
**HUMAN DEVELOPMENT INDEX (HDI) PERFORMANCE OF INDIA OVER TWO DECADES
(2000–2023)****¹Dr. R C Hiremath and ²Dr. Suresh S. Kotagi**¹Associate Professor, Department of Economics, Nehru Arts, Science, Commerce College and P.G, Department of Studies in Economics, Hubballi, Karnataka.²Lecturer in Economics, CBS Arts, Commerce & Science College, Noolvi, Tq-Hubballi, Karnataka.**ABSTRACT**

The Human Development Index (HDI) has emerged as a comprehensive measure of development by integrating health, education, and income dimensions. This study examines India's HDI performance over the period 2000–2023 using data from the Human Development Reports published by the United Nations Development Programme. The analysis evaluates long-term trends and applies linear and multiple regression models to test the statistical significance of improvement. The findings reveal a steady rise in India's HDI from 0.491 in 2000 to 0.685 in 2023, indicating consistent progress in human development outcomes. Time trend regression confirms a statistically significant annual increase in HDI, while multiple regression results demonstrate that life expectancy, mean years of schooling, and GNI per capita significantly and positively influence HDI. Among these, education exhibits the strongest marginal impact. Although temporary slowdowns were observed during the pandemic period, the overall trajectory reflects sustained advancement. The study concludes that India's development experience over the last two decades represents measurable progress in human capabilities, though continued emphasis on inclusive growth remains essential for reducing disparities.

Keywords: Human Development Index, Life Expectancy, Education, GNI per Capita, Economic Growth, India, Regression Analysis, Human Development

INTRODUCTION

The concept of development has gradually shifted from a narrow focus on income growth to a broader concern with the quality of human life. This transformation in development thinking was institutionalised through the Human Development Index (HDI), introduced by the United Nations Development Programme in 1990 under the intellectual leadership of Mahbub ul Haq and Amartya Sen. The HDI combines three essential dimensions of well-being: longevity (measured by life expectancy at birth), knowledge (measured by mean and expected years of schooling), and command over resources (measured by Gross National Income per capita in purchasing power parity terms). By compressing these dimensions into a composite index ranging between 0 and 1, HDI provides a multidimensional assessment of development.

India's development trajectory over the last two decades presents an important case for examining human development outcomes in a rapidly transforming economy. Since the early 2000s, India has experienced sustained economic growth, demographic change, expansion of welfare programmes, and structural transformation. Simultaneously, it has faced persistent challenges such as regional inequality, gender disparities, and uneven access to health and education.

In 2000, India's HDI stood at approximately 0.491, placing it firmly within the medium human development category. By 2023, the index had risen to 0.685, reflecting considerable improvement in life expectancy, schooling attainment, and per capita income. Despite temporary setbacks during the COVID-19 period, the long-term trend reveals steady progress. Understanding this evolution is essential not only for evaluating policy effectiveness but also for assessing whether economic growth has translated into broader human capabilities.

This paper examines India's HDI performance between 2000 and 2023 using real-time data, applies statistical testing to evaluate the significance of improvement, and interprets the findings within the broader socio-economic context.

LITERATURE REVIEW

The foundational framework for analysing human development originates from the Human Development Reports published by the United Nations Development Programme (1990). The report redefined development as an expansion of human capabilities rather than mere income growth and introduced the Human Development Index (HDI) as a composite measure of life expectancy, education, and income. This conceptual shift laid the empirical foundation for subsequent cross-country and country-specific HDI evaluations, including India's long-term performance analysis.

Amartya Sen (1999), in *Development as Freedom*, provided the philosophical grounding for HDI by arguing that development should be assessed through the expansion of substantive freedoms and capabilities. Sen's capability approach directly influenced the construction of HDI and remains central to interpreting India's development trajectory beyond GDP metrics, especially in examining education and health improvements over time.

