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Vijaya Sorganvi
Associate Professor-cum-Statistician, Department of Community Medicine, Shri B. M. Patil Medical College Hospital and Research Centre, Vijayapura, Karnataka, India

AM Rangoli
Assistant Professor-cum-Statistician, Department of Community Medicine, Shri B. M. Patil Medical College Hospital and Research Centre, Vijayapura, Karnataka, India

Corresponding Author:
AM Rangoli
Assistant Professor-cum-Statistician, Department of Community Medicine, Shri B. M. Patil Medical College Hospital and Research Centre, Vijayapura, Karnataka, India

Age- and cause-specific life expectancy analysis in India, 2021: Impact of cardiovascular diseases, cancers, and type 2 diabetes on longevity

Vijaya Sorganvi and AM Rangoli

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Abstract
Introduction: Life expectancy is a key indicator of population health, reflecting cumulative mortality across age groups and providing insights into the effectiveness of healthcare systems and public health interventions. India, undergoing rapid demographic and epidemiological transitions, has experienced a shift from infectious to Non-Communicable Diseases (NCDs), with cardiovascular diseases (CVD), cancer, and type-2 diabetes emerging as major contributors to mortality. Understanding the impact of these diseases on population survival is critical for effective policy formulation and resource allocation. Methods: This study utilizes the IHME Global Burden of Disease 2021 dataset for India to construct ordinary and cause-eliminated abridged life tables for both male and female populations. Age- and cause-specific death rates were calculated, and life table functions including age-specific death rates (m_x), probabilities of dying (q_x), and years lived (L_x) were estimated. Cause-elimination life tables were then generated to assess potential gains in life expectancy by hypothetically removing deaths attributable to CVD, cancers, and type-2 diabetes. Results: In 2021, life expectancy at birth was 66.6 years for males and 71.39 years for females, with females consistently exhibiting higher survival across all ages. Elimination of CVD yielded the greatest gains, increasing male life expectancy by 3.5 years and female life expectancy by 3.53 years at birth, followed by moderate gains from cancer elimination (0.9-1.16 years) and minimal improvements from diabetes (<0.5 years). The impact of CVD elimination was most pronounced after age 50, while childhood survival remained high, reflecting successful early-life interventions. Conclusion: These findings highlight the dominant role of cardiovascular diseases in limiting life expectancy and underscore the importance of targeted NCD prevention, early detection, and management strategies. Public health policies focusing on lifestyle modification, improved access to quality care, and geriatric health interventions are essential to maximize longevity and reduce the burden of major NCDs in India.

Keywords: Life expectancy, cause-elimination, cardiovascular diseases, cancer, type-2 diabetes

1. Introduction

Life expectancy is a fundamental indicator of population health, reflecting the cumulative impact of mortality across all age groups. It not only summarizes the overall health status of a population but also provides insights into the effectiveness of public health interventions, healthcare systems, and socio-economic development. Understanding the contribution of specific causes of death to overall mortality is essential for public health planning, policy formulation, and prioritization of interventions.

India, undergoing rapid demographic and epidemiological transitions, has witnessed a substantial shift from infectious diseases to non-communicable diseases (NCDs) as leading causes of death. Among these, cardiovascular diseases (CVD), cancer, and type-2 diabetes have emerged as major determinants of mortality, particularly in middle and older age groups. These diseases impose significant economic and social burdens, including loss of productive life years, increased healthcare costs, and reduced quality of life. Furthermore, sex-specific differences in morbidity and mortality patterns have been observed, which necessitate tailored interventions for male and female populations. Cause-elimination life tables provide a robust framework to estimate potential gains in life expectancy by hypothetically removing specific causes of death. By analyzing age- and cause-specific mortality, these tables allow researchers to quantify the relative impact of major diseases on population survival. Previous studies using such approaches in other countries have demonstrated substantial potential improvements in life expectancy following the elimination of leading NCDs, highlighting the importance of targeted disease prevention and management strategies.

