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An analysis of the temporal changes in the Human Development Index (HDI) and its indicators in India

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Abstract

A key instrument for assessing a nation's level of human development is the Human Development Index (HDI) and its associated dimensions. India's level of human development has been examined using secondary data that was obtained from UNDP reports. Life expectancy has increased by 22.8%, expected years of schooling by 57.9%, average years of schooling by 147.4%, and per capita Gross National Income (GNI) by 317.4% between 1990 and 2023, according to an analysis of changes in India. These increases have happened more quickly in India than in the world average. From 1990 to 2023, India's HDI increased by 53.6%, from 0.446 to 0.685. In addition, this growth is occurring twice as quickly as the global average. India's rise in life expectancy (22.8%) is greater than Iran, Iceland, and Pakistan. It is, however, marginally below Iraq (25.6%), which has a medium level of human development. Comparing the expected years of schooling, India's increase (57.9%) is lower than that of Pakistan and Iraq but higher than that of Iran, Iceland, and the global average. India's increase in the mean years of schooling (147.4%) is superior to that of all other nations and the world. In a similar vein, among the aforementioned nations and globally, India has experienced the largest increase in per capita GNI (317.4%). In addition, India's HDI has risen 53.6% in comparison to other nations and the global average. In conclusion, even though India's HDI and associated indicators have significantly improved; further progress is still required to move the country from a medium to a high level of human development.

Keywords: Human Development Index (HDI), Health, Education, Per Capita Gross National Income, India.

Introduction

In order to assess the level of human development in each nation, Indian economist Dr. Amartya Sen and Pakistani economist Dr. Mahbub Ul Haq developed the idea of the Human Development Index (Wani and Kaspate, 2025). Since 1990, the UN organization known as the United Nations Development Programme (UNDP) has used this index in the creation of its Human Development Report (UNDP, 1990, Bohan et al., 2020; HDI reports, 2025). According to Misra and Chaudhary (2014), Pooja (2016) the HDI is a comprehensive tool used to rank different countries based on their levels of social and economic development. With its inclusion of life expectancy at birth, expected years of schooling, mean years of schooling and per capita gross national income (Singh and Manajan 2025), HDI provides a more comprehensive view of development than just economic metrics like GDP (Sagar and Najam 1998). This index is a useful tool for comparing the development levels of various nations and tracking changes in development levels over time (Wani and Karande, 2025).

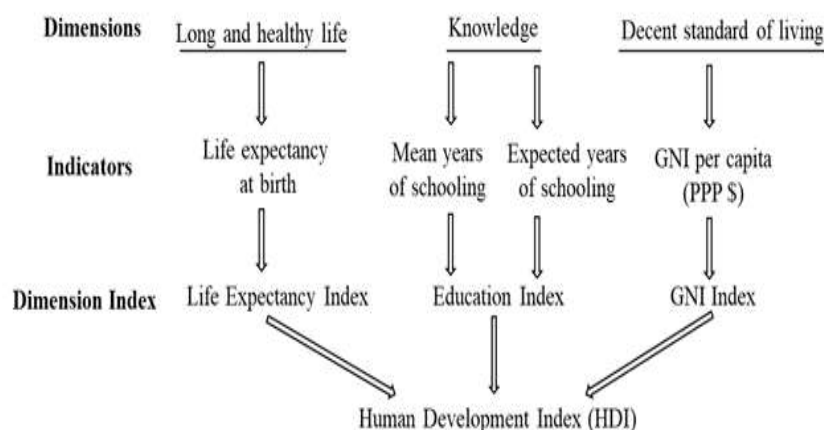
The HDI divides the world's nations into four groups: i) Low Human Development, ii) Medium Human Development, iii) High Human Development and iv) Very High Human Development. In 2023, India was in the medium human development group, according to a report by the UNDP. This study examines how the HDI and its dimensions changed over time in India between from 1990 to 2023.

Objectives

1. To analyzing the temporal changes in the Human Development Index of India.

Data base and Methodology

Secondary data from the Ministry of Statistics and Programme Implementation, Government of India, and UNDP reports has been used to examine how India's Human Development Index has changed over time. HDI is composed of geometric averages of three core dimensions (Singh et al., 2025): (1) Long and healthy life, measured by life expectancy at birth; (2) Knowledge, measured by arithmetic mean of expected years of schooling and mean years of schooling; (3) Decent standard of living, measured by the logarithm of GNI (PPPS) per capita.



