MSW MANAGEMENT -Multidisciplinary, Scientific Work and Management Journal
ISSN: 1053-7899
Vol. 36 Issue 2, 2026, Pages 1464-1467

# Social Sector Expenditure and Human Development in India: A Fixed Effect and Driscoll–Kraay Estimation Approach

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**Abstract**
The current study looks out on the effect of components of social expenditure on Human Development Index (HDI) across selected Indian states for the period 2000–01 to 2022-23. An impact study of education and health expenditure as well as Gross State Domestic Product (GSDP) on human development is conducted using a balanced panel dataset containing 322 observations from 14 states. The methodologies of the study of Fixed Effect (FE), Random Effect (RE), Hausman test and Driscoll–Kraay Fixed Effect estimator are applied. The results show that education expenditure and health expenditure are positively and significantly affected by HDI. Further Gross State Domestic Product is negatively significantly affected by HDI. The Hausman test confirms Fixed Effect model adequacy. Meanwhile, diagnostic tests suggest the existence of heteroskedasticity, autocorrelation, and cross-sectional dependence. As such, the study employs the Driscoll–Kraay estimator for estimation purpose. The study recommends that public spending on education and health is critical to improving human development and achieving inclusive development in Indian states.

**Keywords**: Human Development Index, Social Sector Expenditure, Education Expenditure, Health Expenditure, Panel Data, Indian States.

## 1.Introduction

Human Development has become one of the most relevant indicators for measuring socio-economic advancement of the modern economies. Previously, economic growth measured through Gross Domestic Product (GDP) was assumed as the most important indicator of development. Increasingly it is being recognized that economic growth by itself is not enough to improve quality of life, reduce poverty, achieve better health and educational attainments, and enhance social welfare. The growth-centred development strategies began to show their limitations when a number of economies achieved significant economic growth. The idea of human development became prominent with the work of Amartya Sen and Mahbub ul Haq. Further, they argued that development should be about expanding human capabilities and improving people's choices and freedoms. Due to this, the introduction of HDI or Human Development Index by the UNDP becomes an important composite index for measuring development with respect to health, education and standard of living. The Indian economy has transformed significantly during the post-reform period. There has been tremendous growth in the Gross State Domestic Product (GSDP) of the country. In spite of the Indian economy becoming more robust, there are huge human development disparities among its states. Many states have recorded high economic growth rates. However, poor health facilities, educational inequality, malnutrition, poverty, and regional imbalance are some major issues. Economic growth doesn't mean that human development is getting better. Economic growth does not help improve human development unless it is backed by public expenditure in social sector. As a result, social sector spending has emerged as an important tool for inclusive and sustainable development in India. Spending in the social sector, particularly expenditure on education and health, is critical for human capital formation and socio-economic development. The spending on education helps improve literacy and skills and makes workers more productive, besides creating jobs in the market. A spending on health helps increase life span and productivity of labour as well as the general quality of life. According to a theory of public expenditure, notably Wagner's Law, government expenditure tends to increase with the economic development of a country due to rising social and welfare needs. Endogenous growth theories also stress that expenditure on education and health plays a key role in long-run economic growth. Numerous empirical studies have looked into the relationship between public expenditure and human development in the developed and the developing economies. Existing literature points out that spending on education and health leads to better human development outcomes. Yet, the effectiveness of social-sector expenditure varies with regions because of governance quality, institutional efficiency, fiscal capacity, and social and economic conditions. There have been several studies on public expenditure and economic growth in India by both Indian and foreign authors. However, components of social sector expenditure are useful statistically. Further using panel data techniques to examine their impact on HDI has hardly been studied. In light of that, the present study investigates the impact of the components of social sector expenditure on Human Development Index (HDI) of selected Indian states for the period 2000-01 to 2022-23. The study examines the effect of education expenditure, health expenditure and Gross State Domestic Product on human development outcomes. Based on panel data strategy covering 14 major Indian states with 322 observation the analysis are made. To ensure a robust and reliable estimator choice, the study applies the Fixed Effect and Random Effect model and tests them with a Hausman specification test. Moreover, heteroskedasticity, serial correlation and cross-sectional dependence are found in the diagnostic tests of the panel dataset. As a result, the study then utilizes the Driscoll–Kraay Fixed Effect estimator to ensure robustness. The result of the Study is expected to give significant policy implications for efficient deployment of social sector expenditure for the attainment of inclusive and sustainable human development in Indian states.