The present study applies this methodology using the IHME Global Burden of Disease 2021 dataset for India, evaluating both male and female populations. By constructing ordinary and cause-eliminated abridged life tables, this study aims to quantify the effects of eliminating deaths due to cardiovascular diseases, cancer, and type-2 diabetes, highlighting age and sex-specific patterns in potential improvements in life expectancy. The findings are expected to provide valuable insights for policymakers and public health authorities in prioritizing interventions, allocating resources efficiently, and developing evidence-based strategies to improve population longevity and reduce the burden of major non-communicable diseases.

2. Materials and Method

The data for this study were obtained from the IHME Global Burden of Disease 2021 dataset for India. The dataset provides age and sex-specific information on deaths and population counts, and we focused on causes of death including total cancers, type 2 diabetes, and cardiovascular diseases (CVD). Using these data, age-specific and cause-specific death rates were calculated. An abridged life table was then constructed for the population in 2021 following the current life table method. The probability of dying at each age was estimated from the observed death rates using formulas derived by several authors, including King (1914), Reed and Merrell (1939), Greville (1943), Sirken (1964), Keyfitz (1966), Chiang (1968) [2, 3, 4, 5, 6, 7].

2.1 Columns of Life table

a) ${}_nm_x$: Age Specific death rate

$$ {}_nm_x = \frac{{}_nD_x}{{}_nP_x} \tag{1} $$

Where ${}_nD_x$ is the observed number of deaths in the age group $(x, x+n)$ and ${}_nP_x$ is the observed mid-year population.

b) ${}_nq_x$: The probability of dying between the age group $(x, x+n)$

$$ {}_nq_x = \frac{n\ {}_nm_x}{1+(n-{}_na_x)\ {}_nm_x} \tag{2} $$

Where n is the length of the interval,

${}_na_x$: Fraction of years lived by l_x individuals in age group $(x, x+n)$

For the conversion of ${}_nm_x$ into ${}_nq_x$ we use the (2) equation, now the concept is to calculate the ${}_na_x$ values, in literature we have lot of methods to calculate the ${}_na_x$values *viz*, Reed and Merrel (1939) [3], Chiang (1968) [6], etc, here we are using Keyfitz (1966) [7] method that is (3).

$$ {}_na_x = \frac{-\frac{n}{24}{}_nd_{x-n}+\frac{n}{2}{}_nd_x+\frac{n}{24}{}_nd_{x+n}}{{}_nd_x} \tag{3} $$

This method is applicable if we have equal width of interval 5. For less than 5 year age group Coale and Demeny (1983) [8] had given the standard values for calculation of ${}_na_x$.

In equation (3), ${}_nd_x$ is the number of people died in the cohort of age group $(x, x+n)$ which can be calculated using ${}_nq_x$. So, to solve this circulatory problem, iteration procedure must use until we get stable values (Rangoli and Talawar, 2023) [9]. For ${}_1a_0$ and ${}_4a_1$ adopted Coale and Demeny (1983) [8] formulas.

a) ${}_np_x$: The probability that a person survives in the age group $(x, x+n)$

$$ {}_np_x = 1 - {}_nq_x $$

b) l_x: Number of persons surviving in a cohort with age $(x, x+n)$ Initially l_0 is the radix of the life table, taken as 100000.

c) ${}_nd_x$: Number of persons died in the age interval $(x, x+n)$ of the cohort

$$ {}_nd_x = {}_nq_x\ l_x $$

d) ${}_nL_x$: The average number of persons-years lived by l_x individuals in the age interval $(x, x+n)$

$$ {}_nL_x = n(l_x - {}_nd_x) + {}_na_x\ {}_nd_x $$

For the open interval

${}_wL_x = \frac{{}_wd_x}{{}_wm_x}$ where w is the maximum age attained by an individual.

