

Cardiovascular Health and Longevity: Assessing the Burden and Life Expectancy Among India's Elderly

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Abstract

Cardiovascular diseases (CVDs) remain a major contributor to morbidity and mortality worldwide, with their impact increasingly felt in low- and middle-income nations such as India. This study explores the prevalence of CVDs and estimates the life expectancy free from these conditions among elders in India, drawing on data from the Longitudinal Ageing Study in India (LASI) Wave 1 (2017–18). Utilizing both descriptive statistics and life table methods, we assess how CVD prevalence varies across different socio-demographic groups and calculate health expectancies based on gender, place of residence, and regional differences. The analysis reveals notable disparities in CVD prevalence by age, sex, economic status, and geographic location, with urban and wealthier populations reporting higher rates. Nevertheless, disadvantaged groups tend to have significantly lower life expectancy free of CVD, highlighting existing inequities in health outcomes and aging experiences. These findings emphasize the pressing need for inclusive public health strategies and improved access to healthcare to enhance cardiovascular health and ensure healthier aging in India.

Keywords: CVD, Life expectancy, Aging, Non-communicable diseases

Cardiovascular diseases (CVDs) comprise a broad group of disorders affecting the heart and blood vessels, including coronary artery disease, cerebrovascular disease (stroke), hypertension, heart failure, peripheral arterial disease, and rheumatic heart disease. Globally, CVDs remain the leading cause of mortality, and India bears a disproportionately high share of this burden. Over the past few decades, cardiovascular diseases have emerged as a major public health concern in the country, contributing substantially to mortality, disability, and healthcare expenditure.

India is currently experiencing an epidemiological and demographic transition characterized by declining fertility and mortality, increasing life expectancy, rapid population aging, and a shift from communicable to non-communicable diseases (NCDs). This transition has been accompanied by a marked increase in the prevalence of cardiovascular diseases. The growing burden is driven by a complex interplay among demographic changes, urbanization, socioeconomic development, lifestyle changes, and environmental influences. Increasing consumption of energy-dense diets, reduced physical activity, tobacco use, harmful alcohol consumption, obesity, diabetes mellitus, hypertension, and dyslipidemia have significantly elevated the risk of cardiovascular diseases among the Indian population.

Cardiovascular diseases constitute the leading cause of death among non-communicable diseases in India, with ischemic heart disease and stroke accounting for the majority of

cardiovascular-related deaths. A notable characteristic of the Indian population is the earlier onset of cardiovascular diseases compared with many high-income countries, resulting in considerable premature mortality and loss of productive life years. This places a substantial economic burden on individuals, households, and the healthcare system through increased medical expenditure, reduced workforce participation, and long-term disability.

The burden of cardiovascular diseases is not uniformly distributed across the country. Considerable regional, socioeconomic, and rural–urban disparities exist in the prevalence, risk factors, access to healthcare, and health outcomes. Furthermore, the ageing population has intensified the challenge, as cardiovascular diseases become increasingly common with advancing age and frequently coexist with other chronic conditions such as diabetes, chronic kidney disease, and cognitive impairment.

India State-Level Disease Burden Initiative CVD Collaborators (2018) reported that cardiovascular diseases are the leading cause of mortality in India, with ischemic heart disease and stroke contributing the largest share of deaths. It also highlighted substantial interstate variations in CVD burden, emphasizing the need for state-specific prevention and control strategies. Prabhakaran et al. (2018) found that Indians develop cardiovascular diseases at younger ages than populations in many high-income countries due to the rising prevalence of hypertension, diabetes, unhealthy lifestyles, and other metabolic risk factors. The study stressed the importance of strengthening primary healthcare and preventive interventions to reduce the growing burden of CVDs. Ke et al. (2018) showed an increasing trend in ischemic heart disease mortality and significant regional disparities in cardiovascular deaths across India. It emphasized the need for early detection and effective management of modifiable risk factors such as hypertension, diabetes, and tobacco use.

Recognizing the growing public health importance of cardiovascular diseases, the Government of India has implemented several initiatives aimed at prevention, early detection, and management of non-communicable diseases. National programs emphasize population-based screening for hypertension and diabetes, tobacco control, promotion of healthy lifestyles, and strengthening of primary healthcare services. Nevertheless, significant challenges remain in improving awareness, ensuring equitable access to quality healthcare, enhancing adherence to treatment, and reducing disparities in cardiovascular outcomes across different population groups.