**2.Review of Literature:**Numerous studies have delved into the connection between social sector expenditure and human development in the Indian context. Goswami and Bezbaruah (2011) studied the effect of expenditure on education, health and rural development on Human Development Index (HDI) in Indian states during post-reform period. The study revealed that the rise in social sector expenditure over time did not contribute to interstate differences in human development but was due to per capita income and not expenditure. Agarwal (2015) likewise examined the connection between expenditure in social sector and HDI across Indian states and reported that per capita income and social sector expenditure positively impacted human development outcomes. The study also revealed that the interstate disparities in HDI are persistent in development indicators. Reddy, & Reddy (2019) employed Tobit regression analysis to study the impact of expenditure on social sector on human development in India. The study found that spending on education, medical and public health, sanitation and housing, nutrition and welfare programmes has enhanced HDI indicators. In agreement, Mittal (2016) argues that per capita social sector expenditure has a positive association with HDI of states in India. Mittal observes that states like Kerala and Tamil Nadu consistently rank higher than others due to their high expenditure on education and health. Dutt, Das, and De (2023) also found that enhanced social sector spending had a positive impact on education, health and living standards which helped in human development and economic growth. Education and Health Expenditure as Components of Human Development. Several studies specifically emphasise that education and health expenditure can improve human development achievement. Findings of a paper by Ruzima and Veerachamy (2023) found that India's public expenditure on health, education and human development (in 1990-2018) were long-run endogenous. The research indicated that health expenditure positively and significantly impacted HDI while education expenditure had mixed outcomes owing to poor quality of education and high dropout rate issue. Furthermore, Sinha (2025) investigated the association between the spending pattern in the social sector and economic growth in India and found that spending on education and health led significantly to the formation of human capital and productivity growth which in turn leads to inclusive economic growth. In low-income states of India, as Ranjan and Panda (2021) analysed development expenditure and its relationship with HDI and GSDP. The research shows that although development expenditure helps raise GSDP, it negatively affects HDI in the long run. But, sector-wise health spending enhanced health outcomes. Das, Mandal, and Patra (2021) conducted further investigation of the relationship between social sector expenditure and HDI across Indian states by employing panel data analysis. The authors found long-run long-run associations between government social expenditure and human development in some states. Social sector Expenditure Trends, Regional Disparities and Efficiency. A series of studies examined trends, inter-regional variations and efficiency in social sector spending by Indian states. According to an analysis by Chattopadhyay (2017), despite a policy thrust on inclusive growth, the social sector expenditure which includes education, health and rural development during the 2000s remained inadequate. The study found that states accounted for the largest share of social sector expenditure, although prioritization of social spending was weak. Soni (2019) investigated inter-state differences in the expenditure on social sectors. There is considerable inter-state variation in education and health outcomes. States including Kerala and Himachal Pradesh did well due to higher investment in the social sector; Assam, Madhya Pradesh and Uttar Pradesh performed poorly. Identically Purohit (2014) assessed the efficiency of the social sector expenditure through Free Disposable Hull (FDH) and Stochastic Frontier Analysis (SFA). According to the report, there are disparities across states in the utilization of health care and education spending. Also, efficient utilization of public resource and health care infrastructure must be done to achieve the desired results in the social sector. Roula and Kumaran in the year 2025, analysed the public expenditure efficiency across Indian states using DEA. The results showed that states' efficiency in public expenditure was higher for better-off states with good governance, infrastructure and resource allocation and lower for poorer states. Efficient allocation of expenditure in the social sector can be an ideal means to reduce regional disparities and promote balanced development. Social sector expenditure, fiscal policies and economic growth Various research studies looked at the link between social sector expenditure, fiscal policy, and economic growth. Bose and Banerjee (2025) undertook the analysis to study the relationship

MSW MANAGEMENT -Multidisciplinary, Scientific Work and Management Journal
ISSN: 1053-7899
Vol. 36 Issue 2, 2026, Pages 1464-1467

