Emerging Levels and Patterns of Morbidity in Kerala

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ABSTRACT

Though Kerala has made tremendous advancements in health indicators, the state's rising morbidity rate and accompanying health concerns remain a burning issue. This study aims to explore the emerging levels and patterns of morbidity in Kottayam district using cross-sectional data. The study reveals an alarming morbidity rate of 347 per 1000 people in Kottayam, which is substantially higher than the state average (245 per 1000 people) and more than four times higher than that of the all-India figure (75 per 1000 population). The prevalence of chronic morbidity, acute morbidity, and multiple co-morbidities is significantly high, with multiple chronic illnesses accounting for one-third of all sick people. Hence, urgent interventions by local and state governments, in collaboration with other stakeholders, are inevitable to evolve effective strategies and schemes to arrest the state's rising morbidity trend and also to offer the best and most timely health care facilities to the morbid population.

 Keywords: Acute morbidity, Chronic morbidity, Kerala, Morbidity, and Multiple co-morbidities.

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INTRODUCTION

Kerala, with a per capita income lower than many other states in India, has made tremendous advancements in health indices, such as low birth and infant death rates and high life expectancy. Though these health indices are the best among the Indian states and even comparable to those of the developed countries, the rising morbidity rate and accompanying health concerns remain a burning issue. While Kerala has achieved remarkable progress in terms of demographic indicators, it has the highest rate of morbidity among Indian states (Ghosh and Arokiasamy, 2010). In 2018, Kerala had a morbidity rate of 245 per 1000 people, compared to 75 per 1000 population for the entire country (NSSO, 2020). So, the morbidity rate in Kerala was more than three times higher than the national average. Within two decades (1995–2014), the morbidity prevalence rate in Kerala approximately tripled from 110 to 308 per thousand people. Infectious diseases grew six times, Cardiovascular diseases (CVDs) nearly nine times, Non-communicable diseases (NCDs) nearly six times, and disability climbed five times over this period (Paul et al., 2020).

Kerala, with low mortality, has a greater rate of morbidity than other Indian states. As a consequence,

the Kerala predicament is referred to as "Low Mortality High Morbidity Syndrome" (Panicker and Soman, 1985). A large segment of the population in Kerala suffers from morbidity caused by air and water-borne infections (Kabir and Krishna, 1991). Infectious diseases such as dengue fever, diarrhea, leptospirosis, and others are far more common in Kerala than they are elsewhere in the country. In addition, the prevalence of certain lifestyle diseases is significantly higher than the national norm (Ekbal, 2006). Multiple co-morbid diseases, as well as a high frequency of NCDs and related risk factors, pose a significant challenge to Kerala's public health system. The state has much higher rates of heart disease, diabetes, cancer, and chronic respiratory disorders (Sivasankaran and Thankappan, 2013) .

Kottayam had the highest morbidity among Kerala's major districts between the two decades (1995–2014), with a dramatic increase in the number of infectious disease patients from 9 per thousand persons to 110 per thousand persons, and the highest self-reported CVDs, which reached an alarming level of 159 per thousand persons from 59 per thousand persons (Paul et al., 2020). It is observed that the southern part of Kerala reported a substantial level of illness and hospitalisation cases due to its better education and healthcare facilities, greater urbanization, and density of population (Paul and Sengupta, 2017). Morbidity was shown to be influenced by age, gender, and location, with the elderly, females, and metropolitan areas having greater rates. The southern half of Kerala had greater rates of illness and hospitalisation than the northern section (Paul et al., 2020). The rising trend in infectious diseases, NCDs and CVDs, in both rural and urban regions signals a serious challenge and concern for the provision of better sanitation and healthcare facilities (Anand and Singh, 2017).