As India continues to experience rapid demographic ageing and an increasing prevalence of modifiable cardiovascular risk factors, the prevention and control of cardiovascular diseases have become critical public health priorities. Strengthening health systems, promoting healthy behavioural practices, facilitating early diagnosis, and ensuring timely and effective treatment are essential for reducing cardiovascular morbidity and mortality and improving the overall health and well-being of the population.

Objectives

The objectives are to:

1. To estimate the prevalence of cardiovascular diseases among the elderly in India.
2. To estimate the proportion of healthy life expectancy free of CVD among the elderly in India, with distinctions by gender and place of residence.

Data

For estimating the prevalence of chronic conditions, we have used data from the first wave of the Longitudinal Ageing Study in India (LASI) Wave 1, conducted in India. LASI is a nationally representative survey of India that represents all its states and union territories. LASI investigated the health, economic, and social determinants and consequences of population ageing in India. Households with at least one member aged 45 and above were taken as the eventual observation unit. The Indian Council of Medical Research (ICMR) provided the essential guidance and approval for data collection in the LASI survey. Written informed consent was obtained from each household and every age-eligible individual. The LASI data provides valuable insights into India's prevalence and burden of chronic diseases. At the national level, the survey includes a sample of 72,250 individuals aged 45 years and above and their spouses with no age criterion. For the present study, we have considered older adults aged 60 and above from major states in India. To construct the life table to find the life expectancy, the age-specific death rate from the Sample Registration System (SRS), 2018 was utilized.

Methodology

Data from constructed life tables with morbidity data from the LASI were combined to estimate Healthy life expectancy (HLE). To estimate the HLE, we have followed the Sullivan Method (Sullivan, 1971). The Sullivan method is the most widely used method to estimate population health indicators. The total life expectancy is the sum of healthy and unhealthy years of life. The Sullivan method provides estimates of the general burden of chronic conditions in terms of years lived with and without chronic conditions.

Life Expectancy and Healthy Life Expectancy

Life expectancy alone does not serve the purpose of measuring health status anymore for the aging population with the increasing prevalence of chronic diseases. Healthy life expectancy combines information on mortality and morbidity to indicate the health of a particular population. Healthy life expectancy is analyzed using the Sullivan method. (Sullivan, 1971)

Life tables with broader age groups, such as 5 or 10 years, called abridged life tables, are found to be adequate and proper for most of the situations confronted in demographic analysis. The steps in the construction of an abridged life table are the following:

While constructing an abridged life table, there are seven columns, which are as follows:

Column 1, x to $x+n$: The period of life time between two exact ages between x and $x+n$.

Column 2, ${}_nq_x$: The probability that a person alive at the beginning of the indicated age interval at x will die before reaching the end $(x+n)$ of the age interval.

$${}_nq_x = \frac{2 * n * {}_nm_x}{2 + n * {}_nm_x}$$

Column 3, l_x : The number alive at the beginning of the indicated age interval. Constructing a life table usually starts with an arbitrary number of newborns, such as 100,000. This starting number is called the radix of the table.

Column 4, ${}_nd_x$: The number of persons who die within the indicated age interval x to $x+n$.

$${}_nd_x = l_x * {}_nq_x$$

Column 5, ${}_nL_x$: The number of years of life a person lives within the indicated age interval x to $x+n$.

$${}_nL_x = n * \left(\frac{l_x + l_{x+n}}{2} \right)$$

Column 6, T_x : The total number of years remaining for a person after surviving till the beginning of the indicated age interval x to $x+n$.

$${}_nT_x = {}_nL_x + T_{x+n}$$

Column 7, e_x^0 : The average number of years of life remaining for a person after reaching the beginning of the age interval indicated.

$$e_x^0 = \frac{T_x}{l_x}$$

To find a healthy life expectancy, we need the ${}_nL_x$ values of the ordinary life table. Then, the prevalence rate (PR) of chronic conditions is calculated using the LASI data.