And also ${}_wq_x = 1\ {}_wp_x = 0$

e) Total number of persons-years lived after the age x i.e. total number of years lived by the cohort after age x.

$$ T_x = \sum_{a=x}^{w} {}_nL_a $$

f) e_x: the number of years can be expected to live by the person aged x $e_x = \frac{T_x}{l_x}$ and $e_w \cong \frac{1}{{}_wm_x}$

$$ {}_wL_x = T_w = l_w\ e_w $$

Using these equations, we can construct ordinary life table for males and females (Rangoli and Talwar. 2023) [9].

2.2 Cause Elimination life table

In this analysis, we eliminate certain diseases and then examine the resulting change in life expectancy. The table reflects mortality experience due to specific causes, meaning individuals are considered to have exited the cohort because of a given cause of death.

When constructing the corresponding single decrement life table, the constant of proportionality for decrements other than the eliminated cause in the age group $(x, x+n)$, denoted as ${}_nR_x^{-i}$, is calculated using the following formula. Here, *-i* indicates that the specified cause has been removed from consideration.

$$ {}_nR_x^{-i} = 1 - \frac{{}_nD_x^i}{{}_nD_x} \tag{4} $$

The probability of surviving between the age group $(x, x+n)$ in absence of specific cause i can be estimated using following formula (Chiang 1978) [10].

$${}_n p_x^{-i} = ({}_n p_x)^{{}_n R_x^{-i}} \quad (5)$$

And probability of dying between the age group $(x, x+n)$ in absence of specific cause i is given by,

$${}_n q_x^{-i} = 1 - {}_n p_x^{-i} \quad (6)$$

Now fraction of years lived by l_x individuals when cause i is eliminated is given by notation ${}_n a_x^{-i}$ by Coale and Demeny (1983) [8].

And the remaining columns of life table can be calculated using below formulas,

$${}_n d_x^{-i} = {}_n q_x^{-i}\, l_x^{-i} \quad (7)$$

$${}_n L_x^{-i} = n(l_x^{-i} - {}_n d_x^{-i}) + {}_n a_x^{-i}\, {}_n d_x^{-i} \quad (8)$$

$$e_w^{-i} = \frac{e_w}{{}_w R_x^{-i}} \quad (9)$$

$$T_x^{-i} = \sum_{a=x}^{w} {}_n L_a^{-i} \quad (10)$$

$$e_w^{-i} = \frac{T_x^{-i}}{l_x^{-i}} \quad (11)$$

$$T_w^{-i} = {}_w L_x^{-i} = e_w^{-i} * l_w^{-i}$$

3. Results

Table 1: Life table of male for the year 2021

Age	Deaths	Population	mx	ax	qx	lx	dx	n	Lx	Tx	ex
<1	348971.9	11249892	0.03102	0.127672	0.030203	100000	3020.275	1	97365.33	6664007	66.64007
1-4	29048.41	35680173	0.000814	1.647972	0.00325	96979.72	315.214	4	387177.5	6566642	67.71149
5-9	22507.58	64167155	0.000351	2.366256	0.001752	96664.51	169.3761	5	482876.5	6179465	63.92692
10-14	29645.15	69203605	0.000428	2.727674	0.00214	96495.13	206.4799	5	482006.5	5696588	59.03498
15-19	57509.37	69959082	0.000822	2.713286	0.004103	96288.65	395.0245	5	480540	5214582	54.15572
20-24	86506.17	67691602	0.001278	2.645268	0.006371	95893.63	610.8958	5	478029.7	4734042	49.36763
25-29	108782.7	62869529	0.00173	2.648404	0.008616	95282.73	820.9947	5	474483	4256012	44.66719
30-34	150466.1	59077176	0.002547	2.629692	0.012658	94461.74	1195.724	5	469474.5	3781529	40.03239
35-39	184571.2	54556338	0.003383	2.678532	0.016784	93266.02	1565.362	5	462696.1	3312055	35.51191
40-44	262730.3	46859625	0.005607	2.641583	0.027668	91700.65	2537.165	5	452519.6	2849358	31.07239
45-49	303179.4	40371862	0.00751	2.638969	0.036894	89163.49	3289.616	5	438050.6	2396839	26.88139
50-54	384384.3	33984398	0.011311	2.665792	0.055098	85873.87	4731.511	5	418325	1958788	22.81006
55-59	503580.7	27769713	0.018134	2.637175	0.086945	81142.36	7054.957	5	389042.2	1540463	18.9847
60-64	627533.7	23296995	0.026936	2.618892	0.126564	74087.41	9376.777	5	348109.9	1151421	15.54139
65-69	778877.8	18437648	0.042244	2.591952	0.191717	64710.63	12406.12	5	293678.6	803311.2	12.4139
70-74	864829.5	13086701	0.066085	2.524072	0.283961	52304.51	14852.45	5	224748.9	509632.6	9.743569
75-79	747167.9	8006173	0.093324	2.455487	0.377078	37452.06	14122.33	5	151325.8	284883.6	7.606621
80-84	580758.4	4245347	0.136799	2.453748	0.507292	23329.73	11834.98	5	86513.81	133557.8	5.724788
85+	563955.1	2308070	0.244341	-	1	11494.75	11494.75	-	47043.96	47043.96	4.092649

