

Exploring the Status of Life Expectancy at Birth in Indian States and the Evolving Health Perspectives for well-being

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Abstract

The present study aims to assess the life expectancy at birth (LEB) of the fifteen major states in India and verify for the regional disparity in LEB over the study period. An analysis of secondary data on LEB is performed. The coefficient of variation (CV) of LEB across states is estimated to examine σ -convergence and absolute convergence is assessed by means of ordinary least square (OLS) technique. Gini Coefficient is also used to measure the change in regional inequality in LEB over the time period. A technique of estimating divergence reduction is employed to assess the accomplishment of states on the LEB indicator. The sigma and absolute convergence estimation reveals that India is experiencing continuous gains in life expectancy and regional divide in LEB has reduced over the years. But a regional gap still remains. A variation in life expectancy is mostly caused by differences in the social determinants of health viz. potable water, medical care, sanitation, hygiene. The states which are aiming at improving LEB should focus on non-clinical measures as well to enhance the life span of individuals and also to reduce the burden on health infrastructure. The health policy design and implementation should also be designed in creating health rather than purely focused on curing illness. A pandemic like the coronavirus disease (COVID -19) has urged a new way of looking at health; beyond pharmaceutical measures. Social, meditative and technology based intervention can help in improving the life expectancy and other health indicators.

Key words: life expectancy at birth; COVID -19; Social prescription; health; non-clinical

Introduction

Development means improved life for each one. The period of early 1990's saw a noteworthy change in the development literature from economic growth to human well-being. United Nations Development Programme (UNDP) [1] argues for looking at development as the course of enhancing individuals' capabilities for cultivating quality of life. Health status is an important component of quality of life and life

expectancy at birth is considered as one of the robust indicators of population's health. Since the early twentieth century, the summary measure most extensively applied to define health of the population is life expectancy at birth [2-4]. Life expectancy is considered as a vital metric for judging population health. Life expectancy holds an edge over other narrow indices like infant and child mortality, which emphasizes merely mortality at an early age while it

covers the mortality along the complete life cycle [5]. It determines overall quality of life of the population of a country. Not beyond belief, life expectancy is low in India when matched with other countries. Life expectancy has shown improvement in some parts of the world and fails to improve in others. A person born today is expected to live up to the age of 85 years in some parts of the world while less than 68 years in others.

Table 1: Trends in Life expectancy at birth, selected countries.

Selected Countries	Life expectancy at birth (in years)		
	1960	2010	2016
India	40	64	68
Brazil	58	72	75
China	45	74	76
Indonesia	43	71	69
Iran	43	73	70
Source: World Population Prospects: The 2012 Revision and https://ourworldindata.org/life-expectancy (2016)			

A person born today in India is expected to survive until the age of 68, this is too low a figure among the main developing countries. Dramatic improvement in health globally have occurred for some countries in the last fifty years (Table 1), initially there no huge differences in the life expectancy amid India and other populous Asian nations like China and Indonesia persisted, but the gap has widened over the time period. Deviation in life expectancy is attributed to differences in the social determinants of health: potable water, medical care, sanitation, hygiene, nutrition, etc.

Longevity of an individual is an inclusive pointer to the economic and social well-being of the public. Life expectancy at a given age is the statistically evaluated expected years of life an individual would survive [6]. Life expectancy is an appropriate and a significant precise index of mortality and is relatively more intuitive than the mortality rates [7].

As the health status in a society improves, the life expectancy of its individual's proliferates. While India has

made considerable improvement in life expectancy at birth, this advancement has been uneven among different states of the country. The development of a nation can be adjudged by the worth of its population's health and how reasonably well, health is distributed across the regions.

Objective and Methodology

Endowment of a basic level of health facility to its population is an indispensable component of a country's development course. The last three decades of development have witnessed immense advancement and improvement in medical and scientific technology resulting in the enhancement of living years of the people. However within the country there is disparity in the health outcomes. The objective of the present study is to assess the life expectancy at birth (LEB) of the fifteen major states viz., Andhra Pradesh, Assam, Bihar, Gujarat, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal and verify for the regional disparity in life expectancy at birth

over the study period using gini coefficient, sigma (σ) and absolute convergence. Various methods of measuring convergence[8-9] are applied to examine the amount of change in regional inequality in LEB. The coefficient of variation (CV) of LEB across states is estimated to examine σ -convergence [10] and absolute convergence is assessed by means of ordinary least square (OLS) technique. Gini Coefficient is also used to measure the change in regional inequality in LEB over the time period. A technique of estimating divergence reduction is employed to assess the accomplishment of states on the LEB indicator. Divergence is referred to as the amount of variation in the best performing state and a particular state. It is measured as the percentage difference between the states performance on LEB relative to the best performing state on LEB. The accomplishments of the states are assessed by computing the amount of change in divergence over the period of time. The amount of change in divergence over the time period indicated the ability of the state to get closer to the leading state by reducing the size of the divergence.