$$HnL_x = nL_x.(1-PR)$$

In an ordinary life table, the L_x column is multiplied by $(1-PR)$ to generate the $H nL_x$ column. Then, HnT_x is calculated. The healthy life expectancy He_x is then obtained by dividing the cumulative healthy person-years ($H nT_x$) by the l_x column. That is,

$$HnT_x = \sum H nL_x$$

Then

$$He_x = H nT_x / l_x$$

Findings**Prevalence of Cardiovascular Diseases****Table 1: Prevalence of CVD Among Elders in Major States by Gender and Place of Residence**

States	Rural			Urban			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
India	28.3	34.3	31.4	45.2	52.1	48.8	33.9	40.5	37.4
Andhra Pradesh	38.1	47.8	42.8	56.9	52.0	54.2	42.3	48.9	45.6
Assam	33.8	42.1	38.1	56.9	53.7	55.1	36.9	43.9	40.6
Bihar	25.5	31.9	28.6	44.0	41.1	42.5	27.4	32.8	30.0
Gujarat	28.8	31.2	30.1	31.0	44.4	38.0	29.7	36.5	33.4
Haryana	31.5	46.6	40.5	51.9	54.9	53.6	37.5	49.1	44.1
Jharkhand	21.2	21.0	21.1	50.4	45.7	48.1	27.4	25.9	26.6
Karnataka	23.4	33.8	28.6	41.4	57.6	50.7	28.2	41.5	35.2
Kerala	51.9	59.4	56.1	56.9	55.1	55.9	54.3	57.4	56.0
Madhya Pradesh	15.9	22.4	19.2	32.3	47.3	40.0	20.0	28.7	24.4
Maharashtra	29.6	31.9	30.8	51.2	57.6	54.7	39.4	44.3	42.1
Odisha	23.3	29.3	26.4	41.5	51.0	46.4	26.1	32.7	29.5
Punjab	44.3	57.3	50.8	46.7	55.7	51.3	44.9	56.9	50.9
Rajasthan	27.6	32.2	30.1	45.3	41.0	43.0	31.3	34.0	32.7
Tamil Nadu	32.3	34.4	33.5	43.5	44.6	44.1	38.5	40.3	39.5
Telangana	28.7	38.8	34.0	54.5	70.8	63.3	36.7	49.0	43.2
Uttarakhand	29.1	24.0	26.4	38.4	52.6	45.6	31.4	30.5	30.9
Uttar Pradesh	17.7	25.0	21.3	33.2	40.4	36.6	20.8	28.0	24.3
West Bengal	34.4	38.9	36.7	45.8	61.6	54.1	40.0	50.5	45.4

The table 1 presents the state-wise distribution of the prevalence of CVD by sex and place of residence. At the national level, the overall value is 37.4 percent, with a higher proportion among females (40.5 percent) than males (33.9 percent). A clear rural–urban differential is observed, with the prevalence being higher among urban residents (48.8 percent) compared with rural residents (31.4 percent). This pattern is evident in most states, although the magnitude varies considerably. Kerala records the highest overall value (56 percent), followed by Punjab (50.9 percent), Andhra Pradesh (45.6 percent), West Bengal (45.4 percent), Haryana (44.1 percent) and Telangana (43.2 percent), whereas relatively low values are observed in Uttar Pradesh (24.3 percent), Madhya Pradesh (24.4 percent) and Jharkhand (26.6 percent). Telangana shows one of the largest rural–urban differentials, with

values increasing from 34 percent in rural areas to 63.3 percent in urban areas, while Jharkhand also shows a substantial difference from 21.1 percent to 48.1 percent. In contrast, Kerala and Punjab exhibit very small rural–urban differences, suggesting greater similarity between rural and urban populations. Females generally have higher values than males across most states, with particularly notable differences in Punjab, Telangana, Karnataka, and West Bengal. Overall, the findings demonstrate substantial state-level, rural–urban, and gender disparities, with urban populations and females generally exhibiting higher levels of the indicator.