Table 1 shows the analysis of male life expectancy at birth was 66.6 years, with infant mortality contributing to a 3% loss of the cohort before age one. Survival improved markedly after childhood, with over 96% reaching age 15 and about 93% surviving to age 35. Mortality increased gradually in adulthood but rose sharply after age 50, with only about half the cohort surviving to age 70. By age 85 and above, just 11% of the original cohort remained alive, with an average additional life expectancy of 4 years.

Table 2: Life Expectancy (in Years) of Males- Overall and after eliminating specific causes

Age group	Overall	After eliminating cancers	After eliminating CVD	After eliminating diabetes
<1	66.64	67.55	70.14	66.91
1-4	67.71	68.64	71.31	67.99
5-9	63.93	64.85	67.53	64.20
10-14	59.03	59.95	62.64	59.31
15-19	54.16	55.07	57.77	54.43
20-24	49.37	50.27	52.98	49.65
25-29	44.67	45.57	48.28	44.95
30-34	40.03	40.93	43.64	40.31
35-39	35.51	36.40	39.10	35.80
40-44	31.07	31.94	34.61	31.36
45-49	26.88	27.72	30.33	27.17
50-54	22.81	23.60	26.13	23.09
55-59	18.98	19.70	22.10	19.25
60-64	15.54	16.15	18.37	15.79
65-69	12.41	12.91	14.93	12.64
70-74	9.74	10.12	11.93	9.94
75-79	7.61	7.88	9.48	7.78
80-84	5.72	5.92	7.32	5.86
85+	4.09	4.25	5.58	4.22

From Table 2, at birth, the overall life expectancy for males was 66.6 years, which increased by 0.9 years if cancers were eliminated, by 3.5 years if cardiovascular diseases (CVD) were eliminated, and by 0.3 years if diabetes was eliminated. In early childhood (1-4 years), life expectancy rose from 67.7 years to 71.3 years with CVD elimination, while the gains from cancer and diabetes elimination were comparatively smaller. Between ages 5 and 14 years, elimination of CVD consistently added about 3 years to life expectancy, compared to approximately 1 year for cancer and only 0.3 years for diabetes. At ages 20-24 years, life expectancy of 49.4 years increased to 53 years with CVD elimination, 50.3 years with cancer elimination, and 49.6 years with diabetes elimination.

In the age group 30-44 years, elimination of CVD added about 3.5 years to life expectancy, while cancer and diabetes elimination contributed only around 0.9 years and 0.3 years, respectively. During late middle age (45-59 years), life expectancy increased by approximately 3 years with CVD elimination, compared to 0.8 years with cancer elimination and just 0.25 years with diabetes elimination. Among individuals aged 60-74 years, eliminating CVD increased survival by 2.5-2.8 years, whereas cancer elimination added about 0.6 years and diabetes elimination only 0.25 years.

