

Morbidity =

$$\frac{\text{Number of persons who were ailing during the 15 days prior to the survey} \times 1000}{\text{Total population present in the sample}}$$

Similarly, annual hospitalization rate — that is, the number of persons who had been hospitalized during the year leading up to the date of the survey per thousand population — was calculated as:

Annual hospitalization rate =

$$\frac{\text{Number of persons who had been hospitalized during the one year prior to the survey} \times 1000}{\text{Total population present in the sample}}$$

The differences in morbidity levels by selected background variables known to be closely related to the health status of the population is examined through bivariate analysis. Logistic regression analysis was performed to study the independent effect of each of these predictor variables on the morbidity of the population. Ailments reported during the survey were classified as acute or chronic, to examine the prevalence of these conditions in various subsections of the population. A similar exercise was carried out to see how far these determinants influenced hospitalization — a major nonfatal health outcome considered to be relatively free from the reporting bias associated with reporting of ailments.

Bivariate analysis

Table 1 shows the morbidity and annual hospitalization rates, according to the different background characteristics of the study population.

Morbidity

Morbidity, or ailments, were reported in Kerala at a rate of 110 per thousand population during the 15-day reference period. Sex differences in prevalence of ailments were not found. Elderly people (those aged 60 years and above) were very vulnerable to ailments. The prevalence was 234 per thousand in this age group, 133 per thousand population in those aged 35–39 years and 125 per thousand population in those aged 0–14 years. People aged 15–39 years were the healthiest, with the lowest prevalence of 67 per thousand population.

Morbidity was higher in rural areas than in urban areas (118 per thousand population versus 89 per thousand population). The prevalence of ailments was higher in people who lived in small households (123 per thousand population) than in those who lived in large households (92 per thousand population).

We included the variable “monthly per capita consumer expenditure (MPCE)” to represent the economic situation of the household; this showed that MPCE and prevalence of ailments were positively related. The prevalence of ailments was 101 per thousand population in the lowest MPCE quartile, and it gradually increased with increasing MPCE, reaching a maximum of 132 per thousand population in people in the highest MPCE category.

Prevalence of ailments in Kerala showed a high degree of seasonal variation. The burden of ailments was highest during July–September (127 per thousand population) and lowest during October–December (96 per thousand population). Geographically, when the prevalence was 127 per thousand population in Southern Kerala, it was only 82 per thousand population in Northern Kerala.

Acute and chronic ailments

Ailments reported during the survey were also analysed by classifying them as acute and chronic on the basis of their expected duration. We classified ailments of short duration (not longer than 30 days) as acute, and ailments of long duration (longer than 30 days) as chronic. Most ailments

classified as acute were communicable and most ailments classified as chronic were noncommunicable.

Acute ailments. The prevalence of acute ailments in Kerala was 77 per thousand population (Table 1). Sex differences were only marginal, but the picture was clear in the case of age. The prevalence of acute ailments was highest among those aged 0–14 years (114 per thousand population) and lowest in those aged 15–39 years (54 per thousand population). The prevalence of acute ailments was 75 per thousand population in those aged 40–59 years and 81 per thousand population in those over 60 years.

The prevalence of acute ailments was 82 per thousand population in rural areas and 64 per thousand population in urban areas. Acute ailments were often reported in people living in small households (1–5 members). The prevalence was 85 per thousand population in households with 1–5 members and 65 per thousand population in households with six or more members. The risk of a person reporting acute ailments was unrelated to their MPCE background.

Seasonal variations were observed, with the highest prevalence (92 per thousand population) in the period close to the monsoon season — from July to September — and the lowest (57 per thousand population) in October to December. Regional differences were observed, with Southern Kerala experiencing higher morbidity (86 per thousand population) than Northern Kerala (62 per thousand population).

Chronic ailments. Chronic ailments were reported at a rate of 35 per thousand population. Sex differences were not noted. As can be expected, the chronic ailments was found to be associated with old age. There was an increase in the prevalence of chronic ailments from 11 per thousand population in 0–14 age group to 59 per thousand population in 40–59 age group and to 162 per thousand population in 60+ age group.