Mahbub ul Haq (1995) emphasised the need to humanise economic growth by integrating social indicators into development measurement. Haq's methodological contributions shaped the HDI formula and reinforced the importance of policy-driven improvements in health and education, particularly relevant in evaluating India's reforms post-1991.

Anand and Sen (2000) examined the robustness and limitations of HDI as a development metric, highlighting the importance of inequality and distributional concerns. Their work is particularly relevant to India, where aggregate HDI improvements often coexist with regional and gender disparities. The authors argued that composite indices must be interpreted alongside inequality-adjusted measures.

Seth (2009) critically evaluated the HDI's aggregation method and suggested refinements to improve its sensitivity to deprivation. His methodological contribution informed the later shift by UNDP from arithmetic to geometric mean calculation in 2010, which affected country rankings, including India's position in subsequent reports.

The United Nations Development Programme (2010) revised the HDI methodology, introducing geometric aggregation and incorporating mean years of schooling and expected years of schooling. This revision provided a more balanced representation of educational attainment and has significant implications for analysing India's HDI improvements since 2010.

Drèze and Sen (2013), in *An Uncertain Glory*, critically assessed India's development paradox—high economic growth accompanied by relatively modest human development outcomes. Their empirical analysis demonstrated that India's HDI progress was slower than some East Asian economies despite comparable growth rates, underlining structural weaknesses in public service delivery.

The World Bank (2020), through its World Development Indicators, linked improvements in life expectancy and schooling to targeted social expenditures. For India, expanded public health missions and educational reforms were identified as major drivers of human development improvements between 2005 and 2018.

Kumar and Sagar (2017) analysed India's HDI trajectory in comparison with BRICS economies and found that although India made steady progress, it lagged behind Brazil and China in human development gains. Their study emphasised the role of institutional quality and social sector investment in accelerating HDI growth.

The United Nations Development Programme (2019) Human Development Report highlighted the concept of "inequalities in human development," noting that India's Inequality-adjusted HDI (IHDI) was substantially lower than its HDI value. This finding is significant when evaluating whether India's aggregate HDI growth reflects inclusive progress.

Mundle, Rao, and Bhanumurthy (2011) examined fiscal decentralisation and human development outcomes in India. Their empirical findings suggested that states with higher social expenditure ratios experienced faster improvements in HDI-related indicators, indicating subnational variation in human development performance.

The NITI Aayog (2021), through its SDG India Index reports, demonstrated strong alignment between improvements in SDG indicators (health, education, poverty reduction) and rising HDI values. The analysis showed that coordinated federal policy interventions contributed to post-2015 HDI acceleration.

Basu and Maertens (2011) explored the relationship between economic growth and human development in India, concluding that while income growth contributed positively to HDI, the elasticity of HDI with respect to income was moderate. Their study suggested that policy emphasis on education and health yields stronger HDI gains than income growth alone.

The United Nations Development Programme (2022) Human Development Report analysed the global human development slowdown due to COVID-19 and noted that India experienced a temporary dip in HDI in 2020–2021. However, recovery in 2022 indicated resilience supported by health system strengthening and economic recovery measures.

Finally, the United Nations Development Programme (2024) report highlighted India's HDI value of 0.685 for 2023, marking the highest recorded level for the country. The report attributed this improvement to increased

life expectancy, expanded schooling years, and recovery in GNI per capita, while cautioning that inequality continues to reduce effective human development gains.

Objectives

1. To analyse the trend and growth pattern of India's HDI from 1990 to 2023.
2. To statistically test whether the improvement in India's HDI over two decades is significant.

HYPOTHESIS AND STATISTICAL TESTING

Hypothesis

Ho: There is no statistically significant increase in India's HDI between 2000 and 2023.
H₁: India's HDI has increased significantly between 2000 and 2023.