The dimensions indicators are calculated as follows:

Following formula was used for measurement of all three primary indices:

$$\frac{(I - I_{min})}{(I_{max} - I_{min})}$$

Where:

'I' represents the actual value in the country.

min and max represents the minimum and maximum values of individual indices.

The Human Development Index (HDI) is a simple arithmetic mean of all three primary indices:

$$HDI = \frac{I_1 + I_2 + I_3}{3}$$

Where:

I 1 represent life expectancy index, I 2 education index and I 3 GNI index.

On the basis of HDI values countries classified into following four groups, which indicate the level of human development achieved:

<0.550 – low level of human development

0.550 to 0.699 – medium level of human development

0.700 to 0.799 – high level of human development

≥ 0.800 – very high level of human development

According to the HDI, countries around the world are classified into four levels. Based on the 2023 index, data from the top or representative countries in each level have been taken for comparison with India's HDI. Among these countries, Pakistan (0.544) represents the low human development category, Iraq (0.695) the medium human development category, Iran (0.799) the high human development category and Iceland (0.972) the very high human development category. India (0.685) falls under the medium human development category.

Result and Discussion

1. Life Expectancy at Birth

Three-dimensional coordinates are depicted in the Human Development Index. The expected years of life at birth are taken into account when calculating for a long and healthy life. The expected age at birth in India rose from 58.6 years in 1990 to 72 years in 2023 (Pankhuri, and Sharma, 2025). Compared to 1990–2023, this change in life expectancy indicates a 22.8% increase (Fig. 1).

The change in life expectancy worldwide from 1990 to 2023 has been 13.3% in Pakistan (low human development level), 25.6% in Iraq (medium human development level), 21.2% in Iran (high human development level), and 6.4% in Iceland (very high human development level) (Table 1). India's increase in expected years of life at birth is 10.1% higher than the global average, 16.4% higher than Iceland (which has a very high level of human development), and 9.5% higher than Pakistan (which has a low level). However, compared to Iraq, the increase is somewhat smaller because India is at a middle level of human development. The life expectancy in India has increased to 72 years through the *Swachh Bharat Abhiyan* (Clean India Mission) (Barik, 2022) advancements in healthcare services, vaccination programs, and other measures. However, health-related improvements are required to further human growth.

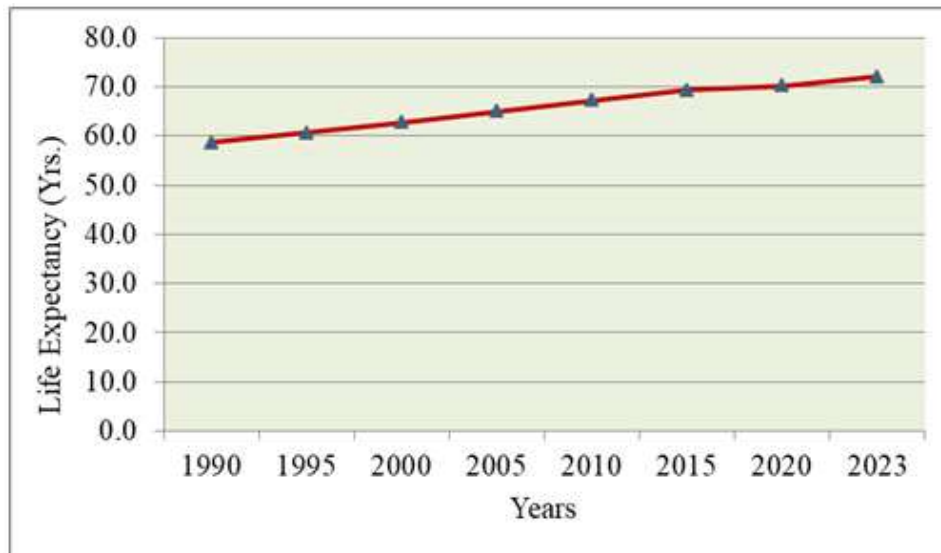


Fig. 1: Life Expectancy at Birth in India

**Table 1: Country and level wise changed of HDI and its indicators
Between 1990 to 2023 (%)**

Country and level	Life Expectancy at Birth	Expected Years of Schooling	Mean Years of Schooling	GNI Per Capita (2021 PPP\$)	HDI
Pakistan - low level of human development	13.3	86.3	86.4	75.3	37.4
Iraq - medium level of human development	25.6	68.7	39.2	17.5	30.9
Iran - high level of human development	21.2	29.3	89.0	22.7	27.6
Iceland – very high level of human development	6.4	33.3	32.4	77.3	15.6
India - medium level of human development	22.8	57.9	147.4	317.4	53.6
World - high level of human development	12.7	39.8	49.2	80.3	24.3