Table 2: Prevalence of CVD among Older Adults in India by Age, Sex, and Place of Residence

Age	Rural			Urban			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
60-64	23.3	30.8	27.3	37.6	48.3	43.6	28	36.9	32.8
65-69	28.6	35.3	32	47.8	52.2	50.1	35.2	41.3	38.3
70-74	31.2	37	34	49.4	57.2	53.4	37.3	44.2	40.7
75-79	32.1	39	35.6	50.4	55.9	53.2	38.6	44.9	41.8
80-84	33.2	36.1	34.6	52.7	53.3	53.1	38.9	42.1	40.5
85+	34	32.9	33.4	44.3	50.6	47.9	36.9	38.3	37.6
Total	22.9	26.8	25.1	35.5	38.1	37	27.3	30.9	29.4

Table 2 presents age-wise percentages of the elderly population (aged 60 and above), disaggregated by sex and place of residence. It highlights differences in prevalence across age groups. Across all age groups, urban elderly consistently record higher percentages than their rural counterparts for both men and women. This gap is visible from ages 60–64 onward and persists into the oldest-old (85+), indicating a clear rural–urban differential. In both rural and urban areas, values generally increase with advancing age, peaking around ages 75–84, then showing a slight decline in the 85+ category, particularly among males. Females exhibit higher percentages than males in almost all age groups, irrespective of residence. This female advantage is especially pronounced in urban areas—for example, among those aged 70–74 and 75–79 years. However, in the 85+ age group in rural areas, male values slightly exceed female values, suggesting selective survival or reporting differences at very advanced ages. The urban elderly (37 percent) have substantially higher values than rural elderly (25.1 percent), and females (30.9 percent) exceed males (27.3 percent) at the national level. These patterns reflect the combined influence of better access to services in urban areas, gender differences in longevity, and age-related accumulation of vulnerabilities among the elderly population.

Healthy Life Expectancy

By adding the number of years lived in less than full health or with a disability, healthy life expectancy calculates the average number of years that should be lived in good health. Sullivan created the idea of "healthy life expectancy" as an operational measure in the 1970s after it was first proposed in the 1960s. While life expectancy is a measure of population mortality, healthy life expectancy is a measure that takes into account both morbidity and mortality.

Table 3: Life Expectancy and Healthy Life Expectancy of a Person Aged 60 years in India and Major States

States	Total			Male			Female			Pro(HLE/TLE)		
	L E	HL E	UHL E	L E	HL E	UHL E	L E	HL E	UHL E	Tot al	Mal e	Fema le
India	18	11	7	17	11	6	19	11	8	61	65	58
Andhra Pradesh	19	10	9	19	11	8	20	10	10	53	58	50
Assam	18	10	8	17	11	6	18	10	8	56	65	56
Bihar	16	11	5	16	12	4	15	10	5	69	75	67
Gujarat	19	12	7	17	12	5	21	13	8	63	71	62
Haryana	19	11	8	17	11	6	21	11	10	58	65	52
Jharkhand	17	12	5	18	13	5	16	12	4	71	72	75
Karnataka	17	11	6	16	12	4	18	11	7	65	75	61
Kerala	19	8	11	17	8	9	21	9	12	42	47	43
Madhya Pradesh	18	13	5	17	13	4	18	13	5	72	76	72
Maharashtra	20	11	9	19	11	8	20	11	9	55	58	55
Odisha	19	13	6	19	13	6	20	13	7	68	68	65
Punjab	20	10	10	20	11	9	21	9	12	50	55	43
Rajasthan	19	13	6	17	12	5	20	14	6	68	71	70
Tamil Nadu	20	12	8	19	12	7	21	13	8	60	63	62
Telangana	18	10	8	17	11	6	19	9	10	56	65	47
Uttarakhand	18	13	5	17	11	6	20	15	5	72	65	75
Uttar Pradesh	17	13	4	16	13	3	18	13	5	76	81	72
West Bengal	19	10	9	18	10	8	20	10	10	53	56	50

Table 3 presents state-wise life expectancy (LE), disaggregated into healthy life expectancy (HLE) and unhealthy life expectancy (UHLE), for the total population, males, and females, along with the proportion of healthy life expectancy. In India the life expectancy of a person at age 60 is 18 years, of which 11 years are healthy and 7 years are unhealthy. Males and females show similar healthy life expectancy (11 years), but females spend slightly more years in poor health (UHLE= 8 years) compared to males (6 years). Overall, about 61 % of total life expectancy is healthy, with males (65 percent) enjoying a higher share of healthy years than females (58 percent).