The prevalence of chronic ailments was 38 per thousand population in rural areas and 26 per thousand population in urban areas. Chronic ailments were reported at a rate of 39 per thousand population in households with 1–5 members, but at only 28 per thousand population in households with six or more members. Unlike acute ailments, the rate of chronic conditions was higher in people from the top MPCE quartile than the rest. The prevalence of ailments (both acute and chronic) was high in the top MPCE group (Table 1). The high rate of ailments among the high MPCE group seemed to be because of a higher rate of prevalence of chronic conditions in this category, as there was hardly any difference in the prevalence of acute ailments by different MPCE groups. The prevalence of chronic ailments was 25 per thousand population for people from the lowest MPCE quartile and 59 per thousand population for people in the highest MPCE quartile. The analysis did not show any seasonal variation in the prevalence of chronic conditions, which included only ailments of a long duration, but the lowest level was observed during

Table 1. Prevalence of ailments during 15 days leading up to the survey date and hospitalization in the year leading up to the survey date, by selected background characteristics in Kerala, 1995–96

Background characteristics	Prevalence per thousand population			
	Any ailment	Acute ailments	Chronic ailments	Hospitalization
Sex				
Male	110	79	33	68
Female	111	75	37	68
Age				
0–14	125	114	11	50
15–34	67	54	14	50
35–59	133	75	59	96
≥60	234	81	162	155
Place of residence				
Rural	118	82	38	70
Urban	89	64	26	65
MPCE quartile group				
0–25	101	76	25	58
25–50	103	78	26	64
50–75	121	77	45	70
75–100	132	76	59	88
Season				
July–September	127	92	36	NA
October–December	96	57	39	NA
January–March	113	86	29	NA
April–June	108	73	36	NA
State region				
Southern Kerala	127	86	42	84
Northern Kerala	82	62	22	40
Total	110	77	35	68
<i>n</i>	24 304	24 304	24 304	24 401

NA = not applicable since reference period for hospitalization was one year in the survey .

Source: Calculated with data from the 52nd National Sample Survey on Health Care (3).

Note: Sum of prevalence of acute and chronic ailments may not add up to prevalence of any ailment because of comorbidity.

January–March. The prevalence was 42 per thousand population in Southern Kerala but only 22 per thousand population in Northern Kerala.

Hospitalization

The hospitalization rate was 68 per thousand population. Sex-specific differences were not observed in the study population. The rate of hospitalization was much higher in older age groups (50 per thousand population in those aged 0–14 and 15–39 years, 96 per thousand population in those aged 40–59 and 155 per thousand population in those aged ≥ 60 years).

As in the case of ailments, the hospitalization rate was slightly higher in rural areas (70 per thousand population) than in urban areas (65 per thousand population). The hospitalization rate was also slightly higher in small households than in large households. In fact, the same relation was observed in the case of non-hospitalized ailments, and this may be due to the higher concentration of older people in small households, which could be best explained by multivariate analysis.

The hospitalization rate for the lowest MPCE quartile was 58 per thousand population and for people in the highest MPCE group was 88 per thousand population. Regional differences were clear, with a very high hospitalization rate of 84 per thousand population in Southern Kerala and only 40 per thousand population in Northern Kerala.

Multivariate analysis: logistic regression

Table 2 shows the results of a logistic regression analysis made to find out the effect of selected background characteristics on reported health status of the population. The odds ratio [exp (β)] for each category of independent variable obtained from the analysis indicated the odds of reporting ill or getting hospitalized compared to the reference category during the reference period, when the effect of all other variables was kept constant. The category with odds ratio one was the reference category.