The literature analysis revealed an alarming rise in morbidity in Kerala, with the highest prevalence in Kottayam district, as well as challenges in the state's health sector. However, these studies have mostly relied on secondary data from the first three rounds of the NSSO morbidity survey, which covered the period 1995–2014. It is also found that no recent study has been undertaken in Kerala to explore the trends in morbidity after the publication of the 75th round of NSSO survey data in 2020. Furthermore, no serious study based on cross-sectional data has so far been conducted on levels and patterns of morbidity in Kottayam, the district with the highest literacy rate and no poverty (NITI Aayog, 2021). This study was carried out to fill such a gap.

Objectives

This study has been undertaken based on the following specific objectives:
- To examine morbidity levels and patterns in Kottayam district.
- To evaluate the gender difference in morbidity and its prevalence among different age groups.
- To identify the factors contributing to the high morbidity rate in Kerala.

Methodology

The study is both empirical and analytical in nature, and it is based on primary and secondary data. The primary data was collected from 375 households chosen at random from 24 Panchayats in Kottayam district. The respondents' information was elicited using an interview schedule. The reference period for collecting the data on morbidity was 15 days before the date of the survey. In this study, "morbidity rate is termed as the proportion of ailing persons (PAP), measured as the number of living persons reporting an ailment per 1000 persons during a 15-day reference period" (NSSO, 2014).

The study divided morbidity into three categories: acute morbidity, often known as "infectious disease," (illnesses that develop quickly, are caused by a virus, and endure for a short period of time, such as fever, cough, cold, pneumonia, etc.); chronic morbidity (long-term illnesses, such as heart disease, diabetes, hypertension, etc.); and multiple co-morbidities, also known as "multiple chronic conditions" (the simultaneous existence of two or more chronic health disorders such as heart disease, hypertension, stroke, diabetes, etc.).

Results

Morbidity Levels and Patterns

In this section, the health conditions of the respondents and their family members are investigated by looking at their morbidity levels and patterns in the study area. The total morbidity rate in Kottayam district was estimated at 347 per 1000 population, with acute morbidity accounting for 96 per 1000 people, chronic morbidity for 189 per 1000 population, and multiple co-morbidities for 96 per 1000 population. Females have a larger prevalence of total morbidity (356 per 1000) than males (337 per 1000), whereas the risk of chronic morbidity is greater among males than females. The morbidity rate for chronic ailments is reported to be 192 per 1000 and 186 per 1000 for males and females, respectively. The female population suffers from more acute morbidity and multiple co-morbidities than the male population. Males have an acute morbidity rate of 88 per 1000 population, while females have an acute morbidity rate of 104 per 1000 population, with multiple

Table 1: Prevalence of Morbidity by Gender

Type of Morbidity	Morbidity Rate (Per 1000 population)		
	Male	Female	Total
Acute	88	104	96
Chronic	192	186	189
Multiple Chronic	57	66	62
Total	337	356	347

Source: Primary data

co-morbidities accounting for 66 per 1000 population for females and 57 per 1000 population for males (See Table 1).

Acute Morbidity for Specific Diseases by Gender

Fever, cough, viral fever, and other diseases like typhoid, jaundice, and diarrhea were the major acute diseases that afflicted people. Fever is shown to be a major acute disease in both males and females, with a morbidity rate of 64 per 1000 people. The prevalence rate of fever was higher among females (70 per 1000 population) than males (58 per 1000 population). The prevalence rate of cough was 17 per 1000, which was recorded more among males (19 per 1000) than females (17 per 1000). The morbidity rate for other acute diseases is 10 per 1000 population (See Table 2). Females have a larger risk of other acute disorders than males.

Incidence of Acute Ailments by Age

Children have the highest risk of acute illnesses, followed by the elderly. The incidence of acute diseases accounted for 38 percent among children aged 0-5. Children suffer more from fever (42%) and cough (46%). The other acute diseases like typhoid, jaundice, and diarrhea were more prevalent among the elderly population (See Table 3). The association between the incidence of acute ailments and age is statistically significant, as the value of the chi-square statistic is 84.936, which is significant at a 1 percent level of significance.