2. Expected Years of Schooling

Human knowledge is measured by the HDI's second dimension (Paul and Mondal, 2019). This entails computing two different kinds of indices for assessment. The index in the first type is calculated using the expected years of schooling. In 1990, the expected years of schooling in India were 8.2 years; by 2023, that number had risen to 13.0 years (Fig. 2). The expected years of schooling in India by 2023 have changed by 57.9% from 1990.

From 1990 to 2023, countries with different levels of human development exhibit notable variations in the index generated from the expected years of schooling worldwide. The change is 86.3% in Pakistan (poor human development), 68.7% in Iraq (medium human development), 29.3% in Iran (high human development), and 33.3% in Iceland (very high human development) (Table 1). India's expected years of schooling are higher than those of Iran, Iceland, and the rest of the globe, but they are 28.4% lower than those of Pakistan and 10.8% lower than those of Iraq. Positive trends include rising literacy rates, a growth in the number of children entering the educational system, and greater investment on education by the Indian government and educational institutions (Singh, 2018). But ensuring that everyone has access to high-quality education is as crucial.

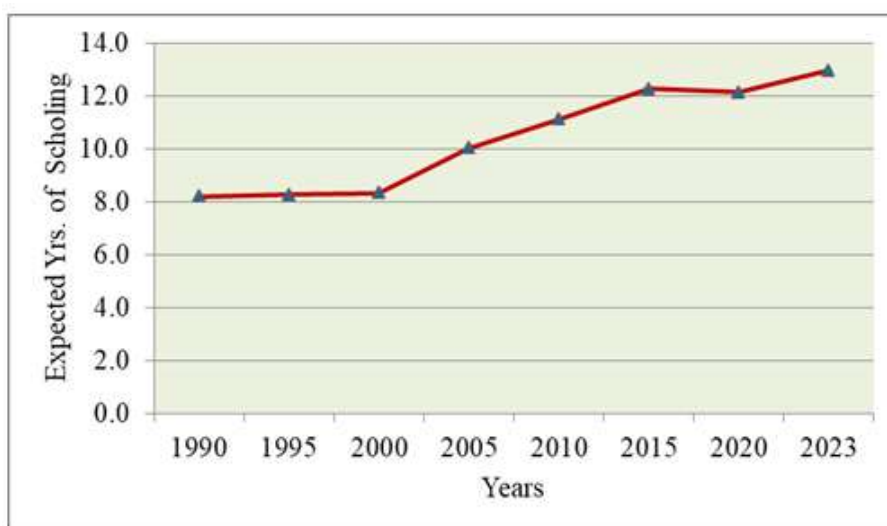


Fig. 2: Expected Years of Schooling in India

3. Mean Years of Schooling

The mean years of schooling of adults 25 years of age and older are used to create an index in the second way of assessing human knowledge levels. In 1990, the mean years of schooling in India were 2.8 years; by 2023, that number had risen to 6.9 years (Fig. 3). The mean years of schooling has increased by 147.4% in India.

When the mean years of schooling index in the field of education is examined across nations based on human development levels, the rise in Pakistan, which has a low level of human development, is 86.4% between 1990 and 2023. The growth rate in Iraq, a country with a medium level of human development, is 39.2%. Growth is 89.0% in Iran, which has a high level of human development, and 32.4% in Iceland, which has a very high level of human development (Table 1). In comparison to Pakistan, Iraq, Iran, Iceland, and the world (49.2%) at all four stages of human development, India has the largest increase in mean years of schooling (147.4%). Increased awareness and better facilities have enabled this amazing expansion in Indian education. Nonetheless, more educational facilities are still required to advance human progress.