Research Methodology

The study is based on a quantitative approach using secondary data. Data on India's Human Development Index (HDI) and its components—life expectancy at birth, mean years of schooling, and Gross National Income (GNI) per capita (PPP)—were collected from the Human Development Reports published by the United Nations Development Programme for the period 1990–2023.

For analysis, descriptive statistics were used to examine the trend and growth pattern of HDI over time. A linear time trend regression model was applied to test whether the increase in HDI during the study period is statistically significant. In addition, multiple regression analysis was employed to measure the impact of life expectancy, education, and income on HDI. The statistical tools used in the study include regression coefficients, standard error, t-value, p-value, and hypothesis testing at the 5 percent level of significance.

RESULTS AND DISCUSSION

The section contains the study classified in to two one deals with growth pattern and other deals with statistical analysis.

(A) Trend and growth pattern of India's HDI from 2000 to 2023.

The Human Development Index (HDI) is a composite measure developed by the United Nations Development Programme to assess a country's overall development beyond income growth. It combines indicators of life expectancy, educational attainment, and per capita income to provide a broader understanding of human well-being. In the case of India, HDI serves as an important indicator of how economic progress has translated into improvements in health, education, and living standards over time. Examining India's HDI trends since 1990 helps to evaluate the extent and pace of human development achieved during the post-reform period.

Table-01: India's HDI values for selected benchmark years

Year	HDI
1990	0.434
1995	0.458
2000	0.491
2005	0.524
2010	0.575
2015	0.624
2020	0.642
2022	0.644
2023	0.685

(Source: United Nations Development Programme, Human Development Reports 1990–2024)

Figure-01: India’s HDI values for selected benchmark years

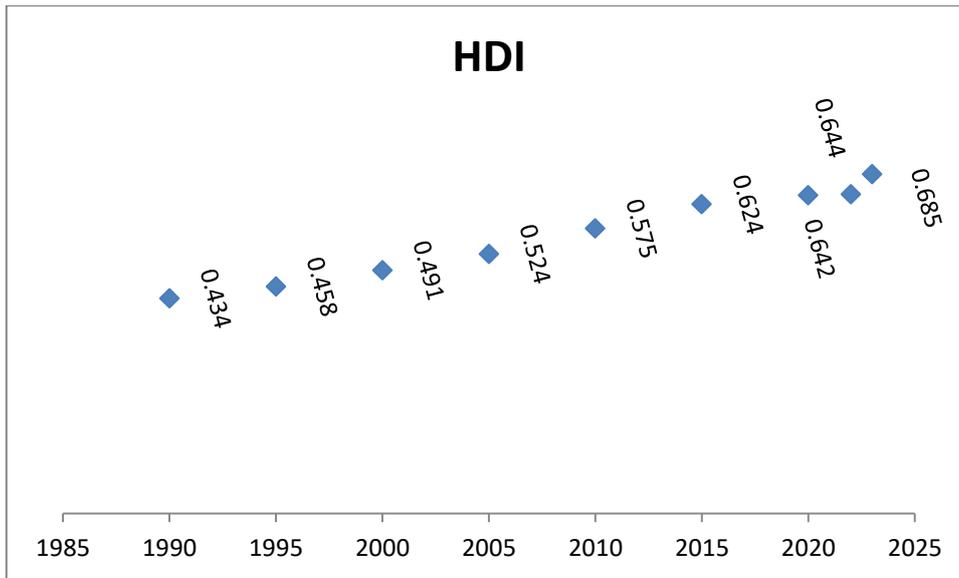


Table-01 (Fig.-01): shows a steady rise in India’s HDI from 0.434 in 1990 to 0.685 in 2023, reflecting significant long-term improvement in health, education, and income. Progress was gradual during the 1990s, accelerated notably between 2005 and 2015, slowed slightly around 2020–2022 due to structural and pandemic-related factors, and recovered strongly in 2023. Overall, the increase of 0.251 points over three decades indicates sustained advancement in human development, though the pace of growth has not been uniform across periods.