Chronic Morbidity Rate for Specific Diseases by Gender

Hypertension, diabetes, heart disease, arthritis, asthma, and other diseases like cholesterol, stroke, and cancer were among the most common chronic illnesses recorded. On a single disease basis, there are 414 cases of chronic ailments reported, with hypertension accounting for 210 of them (51%). Diabetes was also a very common chronic illness, accounting for 34 percent of all chronic illnesses reported.

Hypertension has the highest morbidity rate, accounting for 127 per 1000 population, followed by diabetes with 87 per 1000 population. The morbidity rate for heart disease is 7 per 1000 people. Arthritis has a morbidity rate of 12 per 1000 people (See Table 4). Males had higher morbidity rates for diabetes, heart disease, and other ailments than females. Females, on the other hand, had a higher prevalence of hypertension and arthritis than males.

Incidence of Chronic Ailments by Gender

The prevalence of chronic ailments (both chronic morbidity and multiple co-morbidities) is slightly higher for females (51%) than for males (49%). Males had a higher rate of diabetes, heart disease, and other disorders, including high cholesterol and stroke, than females. Women are more likely to suffer from hypertension and arthritis (See Table 5). The chi-square test is used to investigate the relationship between the occurrence of chronic illnesses and gender. There appears to be no significant association between the prevalence of chronic diseases and gender, as the chi-square statistic of 0.029 is not significant at the 1 percent level.

Table 2: Disease Specific Acute Morbidity

Disease	Morbidity Rate (Per 1000 population)		
	Male	Female	Total
Fever	58	70	64
Viral fever	4	7	5
Cough	19	15	17
Others	7	12	10
Total	88	104	96

Source: Primary data

Table 3: Incidence of Acute Ailments by Age

Disease	Age group					Total
	0 - 5	6 - 20	21 - 44	45 - 59	60+	
Fever	45 (42%)	16 (15%)	9 (9%)	11 (10%)	25 (24%)	106 (100%)
Viral fever	2 (22%)	3 (34%)	Nil	2 (22%)	2 (22%)	9 (100%)
Cough	13 (46%)	3 (11%)	3(11%)	2 (7%)	7 (25%)	28 (100%)
Others	1(1%)	4 (25%)	Nil	6 (38%)	5 (31%	16 (100%)
Total	61(38%)	26 (16%)	12 (8%)	21 (13%)	39 (25%)	159 (100%)

Source: Primary data

Table 4: Disease Specific Chronic Morbidity

Disease	Morbidity Rate (Per 1000 population)		
	Male	Female	Total
Diabetes	93	81	87
Hypertension	122	131	127
Heart disease	8	6	7
Asthma	9	8	8
Arthritis	6	18	12
Others	11	8	10
Total (Both chronic and multiple co-morbidities	249	252	251

Source: Primary data

Table 5: Incidence of Chronic Ailments by Gender

Type of Diseases	Gender		
	Male	Female	Total
Diabetes	75 (52%)	68 (48%)	143 (100%)
Hypertension	99 (47%)	111 (53%)	210 (100%)
Heart disease	6 (56%)	5 (44%)	11 (100%)
Asthma	7 (50%)	7 (50%)	14 (100%)
Arthritis	5 (25%)	15 (75%)	20 (100%)
Others	9 (56%)	7 (44%)	16 (100%)
Total	201 (49%)	213 (51%)	414 (100%)

Source: Primary data

Incidence of Chronic Ailments by Age

The prevalence of chronic diseases is reported to be very high (67%) in the age group of 60+. The bulk of cases of diabetes, hypertension, heart disease, arthritis, and other diseases such as cholesterol, stroke, and cancer were reported among people aged 60 and up. Chronic disease incidence is relatively low in the younger age groups, up to 44 years old, accounting for 9 percent of all chronic ailments recorded. The reported cases of heart disease (36%), diabetes (28%), and hypertension (22%) are relatively high among the age group of 45–59. It is also worth noting that the incidence of hypertension (9%), diabetes (1%), and asthma (29%) was reported in the age group 0–20 (See Table 6). Furthermore, the chi-square statistic value of 62.093 is significant at the 1 percent level, indicating that there is a link between the occurrence of chronic illnesses and age.