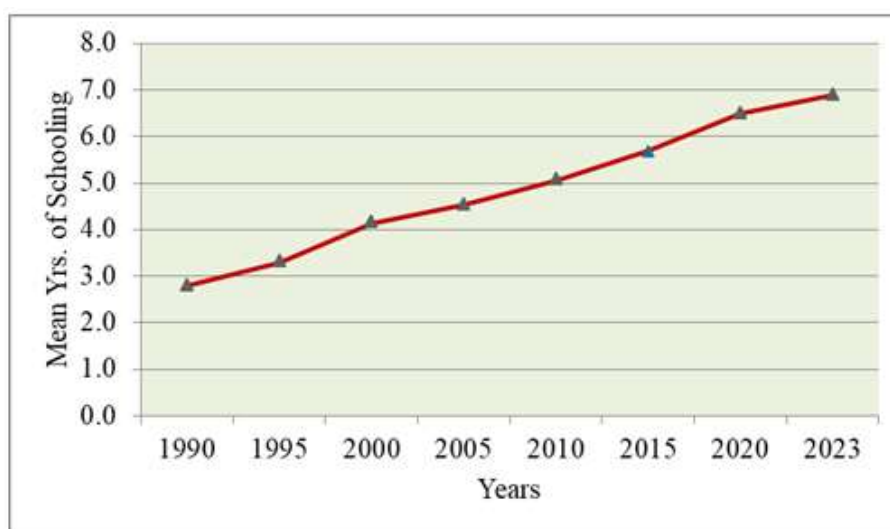


Fig. 3: Mean Years of Schooling in India

4. GNI Per Capita (2021 PPP\$)

An essential economic metric for evaluating a nation's average income, economic well-being, and human development is the Gross National Income (GNI) per capita. The Gross National Income per capita in India rose from \$ 2,167 to \$ 9,047 in 2023 (Fig. 4). The GNI per capita was increased by 317.4% over this time.

According to human development levels across nations, the GNI per capita increased between 1990 to 2023, Iraq increased by 17.5%, Iran by 22.6%, Iceland by 77.3% and Pakistan by 75.3% (Table 1). India other hand, saw a significantly bigger growth of 317.4%. While the global increase was only 80.3%, this significant growth in India reflects not only economic development but also improvement in the standard of living of its people.

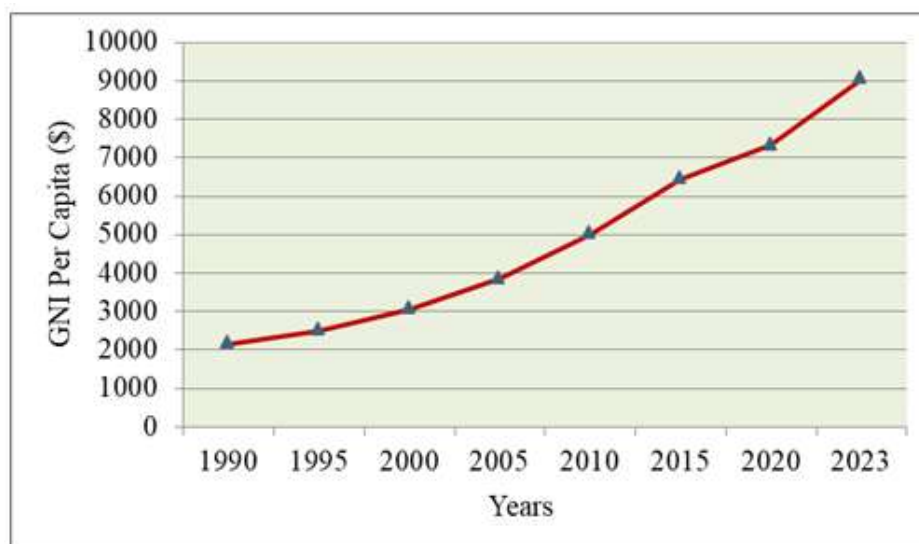


Fig. 4: GNI Per Capita (2021 PPP\$) in India

5. Human Development Index

The life expectancy index, the education index and the income index are the three indices that make up the Human Development Index. It is used to evaluate development across nations and assess the level of human development in diverse countries (Sagar and Najam 1998). India's HDI rose from 0.446 in 1990 to 0.665 in 2023 (Fig. 5). In comparison to 1990, this indicates a 53.6% increase. India's HDI grew by around twice as much as the global average during the same period, whereas the global HDI increased by 24.3%.