between social spending, fiscal policy and human development in India during the post-reform period. The study observed that the FRBM fiscal consolidation policies-imposed restrictions on the fiscal space for education and health spending despite rapid economic growth. As per the authors, expenditure on health and education should be treated as a productive investment for inclusive growth. In the same manner, Roula (2025) studied the influence of social sector expenditure on rural empowerment in India and interestingly, expenditure on education, health care, nutrition, and welfare reduced rural unemployment and raised wage rates. This research concludes that integrated social sector investment and good governance are needed for sustainable rural development. Moreover, Roula, Sethi and Sahu (2026) analysed that in States; to enhance fiscal sustainability and development outcomes, fiscal discipline and effective management of public expenditure is critical. Studies show that social sector expenditure, particularly on education & health sectors have an important role in the improvement of human development outcomes in India. Most the studies have focused on either overall development expenditure, or economic growth, or sectoral outcomes. They do not examine the impact of various major components of social sector expenditure on Human Development Index across Indian states. Moreover, few studies have used robust panel data estimation techniques dealing with such important econometric problems as heteroskedasticity, serial correlation and cross-section dependence. As a result, the current study tries to bridge this gap using robust panel data techniques such as the Driscoll–Kraay Fixed Effect estimator, to study the effects of education expenditure, health expenditure and GSDE on Human Development Index across selected Indian States.

**3.Data Source.**The current research relies on secondary data sourced from numerous official government publications and databases. The study analyses 14 major states of India for the period 2000–01 to 2022–23, which forms a balanced panel dataset with 322 observations. Information on Human Development Index (HDI) was taken from reports by United Nations Development Programme (UNDP), NITI Aayog and the Human Development Reports of various states. Information regarding education expenditure and health expenditure has been collected from the Reserve Bank of India (RBI) publication titled State Finances: A Study of Budgets and state budget documents. The Ministry of Statistics and Programme Implementation (MOSPI), Government of India, provided the data on Gross State Domestic Product (GSDP). To minimize scale differences and make the variables comparable, the education expenditure, health expenditure, and Gross State Domestic Product have been converted into logarithmic form. Using the panel data methodology, the study examines education expenditure, health expenditure, and economic growth on human development across Indian states.

**4.Model Specification.**This study is an attempt to determine the impact of components of social sector expenditure on an index of human development practices across a cross-section of Indian states through panel data regression. Panel data technique is apt because with both cross-section and time series dimensions, the technique captures state-specific heterogeneity and time varying parameter better than pure cross-section or pure time series analysis. The researchers created an unbalanced panel data set of 14 Indian states for the period 2000-01 to 2022-23 consisting of 322 observations

The functional relationship between Human Development Index and explanatory variables is expressed as:

$$HDI = f(LNEE, LNHE, LNGSDP)$$

The econometric model of the study is specified as follows:

$$HDI_{it} = \beta_0 + \beta_1 LNEE_{it} + \beta_2 LNHE_{it} + \beta_3 LNGSDP_{it} + \mu_i + \varepsilon_{it}$$

Where, $HDI_{it}$represents the Human Development Index of state $i$at time $t$, $LNEE_{it}$denotes logarithm of education expenditure, $LNHE_{it}$represents logarithm of health expenditure, and $LNGSDP_{it}$indicates logarithm of Gross State Domestic Product. Further, $\beta_0$is the intercept term, while $\beta_1$, $\beta_2$, and $\beta_3$are the slope coefficients of the explanatory variables. The term $\mu_i$captures unobserved state-specific effects, and $\varepsilon_{it}$represents the random disturbance term.

The explanatory variables are transformed into logarithmic form to reduce scale variation, improve normality, minimize heteroskedasticity, and interpret coefficients in elasticity form. The logarithmic transformation equations are represented as follows:

$$LNEE = \ln(EE)$$
$$LNHE = \ln(HE)$$
$$LNGSDP = \ln(GSDP)$$

where $EE$denotes education expenditure, $HE$represents health expenditure, and $GSDP$indicates Gross State Domestic Product.

The study initially estimates both Fixed Effect (FE) and Random Effect (RE) models. The Fixed Effect model assumes that individual state-specific effects are correlated with explanatory variables and controls for time-invariant heterogeneity among states. The Fixed Effect model is represented as:

$$HDI_{it} = \alpha_i + \beta_1 LNEE_{it} + \beta_2 LNHE_{it} + \beta_3 LNGSDP_{it} + \varepsilon_{it}$$

where $\alpha_i$represents state-specific intercepts.