Ethical consideration

This study is based on secondary data available from various government publications like Centre for Monitoring Indian Economy, Economic Survey, Handbook of Statistics on Indian States. Since the study is based on public use data and there is no identifiable information of any individual, no ethical approval is required.

Performance of States on the Life Expectancy at Birth

A population's life expectancy mirrors its social and economic situations and the worth of its public health and health infrastructure, among other impacts[11]. During peace times, absence of any new epidemics, or extensive economic restructurings, lack or slow improvement in life expectancy figures are beheld as a cause for concern. The direction in which life expectancy moves is a pointer to the health status of the masses determined by socioeconomic developments, quality of healthcare services, or behavioral dynamics.

Recent trends in India suggest that it is experiencing continuous gains in life expectancy. But a large regional gap continues to exist in life expectancy at birth. The state with the longest life expectancy in 2016 was Kerala with 75.1 years. States of Maharashtra, Punjab, Tamil Nadu and West Bengal exceeded 70 years for total life expectancy. In stark contrast states of Madhya Pradesh, Uttar Pradesh and Assam had total life expectancy close to 65 years. Between 2001 and 2011, life expectancy in the states of Punjab and Uttar Pradesh declined.

To gauge the extent of inequality of LEB among various states over different time periods, Gini coefficient has also been estimated for each point of time. The Gini coefficient for 1981 is 0.054, 1991 is .041, 2001 is .034, 2011 is .026. This point to the fact that the regional divide in life expectancy at birth has reduced over the years.

Table 2: Life expectancy at birth in India (1981, 1991, 2001, 2011 and 2016)

Country	Life expectancy at birth (in years)				
	1981	1991	2001	2011	2016
Andhra Pradesh	55.02(7)	61.8 (8)	63.89(9)	65.8(10)	69.6 (6)
Gujarat	56.06(5)	61.0 (9)	63.61(11)	66.8 (8)	69.5 (7)
Haryana	55.75(6)	63.4(4)	66.97(6)	67 (7)	69.4 (8)
Karnataka	57.71(4)	62.5(6)	64.43(8)	67.2 (6)	69.1 (9)
Kerala	67.33(1)	72.9 (1)	73.33(1)	74.2 (1)	75.1(1)
Maharashtra	57.76(3)	64.8(3)	68.25(4)	69.9 (2)	72.2 (3)
Punjab	61.74(2)	67.2(2)	70.89(2)	69.3 (3)	72.5 (2)
Tamil Nadu	53.61(8)	63.3(5)	68.37(3)	68.9 (5)	71.4 (4)
Assam	51.9(10)	55.7(14)	59.91(13)	61.9(15)	65.5 (13)

Country	Life expectancy at birth (in years)				
	1981	1991	2001	2011	2016
Bihar	46.50(15)	59.3(10)	65.22(7)	65.8 (10)	68.7 (10)
Madhya Pradesh	49.74(13)	54.7(15)	58.6 (15)	62.4 (14)	65.4 (14)
Orissa	49.84(12)	56.5(13)	59.88(14)	63 (12)	67.6 (12)
Rajasthan	52.98(9)	59.1(11)	62.48(12)	66.5 (9)	68.3 (11)
Uttar Pradesh	46.98(14)	56.8(12)	63.81(10)	62.7(13)	64.8 (15)
West Bengal	51.72(11)	62.1(7)	67.71(5)	69 (4)	70.8 (5)
All India	53.85	60.3	63.87	66.1	68.7
Mean	54.48	61.59	65.16	66.69	69.22
S.D.	5.67	4.77	4.15	3.34	2.92
C.V.(%)	10.4	7.74	6.37	5	4.22

Source: CMIE, Basic Statistics: States, Sep.1994
Economic Intelligence Service.

Life Exp. (1991): Life Tables 1991-95 – Registrar General of India

SRS Bulletin April, 1999, 2010 – Registrar General of India, Economic Survey 2002-03, Handbook of Statistics on Indian States 2019, RBI.