There are substantial differences across states in both the length and quality of life. States such as Tamil Nadu, Maharashtra, Punjab, and Gujarat report higher life expectancy with relatively higher healthy life expectancy. Gujarat and Tamil Nadu show a favorable balance, where over 60% of life is spent in good health. Kerala stands out for a relatively high life expectancy but a low healthy life expectancy and a high unhealthy life expectancy, especially among females. Only 42 percent of total life expectancy is healthy, indicating

longer survival with morbidity - an advanced stage of epidemiological transition. States like Uttar Pradesh, Madhya Pradesh, Rajasthan, Jharkhand, and Bihar have lower life expectancy, but a higher proportion of life spent in good health (often above 70 percent). This suggests earlier mortality but comparatively fewer years lived with illness. Longevity does not always imply better health – states with longer life expectancy often experience longer periods of morbidity. Across almost all states, females live longer than males, but females spend more years in unhealthy conditions. The male advantage in healthy life expectancy is consistent across most states. States are at different stages of health and demographic transition, with some facing premature mortality and others dealing with prolonged morbidity.

Table 4: Life Expectancy and Healthy Life Expectancy of India and Major States (Rural)

States	Total			Male			Female			Pro(HLE/TLE)		
	L E	HL E	UHL E	L E	HL E	UHL E	L E	HL E	UHL E	Tota l	Mal e	Femal e
India	18	12	6	17	12	5	19	12	7	67	71	63
Andhra Pradesh	19	11	8	19	12	7	20	10	10	58	63	50
Assam	17	10	7	16	11	5	18	10	8	59	69	56
Bihar	15	11	4	16	12	4	15	10	5	73	75	67
Gujarat	19	13	6	17	12	5	22	14	8	68	71	63
Haryana	18	11	7	16	11	5	20	11	9	61	69	55
Jharkhand	16	13	3	17	14	3	15	12	3	81	82	80
Karnataka	17	12	5	16	12	4	18	12	6	71	75	67
Kerala	19	8	11	17	8	9	21	8	13	42	47	38
Madhya Pradesh	17	14	3	17	14	3	18	14	4	82	82	78
Maharashtra	20	13	7	18	13	5	21	13	8	65	72	62
Odisha	19	14	5	19	14	5	20	14	6	74	74	70
Punjab	20	10	10	19	11	8	21	9	12	50	58	43
Rajasthan	18	13	5	16	12	4	20	14	6	72	75	70
Tamil Nadu	18	12	6	17	12	5	18	12	6	67	71	67
Telangana	19	13	6	17	12	5	21	13	8	68	71	62
Uttarakhand	18	14	4	17	12	5	21	15	6	78	71	71
Uttar Pradesh	17	13	4	16	13	3	18	13	5	76	81	72
West Bengal	17	11	6	16	10	6	19	11	8	65	63	58

Table 4 presents life expectancy (LE), healthy life expectancy (HLE), unhealthy life expectancy (UHLE), and the proportion of healthy life expectancy to total life expectancy [Pro (HLE/TLE)] among the rural population of India and major states, separately for males and females. At the national level, rural Indians have a total life expectancy of 18 years, of which 12 years are expected to be lived in a healthy and 6 years unhealthy, indicating that about 67% of total life expectancy is healthy. The corresponding figures are 17 years of LE,

12 years of HLE and 5 years of UHLE for males, while females have 19 years of LE, 12 years of HLE and 7 years of UHLE; consequently, females have a higher life expectancy but also spend more years in an unhealthy state. Considerable interstate variation is observed. Kerala has an LE of 19 years and HLE of only 8 years, resulting in the lowest healthy proportion (42 percent) and the highest UHLE of 11 years, suggesting a greater burden of unhealthy years despite relatively high longevity. In contrast, Madhya Pradesh and Jharkhand show relatively high healthy proportions of 82 percent and 81 percent, respectively, although their overall life expectancy is comparatively lower. Maharashtra and Odisha also show relatively high HLE values of 13–14 years and healthy proportions of 65 percent and 74 percent, respectively. Among females, Kerala has the highest LE (21 years) but only 8 healthy years, with 13 years classified as unhealthy, whereas Uttarakhand also records 21 years of female LE but a higher HLE of 15 years. Overall, the table indicates that higher life expectancy does not necessarily correspond to a higher proportion of healthy years, as demonstrated particularly by Kerala. The findings also reveal a consistent female advantage in longevity, but in several states this is accompanied by a greater number of unhealthy years, highlighting the importance of not only extending life but also improving the quality of the additional years lived.