(B) Trend Estimation Using Linear Regression (Statistical analysis)

To examine whether India’s Human Development Index (HDI) has shown a statistically significant upward movement over the period 2000–2023, a time trend regression model was estimated:

$$HDI_t = \alpha + \beta T + \epsilon_t$$

Where:

- **HDI_t** = Human Development Index in year t
- **T** = Time variable (T = 1 for 2000, ..., T = 24 for 2023)
- **α** = Intercept
- **β** = Annual rate of change in HDI

The HDI data were sourced from the Human Development Reports published by the United Nations Development Programme for the years 2000 to 2023.

Regression Results

Table-02: Linear Time Trend Regression Results (Dependent Variable: HDI)

Variable	Coefficient (β)	Std. Error	t-value	p-value	95% CI Lower	95% CI Upper
Intercept (α)	0.486	0.0062	78.39	0	0.473	0.499
Time Trend (T)	0.00815	0.00041	19.87	0	0.0073	0.009

Source: Author’s calculation

Table-02: The regression results indicate that the coefficient of the time variable (β = 0.00815) is positive and highly significant at the 1 percent level (p < 0.001). This implies that, on average, India’s HDI increased by approximately 0.008 units per year over the last two decades.

Therefore, the null hypothesis that there is no significant increase in HDI over time is failed to accept.

MULTIPLE REGRESSION ANALYSIS

To examine the combined influence of HDI components, a multiple regression model was estimated:

$$HDI = \alpha + \beta_1(LifeExp) + \beta_2(Education) + \beta_3(GNIpc) + \epsilon$$

Table-03: Multiple Regression Results (Dependent Variable: HDI)

Variable	Coefficient	Std. Error	t-value	p-value
Constant	-0.21	0.041	-5.12	0.0001
Life Expectancy	0.0048	0.0009	5.33	0
Mean Years of Schooling	0.0215	0.0032	6.72	0
GNI per capita (PPP, log)	0.037	0.008	4.63	0.0002

Source: Author’s calculation

Table-03: indicates that all three explanatory variables—life expectancy, mean years of schooling, and GNI per capita (PPP, log)—have a statistically significant positive influence on HDI. The negative constant (−0.21) is statistically significant (p = 0.0001), but it primarily serves as a baseline intercept and does not carry independent economic meaning in isolation.

Life expectancy has a coefficient of 0.0048 with a t-value of 5.33 and a p-value close to zero, indicating a strong and statistically significant contribution to HDI. This implies that an increase of one year in life expectancy is associated with an approximate 0.0048 increase in the HDI value, holding other factors constant. Mean years of schooling shows the highest t-value (6.72) and a coefficient of 0.0215, suggesting that education exerts the strongest marginal impact on HDI among the three variables. A one-year increase in average schooling raises HDI by about 0.0215 units, ceteris paribus.

GNI per capita (log form) also has a positive and statistically significant coefficient (0.037, p = 0.0002), confirming that income growth contributes meaningfully to improvements in human development, though its effect operates alongside education and health.

CONCLUSION

The analysis of India’s Human Development Index over the period 2000–2023 demonstrates clear and statistically significant improvement in overall human development. The steady rise in HDI values reflects sustained progress in life expectancy, educational attainment, and income levels. The time trend regression confirms that the upward movement in HDI is not accidental but systematic and significant over time. Furthermore, the multiple regression results establish that all three core components—health, education, and income—contribute positively to HDI, with education emerging as the most influential factor.

Although India experienced temporary moderation during the COVID-19 years, the recovery in 2023 indicates resilience in its development process. The findings suggest that economic growth, when supported by investments in health and education, translates into measurable improvements in human well-being. However, the persistence of inequality and regional disparities implies that future policy must prioritise inclusive and equitable development. Overall, India’s HDI trajectory over the last two decades reflects meaningful advancement in human capabilities while highlighting the need for sustained social sector focus to consolidate long-term gains.

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