Age was an important determinant of morbidity. The odds ratios of 2.04, 2.03 and 4.27 observed for age groups 0–14, 40–59 and ≥ 60 years, respectively, were highly significant and confirmed a J-shaped relation between age and morbidity. People living in rural areas were 31% more likely to report an illness than those living in urban areas. It should be noted that the effect of household size was still significant when other background characteristics were controlled for; this indicated that ailments in larger households were underreported. Our analysis showed an inverse relation between MPCE and a person's morbidity. People from the highest MPCE category were 41% more likely to report illness than those in the lowest MPCE category.

The logistic regression analysis confirmed the seasonal variations observed in the bivariate analysis, with the highest odds value for July–September. People living in more-developed Southern Kerala were 52% more likely to report an ailment than their counterparts in Northern Kerala.

Age, source of household income, MPCE category and region had an effect on the rate of hospitalization. The odds of hospitalization were 1.98 and 3.39 times higher in those aged 40–59 and ≥ 60 years than in those aged 15–34 years. Hospitalization was 25% more likely in those belonging to the highest MPCE category than the lowest MPCE category. The annual risk of hospitalization was about twice as high in

Southern Kerala as in Northern Kerala. Unlike for morbidity, household size was insignificant for hospitalization, which is less likely to be underreported than non-hospitalized ailments.

Discussion

This analysis shows the variations in reported levels of morbidity in a state like Kerala, which is characterized by universal literacy and a widespread network of medical care facilities. As expected, age had a J-shaped relation with both morbidity and hospitalization levels. At the same time, morbidity because of acute ailments was higher among children, whereas the older population was at higher risk of chronic ailments. The burden of illness was higher in rural areas than in urban areas, but this was not the case for hospitalization. Seasonal variations were significant, with morbidity being highest between July and September. Reporting of morbidity and hospitalization was higher in Southern Kerala than in Northern Kerala, which is lagging behind in terms of development. The high level of physical accessibility of health care services in densely populated

Table 2. Results of logistic regression analysis for determinants of morbidity and hospitalization in Kerala, 1995–96

Independent variables	Odds ratio	
	Any ailment ^a	Hospitalization ^b
Sex		
Male	1	1
Female	0.9768	1.0101
Age (years)		
0–14	2.0446 ^c	1.0355
15–34	1	1
35–59	2.0384 ^c	1.9800 ^c
≥ 60	4.2768 ^c	3.3972 ^c
Place of residence		
Rural	1.3131 ^c	1.0796
Urban	1	1
Household size		
1–5	1	1
≥ 6	0.8226 ^c	0.9834
MPCE quartile group		
0–25	1	1
25–50	1.0322	1.0001
50–75	1.1588 ^d	1.2052 ^d
75–100	1.4118 ^c	1.2538 ^c
Season		
July–September	1.5574 ^c	NA
October–December	1	^d
January–March	1.2928 ^c	^d
April–June	1.2287 ^c	^d
Region		
Northern Kerala	1	1
Southern Kerala	1.5239 ^c	2.0551 ^c
Constant	–3.3241	–3.5311
<i>n</i>	24243	24255

^a Was patient ill during last 15 days (yes = 1, no = 0).

^b Was patient hospitalized during last year (yes = 1, no = 0).

^c Significant at <1 % level.

^d Significant at <5 % level dependent variables coding.

Southern Kerala could also be responsible for the regional differences in morbidity and hospitalization observed during the study. It should also be noted that the regional differences were much larger for chronic ailments than for acute ailments. Factors like monthly per capita consumer expenditure of the household are significant, even in the case of hospitalization.

Overall, it is difficult to believe that people living in good economic conditions — who are more likely to have a better lifestyle — are at a higher risk of having a health problem than those living in poor economic conditions. The prevalences obtained after ailments were classified as acute or chronic help to explain this unexpected relation. The reported burden of noncommunicable chronic conditions was higher among people who were economically well-off than the poor sections of the population. The lifestyle-related nature of chronic conditions might have contributed to the higher prevalence of chronic ailments, resulting in a higher burden of morbidity and hospitalization among the better-off subgroups. These groups may be more aware of health issues and therefore be relatively less likely to underreport minor health problems or acute ailments than their counterparts in a poorer economic situation.