Incidence of Multiple Chronic Ailments by Gender and Age

There were 102 people with multiple chronic ailments, accounting for one-third of the total number of sick people reported. The two major co-existing

Table 6: Incidence of Chronic Ailments by Age

Type of Diseases	Up to 20	21 - 44	45- 59	60 +	Total
Diabetes	2 (1%)	7 (5%)	40 (28%)	94 (66%)	143 (100%)
Hypertension	18 (9%)	5 (2%)	46 (22%)	141 (67%)	210 (100%)
Heart disease	Nil	1 (9%)	4 (36%)	6 (55%)	11 (100%)
Asthma	4 (29%)	Nil	3 (21%)	7 (50%)	14 (100%)
Arthritis	Nil	Nil	2 (10%)	18 (90%)	20 (100%)
Others	Nil	1 (6%)	5 (31%)	10 (63%)	16 (100%)
Total	24 (6%)	14 (3%)	100 (24%)	276 (67%)	414 (100%)

Source: Primary data

Table 7: Incidence of Multiple Chronic Ailments by Gender

Multiple Ailments	Gender		
	Male	Female	Total
Diabetes & Hypertension	31 (46%)	36 (54%)	67 (100%)
Diabetes & Heart disease	4 (67%)	2 (33%)	6 (100%)
Diabetes & Arthritis	Nil	4 (100%)	4 (100%)
Diabetes & Others	4 (57%)	3 (43%)	7 (100%)
Hypertension & Heart disease	2 (40%)	3 (60%)	5 (100%)
Hypertension & Arthritis	Nil	2 (100%)	2 (100%)
Hypertension & Asthma	1 (33%)	2 (67%)	3 (100%)
Hypertension & Others	3 (50%)	3 (50%)	6 (100%)
Arthritis & Asthma	1 (50%)	1 (50%)	2 (100%)
Total	46 (45%)	56 (55%)	102 (100%)

Source: Primary data

chronic diseases that showed up were diabetes and hypertension (66%). The risk of multiple chronic ailments is higher among females (55%) than males. Co-existing chronic ailments such as diabetes and hypertension, diabetes and arthritis, hypertension and heart disease, hypertension and arthritis, and hypertension and asthma are more common among women than men. However, the co-existence of diabetes with heart disease and other diseases like cholesterol and cancer is more common among men than women (See Table 7). The association between the incidence of multiple chronic ailments and age is statistically significant as the value of the chi-square statistic is 14.292, which is significant at a 5 percent level of significance.

Multiple chronic illnesses are most common in people aged 60 and older (65%), followed by those aged 45 to 59 (28%). It indicates that the probability of multiple chronic illnesses is minimal in the younger age groups (up to 44 years old), at 7 percent. The chi-square test is employed to look at the relationship between the occurrence of multiple chronic ailments and gender. There seems to be no substantial association between the occurrence of multiple chronic diseases and gender, as the chi-square statistic of 0.653 is not significant at the 1 percent level.

DISCUSSION

The estimated morbidity rate in Kottayam district (347 per 1000 population) is significantly higher than the state average (245 per 1000 population) and more than four times greater than that of the all-India figure (75 per 1000 population) (NSSO, 2018). The greatest rate of morbidity in Kerala is in Kottayam, followed by

Idukki and Kozikode, and Kottayam's rate is far higher than the state's overall statistic (Paul and Sengupta, 2017). Kottayam had the highest morbidity rate among Kerala's major districts from 1995 to 2014 (Paul et al., 2020). The study points to the growing prevalence of chronic morbidity and multiple co-morbidities in the study area, which is a cause for serious concern. Multiple chronic illnesses were reported by one-third of the total number of sick people. Diabetes, along with hypertension, is the major co-existing chronic disorders that are usually seen. Another key finding is that the bulk of the surveyed households (52%) have sick people in the family, of which 26 percent have two or more sick people in the family. As a result, in the majority of households, at least one member of the family undergoes medical treatment and takes medicine regularly. The treatment of ailments, therefore, becomes a heavy financial burden and a source of stress on such households.