Table 5: Life Expectancy and Healthy Life Expectancy of India and Major States (Urban)

States	Total			Male			Female			Pro(HLE/TLE)		
	LE	HLE	UHLE	LE	HLE	UHLE	LE	HLE	UHLE	Total	Male	Female
India	20	10	10	19	10	9	21	10	11	50	53	48
Andhra Pradesh	19	9	10	19	9	10	20	10	10	47	47	50
Assam	20	8	12	21	12	9	20	9	11	40	57	45
Bihar	18	10	8	19	10	9	18	10	8	56	53	56
Gujarat	19	11	8	17	11	6	21	10	11	58	65	48
Haryana	20	9	11	18	8	10	23	10	13	45	44	43
Jharkhand	19	10	9	19	9	10	20	11	9	53	47	55
Karnataka	19	10	9	17	11	6	21	9	12	53	65	43
Kerala	19	8	11	17	7	10	21	9	12	42	41	43
Madhya Pradesh	18	11	7	17	12	5	19	10	9	61	71	53
Maharashtra	20	9	11	19	9	10	20	8	12	45	47	40
Odisha	19	10	9	19	11	8	19	10	9	53	58	53
Punjab	21	10	11	20	11	9	23	10	13	48	55	43
Rajasthan	19	11	8	18	10	8	20	12	8	58	56	60
Tamil Nadu	23	13	10	22	12	10	24	13	11	57	55	54
Telangana	19	7	12	17	8	9	21	6	15	37	47	29
Uttarakhand	18	11	7	17	11	6	20	11	9	61	65	55
Uttar Pradesh	18	11	7	17	11	6	19	12	7	61	65	63
West Bengal	21	9	12	21	11	10	21	8	13	43	52	38

Table 5 presents life expectancy (LE), healthy life expectancy (HLE), unhealthy life expectancy (UHLE), and the proportion of total life expectancy spent in good health [Pro (HLE/TLE)] among the urban population of India and major states, separately for males and females. At the national level, urban residents have a total life expectancy of 20 years, of which 10 years are expected to be lived in a healthy condition and 10 years in an unhealthy condition, resulting in a healthy life expectancy proportion of 50 percent. Males have a life expectancy of 19 years, including 10 healthy years and 9 unhealthy years, while females have a higher life expectancy of 21 years, with 10 healthy years and 11 unhealthy years. Thus, although females have greater longevity, they also experience a larger number of unhealthy years. Considerable interstate variation is evident. Tamil Nadu records the highest total life expectancy (23 years) and HLE (13 years), with 57 percent of life expectancy spent in a healthy state, followed by Punjab, with an LE of 21 years and HLE of 10 years. In contrast, Kerala has an LE of 19 years but an HLE of only 8 years, resulting in a relatively low healthy life expectancy of 42 percent and an unhealthy life expectancy of 11 years. Telangana records the lowest healthy proportion (37 percent) and the highest female unhealthy life expectancy (15 years), despite females having an LE of 21 years. Madhya Pradesh and Uttarakhand show relatively favorable healthy-life proportions of 61 percent, while Uttar Pradesh also records 61 percent. The table further shows that females generally have higher life expectancy than males across most states, but this longevity advantage is often accompanied by additional years lived in poor health. Overall, the findings indicate that urban populations generally experience longer life expectancy than rural populations, but the additional years of life are not necessarily accompanied by a corresponding increase in healthy years. Kerala, in particular, demonstrates a substantial gap between longevity and healthy longevity, highlighting the importance of improving the quality of extended life rather than focusing solely on increasing life expectancy.

Discussion

The findings of this study highlight significant variations in life expectancy and the proportion of healthy versus unhealthy life expectancy across different states in India. India's life expectancy has increased due to advancements in healthcare, nutrition, and disease control. However, the disparity between life expectancy and healthy life expectancy remains a pressing concern, as many individuals spend a substantial portion of their years in poor health. The figures show a concerning pattern that reflects a significant public health challenge.