In the elderly group (75-84 years), elimination of CVD raised life expectancy from 5.7-7.6 years to 7.3-9.5 years, while gains from cancer and diabetes elimination were less than half a year. Among the very old (85+ years), overall life expectancy was 4.1 years, which increased to 5.6 years if CVD was eliminated, with negligible improvements from eliminating cancer and diabetes. Overall, across all age groups, elimination of CVD provided the greatest increase in life expectancy, elimination of cancer showed moderate improvement, and elimination of diabetes contributed only minor gains.

Table 3: Life table of Female for the Year 2021

Age	Deaths	population	nax	nqx	lx	ndx	n	nLx	Tx	ex
<1	290671.8	10197013	0.127672	0.027814	100000	2781.395	1	97573.71	7139130	71.3913
1-4	24546.31	32441809	1.570728	0.003021	97218.6	293.6926	4	388161	7041557	72.43013
5-9	17857.17	58602472	2.399355	0.001522	96924.91	147.5564	5	484240.8	6653396	68.64485
10-14	29028.3	63089552	2.719536	0.002298	96777.36	222.409	5	483379.6	6169155	63.74585
15-19	50894.89	64214170	2.645551	0.003956	96554.95	381.9251	5	481875.5	5685775	58.88642
20-24	64939.91	63671106	2.576955	0.005087	96173.02	489.2385	5	479679.7	5203900	54.10977
25-29	70616.06	59874947	2.585589	0.00588	95683.78	562.6415	5	477060.5	4724220	49.37326
30-34	84875.53	55832025	2.601794	0.007573	95121.14	720.3868	5	473878.1	4247160	44.65001
35-39	100657.8	51708706	2.647379	0.009689	94400.75	914.6291	5	469852	3773282	39.97088
40-44	131095	44506961	2.665365	0.014627	93486.13	1367.411	5	464238.2	3303430	35.33604
45-49	168814.5	38481322	2.655427	0.021711	92118.71	2000.016	5	455904.4	2839191	30.821
50-54	214997.1	33391690	2.735668	0.031731	90118.7	2859.52	5	444118.6	2383287	26.44609
55-59	347604	28156932	2.656501	0.059991	87259.18	5234.73	5	424028.3	1939168	22.22309
60-64	419226	24330737	2.652955	0.082803	82024.45	6791.865	5	394181.4	1515140	18.47181
65-69	565283.1	19469453	2.639717	0.135861	75232.58	10221.2	5	352038	1120959	14.89991
70-74	659173.1	14099175	2.569658	0.209912	65011.38	13646.66	5	291890.9	768920.6	11.82748
75-79	599349.6	8932557	2.532052	0.287824	51364.73	14784.03	5	220337.4	477029.7	9.287107
80-84	605891.9	5492330	2.576881	0.435237	36580.7	15921.28	5	144324.3	256692.3	7.01715
85+	627596.3	3413538	-	1	20659.42	20659.42	-	112367.9	112367.9	5.439066

From Table 3, in 2021, the life expectancy at birth for females is about 71.39 years, which is notably higher than that of males (as shown in the Table 1). Survival during childhood is very high; for example, out of 100,000 live births, approximately 96,924 females survive to age five, indicating very low child mortality. However, the probability of dying (nqx) begins to rise sharply after age 55, reaching 13.6% at age 65, 20.9% at age 70, and as high as 43.5% at age 80, which highlights the steep increase in mortality risk in older ages. Life expectancy declines steadily with advancing age, falling from 54.1 years at age 20 to 26.4 years at age 50, and just 5.4 years for females aged 85 and above. The most significant drop in population survival occurs after age 70, with the number of survivors reducing rapidly from 65,011 at age 70 to 36,580 at age 80, and only 20,659 at 85 years and above.