Figures in Parenthesis show ranks

Analysis and Outcomes

Deficiency Reduction in LEB

An assessment of the deficiency reduction in LEB (Table 3) during three and a half decade starting from 1981 shows that the states of Bihar, West Bengal, Uttar Pradesh, Orissa, Tamil Nadu have performed well than the other states in deficiency reduction relative to the best performing state - Kerala. Bihar with a LEB of 46.50 years in 1981 made the largest deficiency reduction and attained LEB of 68.7 years. The negative values in deficiency reduction as in the case of Haryana, Punjab, Tamil Nadu and Bihar during 2001-2011 shows that deficiency with respect to the best performing state i.e. Kerala was greater in 2001-2011 than 1999-2001.

Table 3. Deficiency Reduction in LEB

States	(1981-2016)	(1981-1991)	(1991-2001)	(2001-2011)	(2011-16)
Andhra Pradesh	10.96	3.06	2.35	1.55	4.00
Gujarat	9.28	0.41	3.07	3.28	2.52
Haryana	9.61	4.17	4.36	-1.03	2.11
Karnataka	6.30	0.02	2.13	2.70	1.44
Kerala	0.00	0.00	0.00	0.00	0.00
Maharashtra	10.35	3.10	4.18	1.13	1.93
Punjab	4.84	0.48	4.49	-3.28	3.14
Tamil Nadu	15.45	7.21	6.40	-0.38	2.22
Assam	10.13	-0.68	5.29	1.72	3.79
Bihar	22.42	12.28	7.60	-0.26	2.80
Madhya Pradesh	13.21	1.16	4.88	4.18	2.99
Orissa	15.99	3.48	4.15	3.25	5.11
Rajasthan	12.26	2.38	4.13	4.42	1.32
Uttar Pradesh	16.51	8.14	9.10	-2.52	1.78
West Bengal	17.46	8.37	7.15	0.66	1.28

Source: Computed

A closer look at the figures of deficiency reduction shows that Punjab and Karnataka have shown minimal deficiency reduction during the period 1981-2016. Punjab with the minimum deficiency reduction has managed to attain a reasonably good LEB of 72.5 while in Karnataka the LEB is at 69.1 years. Bihar with the maximum deficiency reduction is close to Karnataka with 68.7 years. Deficiency reduction has been maximum in states which had low initial LEB.

Convergence in LEB

The style of the investigation that this study intends for, rules out the likelihood of using conditional convergence. Therefore β convergence and absolute convergence is applied for the estimation of state wise inequality in LEB in this study.

σ convergence is estimated using CV. In 1981, CV for life expectancy at birth is low at 10.41 percent, which reduced

to 7.39 percent in 1991 and lessened to 6.37 percent which further reduced to 5 percent in 2011 and 4.22 in 2016. This shows that regional variation has reduced consistently. The estimates of absolute β convergence also confirms with these outcomes (Table 4).

Absolute β convergence is attained by estimation of the following equation:

$$\frac{Z_{it2}}{T} - \frac{Z_{it1}}{T} = a + bZ_{it1} + eit$$

Where $\frac{Z_{it2}}{T} - \frac{Z_{it1}}{T}$ is the i^{th} state's annual average growth rate of LEB during time period 1 and 2.

Z_{it1} denotes the initial time period

T denotes the time duration between period 1 and 2

Table 4: Estimates of Absolute β –Convergence

Table 4: Estimates of Absolute

Dependent Variable	Period	Constant	Coefficient on Initial Level	R ²
Growth in LEB	1981-1991	1.95 (3.243)	-.029** (-2.0749)	.248
	1991-2001	1.506 (2.940)	-0.018**(-2.214)	.273
	2001-2011	1.835 (3.225)	-0.025**(-2.961)	0.40
	1981-2011	4.024 (7.317)	-0.051* (-5.089)	0.66

Figures in parenthesis are t-statistics. * and ** respectively denote significance at 1 and 5 per cent. Number of observation (N)= 15.

The sign and significance of the coefficient (b) attached to the initial LEB (Z_{it1}) in equation 1 notifies the occurrence of convergence. A statistically significant negative coefficient confirms absolute β convergence. A negative sign indicates an inverse relation between the initial level of LEB and state's annual average growth rate of LEB. It signifies that states initially with low LEB tends to converge to the best performing states with a high annual growth rate.