Gender, age, caste, gender, level of education, economic status, marital status, home location, family size, nutritional status, lifestyle of the people, and access to health care services emerged as statistically significant determinants of morbidity (Dilip 2002 & 2010; Rajan, 2003; Simon, 2017and Paul and Singh, 2017). Females have a greater morbidity rate than males. Acute morbidity and multiple co-morbidities are more prevalent in women than in men, whereas the morbidity rate for chronic ailments is slightly higher in men. This finding is consistent with the findings of other studies, with the exception that men outnumber women when it comes to chronic illnesses. The female population in Kerala had consistently higher self-reported morbidity, regardless of the types of morbidities observed, when compared to the male population (Paul and Singh, 2017 and Paul and Sengupta, 2017). Males had a higher rate of diabetes, heart disease, and other chronic diseases, including high cholesterol and stroke, than females. Hypertension and arthritis are more common in women than in men. The association of morbidity with gender and location of residence indicates that women have a greater rate of morbidity than men, and that morbidity in rural areas is much higher than in urban areas men (Suryanarayana, 2008 and Navaneetham et al., 2009).

People aged 60 and over had the highest rate of chronic and multiple chronic diseases, followed by those aged 45 to 59. This indicates that those over 45 years of age have a higher chance of having chronic and multiple chronic illnesses than those under 45. In the age category 0–20, however, the prevalence of hypertension, diabetes, and asthma was found. This could be due to their sedentary lifestyles and frequent use of fast food, junk food, and soft beverages. Children and the elderly are at a higher risk of developing acute diseases. This inference is in conformity with the findings of other studies. Children under the age of five have about half the number of acute diseases (Das et al., 2018).

The prevalence of acute disease was relatively greater among the older population (aged 60+), followed by those aged under 15 years of age. Acute disease was reported to be low among adolescents and young people in the age group of 15–34. When comparing the reported morbidity in Kerala to the national average, single morbid disorders and multi-morbid disorders were found to be more prevalent in Kerala for people aged 45 to 59. When it came to older adults, Kerala had a far higher rate of multi-morbid disorders: more than half of the state's seniors (aged 60+) revealed that they had been diagnosed with two or more illnesses (Thankappan et al., 2010). The elderly population's morbidity from NCDs and CVDs was alarmingly high (Goyal and Yusuf, 2006 ; Dilip, 2007; Ghosh and Arokiasamy, 2010 and Paul and Singh, 2017). The COVID-19 pandemic puts older people and those with co-morbidities at the greatest risk of infection. The older persons and people of all ages with pre-existing medical disorders appear to get serious diseases more frequently than others" (Sebastian et al., 2021). NCDs are the leading cause of morbidity in the elderly population. Four of the five most often reported symptoms among the elderly are chronic illnesses. (Mukherjee and Levesque, 2012).

People's lifestyles, educational attainment, economic standing, and household size are other key factors that influence the rate of morbidity. The results of other studies confirmed this. The NCD risk factors begin early in life in Kerala. As a consumerist state, Kerala is increasingly becoming reliant on commercially accessible food preparations that are heavy in salt, calories, and trans-fats, all of which contribute to the development of NCD risk factors (Isaac and Sadanandan, 2020). The consumption of junk food, physical inactivity, poverty, poor water supply, unsanitary environment, pollution, etc. are all contributing to the rising incidence of NCDs, CVDs and infectious illnesses, CVDs (Omran, 1971; Murray , 1992; Baridalyne and Reddaiah, 2017) **.**