At the national level, total life expectancy is 18 years, of which 11 years are spent in good health and 7 years in poor health. Males exhibit a slightly higher proportion of healthy life (65 percent) compared to females (58 percent), indicating that women, despite higher life expectancy, tend to spend a larger share of their later years in ill health. This finding is consistent with the well-documented "female-male health-survival paradox."

Substantial inter-state variation is evident in both the length and quality of life. States such as Kerala and Punjab, despite relatively high life expectancy, show a lower proportion of healthy life years, particularly among females. Kerala stands out with the lowest proportion

of healthy life (42 percent overall), reflecting longer survival accompanied by a higher burden of morbidity and disability, especially among women. This suggests that advanced epidemiological transition in these states has shifted the disease burden towards chronic and degenerative conditions, which prolong life but reduce functional health.

In contrast, several northern and central Indian states—including Uttar Pradesh, Bihar, Madhya Pradesh, Rajasthan, and Odisha—report a higher proportion of healthy life years despite having lower overall life expectancy. For instance, Uttar Pradesh records the highest proportion of healthy life (76 percent overall), with males reaching 81 percent. This pattern may partly reflect underdiagnosis or underreporting of morbidity, limited access to health services, and higher mortality at earlier ages, which selectively removes individuals with prolonged ill health from the surviving population.

Gender differences persist across most states. Males generally have a higher HLE/TLE ratio than females, indicating that women spend a greater share of their lives in unhealthy conditions. Exceptions are observed in states such as Jharkhand and Uttarakhand, where females report a higher proportion of healthy life than males, possibly reflecting social, occupational, or migration-related factors affecting male health. Nevertheless, the overall pattern highlights women's greater vulnerability to chronic morbidity, disability, and care dependency in later life.

Urbanized and economically advanced states such as Tamil Nadu, Maharashtra, Gujarat, and Karnataka occupy a middle position, with moderate life expectancy and relatively balanced distributions between healthy and unhealthy years. These states demonstrate the dual challenge of sustaining longevity while improving the quality of added years through effective management of non-communicable diseases and ageing-related health conditions.

Conclusion

Overall, the findings underscore that longevity alone is an insufficient indicator of population health. States with higher life expectancy do not necessarily ensure healthier ageing. The pronounced gender gap in unhealthy life expectancy calls for targeted interventions focusing on women's health across the life course. Policymakers must prioritize not only extending life but also compressing morbidity, particularly in states undergoing rapid demographic and epidemiological transition. Strengthening preventive care, chronic disease management, and geriatric health services will be crucial to improving healthy ageing outcomes across Indian states.

Reference

India State-Level Disease Burden Initiative CVD Collaborators. (2018). The changing patterns of cardiovascular diseases and their risk factors in the states of India: The Global Burden of Disease Study 1990–2016. *The Lancet Global Health*, 6(12), e1339–e1351.

International Institute for Population Sciences (IIPS) N MoHFW, Harvard TH Chan School of Public Health (HSPH) and the University of Southern California (USC). Longitudinal Ageing Study in India (LASI) wave 1, 2017-18, India Report 2020. Available from <https://www.iipsindia.ac.in/lasi>

Ke, C., Gupta, R., Xavier, D., Prabhakaran, D., Mathur, P., Kalkonde, Y. V., Kolpak, P., Suraweera, W., & Jha, P. (2018). Divergent trends in ischaemic heart disease and stroke mortality in India from 2000 to 2015: A nationally representative mortality study. *The Lancet Global Health*, 6(8), e914–e923.

Prabhakaran, D., Singh, K., Roth, G. A., Banerjee, A., Pagidipati, N. J., & Huffman, M. D. (2018). Cardiovascular diseases in India compared with the United States. *Journal of the American College of Cardiology*, 72(1), 79–95.

Sample Registration System (SRS)- Abridged Life Tables 2015– 2019, Office of the Registrar General & Census Commissioner, India (ORGI). SRS-Abridged_Life_Tables_2015-2019.pdf.

Sullivan DF. A single index of mortality and morbidity. *HSMHA Health Rep.* 1971;86(4):347- 354. doi:10.2307/4594169