Underreporting of ailments was more common in large households than in small households. This is a methodological issue that needs special attention when morbidity levels are assessed through health interview surveys. Another methodological issue is the limitation of national-level surveys with investigators and respondents being mostly males in terms of recording the gender dimensions in morbidity levels. Learning from the experiences of small-scale studies (10, 11), similar policy-oriented surveys should consider using female investigators and interviewing females in the household rather than the usual “head of household”, to obtain a fuller picture of women’s health problems.

The analysis showed that the regional differentials in morbidity that we observe when we compare Kerala with other

states in India could be found even within Kerala. History shows that the part of the population in Northern Kerala has always lagged behind their counterparts in Southern Kerala, in terms of exposure to health problems and development of health care services in these two regions (12). This regional differential was evident in the distribution of both government and private health care services (13), leading to a relatively lower level of health care consciousness and health service utilization in Northern Kerala. In short, the analysis proved density of health care infrastructure facilities in an area to be a prime determinant of morbidity in the state, which is likely to be true in any population. The observation that people in richer areas are more likely to report themselves ill than people in poorer areas is certainly due to the fact that the gap between reported and observed morbidity is smaller in richer areas than in poorer ones (4). There is also evidence of large-scale inequalities in access to health care services within the state (14). Perhaps the health care costs have risen in such a way that the rich can afford to consider themselves sick and seek treatment in ways that the poor cannot, which lowers the overall level of utilization of health care services by the poor. The finding suggests that factors like the physical accessibility of health care services and the capacity to seek care are likely to create artificial differentials in morbidity and hospitalization among different subgroups in Kerala. This shows that the hypothesis of cultural inflation of morbidity (15) seems to be applicable to this population, and there is a need to explore the role of these factors, while studying the morbidity picture in the population. ■

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Résumé

Comment expliquer les taux de morbidité et d'hospitalisation dans le Kerala (Inde)

La prévalence de la maladie et des hospitalisations dans le Kerala a été examinée à partir des données de la 52^e enquête nationale sur les soins de santé réalisée dans cet Etat en 1995-1996. L'enquête portait sur 24 401 personnes représentant 4928 ménages. L'âge et la saison influaient considérablement sur la morbidité individuelle. La charge de morbidité était plus élevée dans les zones rurales que dans les zones urbaines. Les personnes susceptibles d'avoir un meilleur mode de vie avaient un taux de morbidité et

d'hospitalisation plus élevé. Des différences régionales ont été observées, avec des taux plus élevés dans les régions relativement développées du sud du Kerala que dans les régions du nord. Des facteurs comme l'accessibilité matérielle des services de santé et la possibilité, notamment financière, de consulter ces services pourraient induire des différences artificielles au niveau des taux de morbidité et d'hospitalisation entre divers sous-groupes de la population du Kerala.

Resumen

Significado de los niveles de morbilidad y hospitalización en Kerala (India)

Se analizó la prevalencia de enfermedades y de hospitalización en Kerala a partir de los datos aportados por la 52^a encuesta nacional por muestreo sobre la atención de salud en Kerala, 1995-1996. La encuesta abarcaba a 24 401 personas de 4928 hogares. La edad y la estacionalidad tenían gran influencia en la morbilidad de los individuos. La carga de mala salud fue mayor en las zonas rurales que en las urbanas. Las personas con más probabilidades de haber adoptado estilos de vida adecuados presentaban un nivel más alto

de morbilidad y hospitalización. Se observaron diferencias regionales, pues los niveles de morbilidad y hospitalización eran mayores en las regiones comparativamente desarrolladas del sur de Kerala que en el norte de la región. Factores tales como la accesibilidad física de los servicios de atención sanitaria y la capacidad para buscar servicios de salud podrían dar lugar a diferencias artificiales en la morbilidad y la hospitalización entre los diferentes subgrupos de población de Kerala.

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