The morbidity rate rises with educational and economic attainment, and there is evidence that it falls with household size (Dilip, 2002 and Krishnaswami, 2004). As the people of Kerala are better educated

and have a high level of awareness, the illnesses are easier to detect, and they are frequently cited as the causes of growing morbidity rates. (Kannan et al., 1991, Murray and Chen, 1992 and Gumber and Berman, 1997). In all three rounds of the national sample survey, the incidence of acute diseases declined as the level of education improved. People with a greater degree of education, on the other hand, had a higher prevalence of NCDs and CVDs (Paul and Singh, 2017). Morbidity is significantly greater among the highest monthly per capita expenditure groups, while it is lowest among the Scheduled Tribe category (Simon, 2017).

Recommendations

- Kerala is well-known for its educational and healthcare achievements. The state is presented with a crisis in terms of rising morbidity rates in a globalised system. One of the key reasons for the problem is a lack of basic utilities for the populace. Drinking water, decent housing, a hygienic environment, and clean public places, etc. must be provided to all people as a top priority, with the participation of all stakeholders.
- The state government should **strengthen** primary healthcare services, allowing individuals to detect and cure illnesses at the earliest. Furthermore, as the elderly account for the bulk of morbidities, it is necessary to offer them separate health care services at primary health centres so that they can easily access them and effectively.
- Medical institutions should offer all possible help to the general public to enhance the effective delivery of medical services. Popular participation is to be ensured in the programmes organised by the medical department.
- SHGs, resident associations, local bodies, NGOs, and communal organisations should work in harmony with the health department in organising programmes aimed at ensuring good health for all.
- Governments at all levels should initiate steps to conduct medical camps and awareness classes in all areas. This will help to instil healthy behaviours among the public, which **will improve** the health situation in the state. Our farms, cities, and tourist destinations all need to become more environmentally friendly. To achieve this goal, necessary legislation needs to be enacted. The protection of nature and the environment should be a priority for both governments and citizens.
- In Kerala, waste management is a burning issue. Our local governments should implement programmes to effectively manage the waste generated in our homes. There should also be a concerted effort to propagate the concept of waste management at the source.
- The government should strengthen its preventive health care system so that everyone is free of all types of ailments and disabilities. The entire healthcare team should work in unison to attain the targets within a definite time frame.

Conclusion

The study brings to light the alarmingly high prevalence of morbidity in Kottayam, the district with the highest literacy rate and no poverty. The estimated morbidity rate in Kottayam is substantially higher than the state average and more than four times greater than that of the all-India figure. The study points to the growing prevalence of chronic morbidity and multiple co-morbidities in the study area, which is a cause for serious concern. Multiple chronic illnesses were reported by one-third of the total number of sick people. Diabetes, along with hypertension, is the major co-existing chronic disorders that are usually seen. The majority of surveyed households have sick people in the family, with 26 percent having two or more sick people. As a result, in the majority of households, at least one member of the family undergoes medical treatment and takes medicine regularly. The treatment of ailments, therefore, becomes a heavy financial burden and a source of stress on such households.

The primary factors that determine the rate of morbidity in Kerala are gender, the proportion of children and the elderly in the general population, people's lifestyles, educational attainment, nature of occupation, home location, caste, economic status, and family size. Acute morbidity and multiple co-morbidities are more prevalent in women than in men, whereas the morbidity rate for chronic ailments is slightly higher in men. Chronic and multiple chronic diseases were most common in people aged 60 and over, followed by those aged 45 to 59. This means that those over 45 years of age have a higher risk of developing chronic or multiple chronic illnesses than people under 45. Acute diseases are more likely to affect children and the elderly. In this backdrop, urgent interventions by local and state governments, in collaboration with all other stakeholders, are required to evolve effective strategies and schemes to arrest the state's rising morbidity trend and also to provide the best health care facilities to the morbid population.

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