The HDI has significantly increased in nations with varying levels of human development between 1990 and 2023. The HDI increased by 37.4% in Pakistan, which has a low level of human development; 30.9% in Iraq, which has a medium level; 27.6% in Iran, which has a high level; and 15.4% in Iceland, which has a very high level (Table 1). By contrast, India's HDI has increased by 53.6%, a significantly quicker rate than that of other nations. Improvements in the nation's life expectancy, expected years of schooling, mean years of schooling and per capita Gross National Income are mostly responsible for this sharp rise in India's HDI.

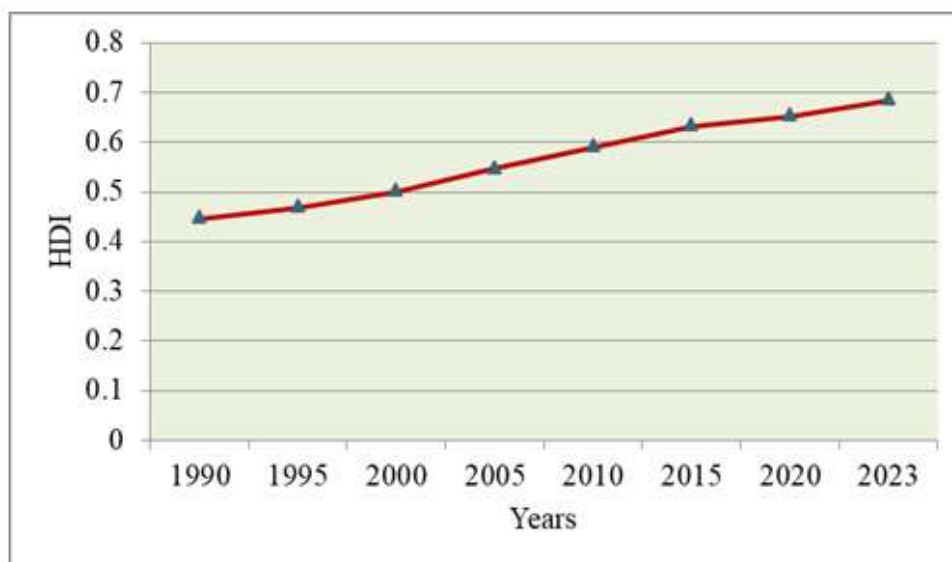


Fig. 5: Human Development Index in India

Conclusion

An essential tool for assessing and rating the social and economic development levels of different nations is the Human Development Index (HDI) and its associated indicators. According to analysis of India's human development level, the country's life expectancy increased by 22.8% between 1990 and 2023, from 58.6 years to 72 years. The expected years of schooling has risen by 57.9%, from 8.2 to 13 years. The mean years of schooling increased from 2.8 to 6.9 years, representing a gain of 147.4% and the per capita Gross National Income (GNI) climbed from \$ 2,167 to \$ 9,047, indicating a growth of 317.4%. India has grown at a greater rate than the worldwide average, as evidenced by the increases in these metrics, which are 12.7%, 39.8%, 49.2%, and 80.3%, respectively.

India's HDI rose by 53.6%, from 0.446 in 1990 to 0.685 in 2023. It is evident that India's growth rate has been more than twice that of the worldwide average throughout that time, while the global increase was 24.3%. India's 22.8% increase in

life expectancy is greater than that of nations with low human development, such as Pakistan (13.3%), high human development, such as Iran (21.2%), and very high human development, such as Iceland (6.4%). However, compared to Iraq, which is at a medium level of human development, India's gain is little lower at 25.6%. India's 57.9% rise in expected years of schooling is more than that of Iran (29.3%), Iceland (33.3%), and the global average (39.8%). But compared to Iraq (68.7%) and Pakistan (86.3%), it is lower. India's 147.4% rise in mean years of schooling is the highest of all nations and the world average. India has increased its GNI per capita by 317.4%, more than Pakistan (37.4%), Iraq (30.9%), Iran (27.6%), Iceland (15.6%), and the world (24.3%). India has outperformed all of these nations in terms of HDI growth. In short, while India has made considerable advances in the HDI and its indicators, further progress is needed to transition from a medium to a high human development level.

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Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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