OLS estimation to obtain absolute β convergence on 15 major states at various points of time is carried. Estimation results (Table 4) shows that the coefficients on the initial LEB in three different time periods 1981-1991, 1991-2001, 2001-2011 are statistically significant at 5 per cent level of

significance and for the entire period 1981- 2011 it is significant at 1 per cent level of significance. This specifies that LEB have a strong propensity of convergence.

This supports the fact that the government efforts over the years and the entry of private players in the health sector have considerably improved the LEB in different states of India. However, the states like Madhya Pradesh, Uttar Pradesh and Assam require placing greater efforts in improving socio economic determinants of health.

The Evolving Health Perspective

India has done considerably well in improving the average life expectancy and reducing the regional differences in LEB. A comparison with the LEB statistics of the developed countries close to 85 years (Japan), lays the target that India can look towards achieving. Apart from targeting the average life expectancy, the gender differences and regional differences in LEB must be aimed

at. The recent pandemic (COVID-19) has surfaced a new standard towards achieving health. Moreover, lifestyle improvements have been considered important in enhancing the quality and duration of living years.

Health is now being considered more of a socioeconomic outcome rather than a clinical outcome. As the world grapples with the coronavirus disease (COVID-19) pandemic, some alarming veracities have surfaced globally. The insufficiency of health arrangements especially infrastructural facilities, testing kits and laboratories, ventilators, inpatient beds, intensive care units etc. have appeared uniformly in most nations, oblivious to the economic conditions of the nations. The recent pandemic has conceptualized health in a unified framework that integrates spiritual, physical, and psychosocial factors [12]. COVID -19 has made it clear that pharmaceutical measures may not suffice to produce and maintain health. Non-pharmaceutical measures wherever implemented and embraced cautiously reaped the results.

Social prescribing has emerged as an important approach in the public health agenda to address the urge to deliver something other than or more than prescription medication [13-14]. The current pandemic is putting overemphasis on social prescribing that incorporates recommendations for health behavior modifications encompassing meditation, music, art and natural spaces apart from lifestyle changes. With the stress of losing jobs, losing life, future economic insecurity and fear of getting infected looming with this pandemic, social prescribing should be the order of the new health strategy.

The practice of meditation helps in eradicating mounted up stress, improving energy levels and cultivating overall health. COVID-19 has unfolded new dimensions for individual lifestyle and public health. Health, to a large extent, has been associated with psychosomatic outcome. The term psychosomatic denotes the real physical symptoms that are influenced by the mind and emotions rather than an explicit biological cause in the physical body [15]. The COVID-19 has raised the importance of the non-clinical methods like yoga and meditation. The post COVID health strategy needs to incorporate a SMART (Social lifestyle, Meditation, Artificial Intelligence and

Digital Technology) approach towards creating health irrespective of illness.

A genuine perspective on health enhancement that unfolds physical, psychological, and social dynamics that disburses a natural healthy life and also a sociocultural approach to behavior modification is what the public health in the countries around the globe need to contemplate on. The pandemic is unfolding a new but not unknown dimension of public health to be given heed to; which largely remain unattended to, in the strive of earning and spending.

The states aiming to improve health indicators and advance health and well- being need to look at a broader paradigm of health. This new perspective of producing health would encourage the states to invest in non-clinical SMART measures for health enhancement and encourage the general public on promoting lifestyle changes to enhance health.

Conclusion and Policy Implications

Latest trends in India suggest that it is experiencing continuous gains in life expectancy. The Gini coefficient for LEB in 1981 is 0.054, 1991 is .041, 2001 is .034, 2011 is .026. This shows that regional divide in life expectancy at birth has reduced over the years. But a large regional gap continues to exist in life expectancy at birth. The state with the longest life expectancy in 2016 was Kerala with 75.1 years whereas states of Madhya Pradesh, Uttar Pradesh and Assam had total life expectancy close to 65 years.

As the health status in a society improves, the life expectancy of its people increases. A pandemic like the coronavirus disease (COVID -19) has urged a new way of looking at health; beyond pharmaceutical measures. Rather than focusing on curing illness, the health strategy framework should be designed in creating health. The states which are aiming at improving LEB should focus on non-clinical measures as well to enhance the life span of individuals and also to reduce the burden on health infrastructure. The states need to invest heavily on preventive cure rather than curative measures. Basic health determinants like clean water, clean and green spaces, healthy food and lifestyle should find place in the health policy design and implementation.

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