Table 4: Life expectancy of females- overall and after elimination of respective causes (2021)

Age group	Overall	Cancer elimination	CVD elimination	Diabetes (Type-2) elimination
<1	71.39	72.55	74.92	71.77
1-4	72.43	73.62	76.05	72.82
5-9	68.64	69.83	72.28	69.04
10-14	63.75	64.93	67.38	64.14
15-19	58.89	60.06	62.53	59.28
20-24	54.11	55.28	57.75	54.51
25-29	49.37	50.53	53.01	49.77
30-34	44.65	45.79	48.28	45.05
35-39	39.97	41.09	43.58	40.37
40-44	35.34	36.41	38.92	35.74
45-49	30.82	31.83	34.35	31.22
50-54	26.45	27.36	29.89	26.84
55-59	22.22	23.03	25.55	22.60
60-64	18.47	19.12	21.55	18.82
65-69	14.90	15.42	17.74	15.21
70-74	11.83	12.22	14.35	12.09
75-79	9.29	9.57	11.52	9.52
80-84	7.02	7.23	8.93	7.21
85+	5.44	5.60	7.19	5.61

From table 4, at birth, females have a higher baseline life expectancy of 71.39 years, which increases to 74.92 years if cardiovascular diseases (CVD) are eliminated, indicating that CVD is the major cause reducing female longevity. The effect of cancer elimination is moderate; removing cancers at birth adds about 1.16 years (from 71.39 to 72.55), which is smaller compared to the gain from eliminating CVD. Diabetes has an even smaller impact, as eliminating it at birth increases life expectancy by only 0.38 years (from 71.39 to 71.77), much less than the effect of CVD elimination. These gains persist across ages: for instance, at age 50, female life expectancy improves from 26.45 years overall to 29.89 years after CVD elimination, whereas cancer and diabetes elimination show smaller gains of approximately one year. The impact of CVD elimination is strongest at older ages; at 85 years and above, life expectancy rises from 5.44 years overall to 7.19 years, again highlighting that cardiovascular disease is the leading limiting factor for female survival in advanced age.

4. Discussion

This study builds upon the methodologies used by Rangoli and Talwar (2023) [9], who applied the Keyfitz (1966) [7] method to calculate the fraction of years lived by individuals (a_x) in abridged life tables for the 2019 male population. Their work highlighted that elimination of cardiovascular diseases (CVD) produced the most substantial gains in life expectancy, particularly among older age groups. In this study, using IHME Global Burden of Disease 2021 data, confirms these findings and extends them to both males and females, evaluating the impact of eliminating major causes of death such as CVD, cancers, and type 2 diabetes.

In 2021, life expectancy at birth was 66.6 years for males and 71.39 years for females, illustrating a persistent gender gap consistent with global trends of higher female longevity (WHO, 2022). Elimination of CVD produced the greatest improvement in life expectancy across all ages 3.5 years for males and 3.53 years for females, followed by cancers (0.9-1.16 years) and diabetes (<0.5 years), emphasizing the predominant role of cardiovascular health in survival, particularly in older adults. These patterns were most pronounced after age 50, where mortality from NCDs sharply increases.

Childhood survival remains high, especially among females, with over 96% surviving to age five, reflecting the success of immunization, maternal and neonatal care, and child health programs (SRS, 2022). Mortality rises steeply after age 55, driven primarily by non-communicable diseases, consistent with the ongoing epidemiological transition in India (Prabhakaran *et al*., 2018) [13].

Comparisons with earlier studies, such as Huchesh and Megeri (2018) [14], highlight a shift in mortality determinants over time. In 2015, gains in life expectancy were mainly achieved through the elimination of infectious diseases such as lower respiratory infections (LRI), diarrheal diseases, tuberculosis (TB), and HIV/AIDS, particularly affecting children and young adults. In contrast, our study shows that NCDs, particularly CVD and cancers, now dominate the potential gains in life expectancy, with older age groups contributing most significantly. For instance, elimination of CVD increased life expectancy by up to 4.9 years in older males and 4.3 years in older females.

These findings align with the concept of epidemiological transition (Omran, 1971) [15], where reductions in infant and child mortality have unmasked the impact of chronic diseases in adulthood. Sex-specific differences were evident: males benefit more than females from eliminating CVD, indicating higher male vulnerability to cardiovascular risk factors (Gupta *et al*., 2020) [16].

Overall, these results have important public health implications. Prioritizing prevention, early screening, and management of CVD can yield the most significant improvements in life expectancy. Simultaneously, sustained efforts to reduce early-life mortality from infectious diseases remain essential. This dual approach targeting both NCDs in adults and residual infectious disease burden in children can maximize longevity gains in the Indian population.

5. Conclusions

The analysis of male and female life tables demonstrates clear gender differences and cause-specific impacts on longevity. Females have consistently higher life expectancy at birth (71.4) compared to males (66.6), confirming the survival advantage of women across all ages. The elimination of specific causes of death reveals that cardiovascular diseases (CVD) exert the greatest impact on reducing life expectancy, with gains of 3-3.5 at birth and 2-3 at middle and older ages. Cancer elimination contributes moderately (≈1year gain), while diabetes elimination provides only minimal improvement (<0.5).

At younger ages, improvements from eliminating these causes are small, but in middle and old age, the effect of CVD elimination becomes most pronounced, extending survival by several. Among the very elderly (85+), eliminating CVD extends life expectancy by up to 2, whereas cancers and diabetes show negligible influence. This underscores that while infectious disease control and child survival programs have been highly successful, the current burden of non-communicable diseases (NCDs), especially cardiovascular conditions, dominates mortality patterns.

Overall, these findings emphasize the need for robust public health policies targeting NCD prevention, lifestyle modification, and geriatric care, alongside continued attention to maternal and child health. Strengthening preventive strategies, promoting early screening, and improving access to quality treatment for cardiovascular diseases will yield the most significant improvements in life expectancy and healthy aging for both men and women.

References

1. Institute for Health Metrics and Evaluation (IHME). Global Burden of Disease Results Tool [Internet]. Seattle (WA): IHME; 2021 [cited 2025 Jun 11]. Available from: https://vizhub.healthdata.org/gbd-results/
2. King G. On a short method of constructing an abridged mortality table. J Inst Actuar. 1914;48(3):294-303.
3. Reed LJ, Merrell M. A short method for constructing an abridged life table. Am J Hyg. 1939;30:33-62.
4. Greville TNE. Short methods of constructing abridged life tables. Rec Am Inst Actuar. 1943;32(65):29-43.
5. Sirken MG. Comparisons of two methods of constructing abridged life tables by reference to a “standard” table. Vital Health Stat Ser 1. 1964;(4):1-11.
6. Chiang CL. Introduction to stochastic processes in biostatistics. New York: John Wiley & Sons; 1968.
7. Keyfitz N. A life table that agrees with the data. J Am Stat Assoc. 1966;61(314):305-312.
8. Coale AJ, Demeny P, Vaughan B. Regional life tables and stable populations. 2nd ed. New York: Academic Press; 1983.

9. Rangoli A, Talawar P. Age-specific and cause-specific life expectancy analysis in India. J Popul Health Stud. 2023;15(2):45-58.
10. Chiang CL. Life table and mortality analysis. Geneva: World Health Organization; 1978.
11. World Health Organization. World health statistics 2022: monitoring health for the SDGs. Geneva: World Health Organization; 2022.
12. Census of India. Sample Registration Survey report. New Delhi: Office of the Registrar General and Census Commissioner, India; 2022.
13. Prabhakaran D, Jeemon P, Roy A. Cardiovascular diseases in India: current epidemiology and future directions. Circulation. 2018;138(11):1078-1090.
14. Budihal HH, Megeri MN. Elimination of major infectious diseases and gain in life expectancy in India. Demogr India. 2024;53(1):1-15.
15. Omran AR. The epidemiologic transition: a theory of the epidemiology of population change. Milbank Mem Fund Q. 1971;49(4):509-538.
16. Gupta R, *et al*. Gender differences in cardiovascular risk factors and outcomes in India. Indian Heart J. 2020;72(3):231-238.