On the other hand, the Random Effect model assumes that state-specific effects are random and uncorrelated with explanatory variables. The Random Effect specification is expressed as:

$$HDI_{it} = \beta_0 + \beta_1 LNEE_{it} + \beta_2 LNHE_{it} + \beta_3 LNGSDP_{it} + u_i + \varepsilon_{it}$$

To determine the appropriate estimation technique between Fixed Effect and Random Effect models, the Hausman specification test is employed. The null hypothesis of the Hausman test states that the Random Effect model is appropriate, while the alternative hypothesis favours the Fixed Effect model. The Hausman test statistic is expressed as:

$$H = (\hat{\beta}_{FE} - \hat{\beta}_{RE})'[Var(\hat{\beta}_{FE}) - Var(\hat{\beta}_{RE})]^{-1}(\hat{\beta}_{FE} - \hat{\beta}_{RE})$$

Further, the Levin–Lin–Chu (LLC) panel unit root test is employed to examine the stationarity properties of the variables. The general LLC test equation is specified as:

$$\Delta Y_{it} = \alpha Y_{it-1} + \sum_{j=1}^{p} \beta_j \Delta Y_{it-j} + \mu_i + \varepsilon_{it}$$

The study also applies the Kao panel cointegration test to examine the existence of long-run equilibrium relationships among variables. Since the empirical analysis reveals the presence of heteroskedasticity, autocorrelation, and cross-sectional dependence, diagnostic tests such as the Modified Wald test, Wooldridge autocorrelation test, and Pesaran Cross-Sectional Dependence test are conducted.

Therefore, to obtain robust and reliable estimates, the study finally employs the Driscoll–Kraay Fixed Effect estimator. The Driscoll–Kraay estimator provides heteroskedasticity-consistent, autocorrelation-consistent, and cross-sectional dependence-consistent standard errors simultaneously, making it particularly suitable for macro panel datasets involving Indian states.

**5.Analysis and Discussion:**

**Table 1: Descriptive Statistics of Variables**

| Variables | Observations | Mean | Standard Deviation | Minimum | Maximum |
|---|---|---|---|---|---|
| HDI | 322 | 0.5997 | 0.0690 | 0.4430 | 0.7620 |
| LNEE | 322 | 14.0043 | 0.6787 | 12.5708 | 15.7604 |
| LNHE | 322 | 12.9311 | 0.8728 | 10.9194 | 15.0280 |
| LNGSDP | 322 | 17.4954 | 0.7233 | 15.8813 | 19.2277 |

**Sources: Author's own estimation**

The average state-wise values for each sector provide sufficient evidence of smoothness in behaviour. The average Human Development Index (HDI) is 0.5997 that range from 0.443 to 0.762 between the States. The average values of LNEE (Logarithm of education expenditure), LNHE (Logarithm of health expenditure) and LNGSDP (Logarithm of Gross State Domestic Product) are 14.0043, 12.9311 and 17.4954 respectively. The moderate standard deviations suggest that the variables are quite dispersed around the same, indicating a reasonable variation in fiscal and developmental performance amongst states.

**Table 4: Levin–Lin–Chu (LLC) Panel Unit Root Test Order of Integration**

| Variables | Adjusted t-statistic | P-value | Order of Integration |
|---|---|---|---|
| **HDI** | -4.3294 | 0.0000 | Stationary at Level |
| **LNEE** | -5.4126 | 0.0000 | Stationary at Level |
| **LNHE** | -3.6146 | 0.0002 | Stationary at Level |
| **LNGSDP** | -3.6827 | 0.0001 | Stationary at Level |

**Sources: Author's own estimation**

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ISSN: 1053-7899
Vol. 36 Issue 2, 2026, Pages 1464-1467

To determine the stationarity properties of the variables used in the study, Levin-Lin-Chu (LLC) panel unit root test was employed. The LLC test's null hypothesis asserts that the panels contain unit roots, and its alternative suggests that they are stationary. These results show that HDI, LNEE, LNHE, and LNGSDP adjusted t-statistics are statistically significant at the 1 percent level; p-values are less than 0.05. Thus, we reject null hypothesis that is unit root for all variables. It indicates all variables are stationary at level; that is, they are integrated of order zero, I(0). Consequently, the variables do not face non-stationarity issues that would prevent the proper application of panel regression estimation techniques such as the Fixed Effect and Random Effect models.

**Table 5: Kao Panel Cointegration Test**

| Test Statistics | Statistic Value | P-value |
|---|---|---|
| **Modified Dickey–Fuller t** | 1.3449 | 0.0893 |
| **Dickey–Fuller t** | 1.9202 | 0.0274 |
| **Augmented Dickey–Fuller t** | 0.5103 | 0.3049 |
| **Unadjusted Modified Dickey–Fuller t** | 1.7393 | 0.0410 |
| **Unadjusted Dickey–Fuller t** | 2.3789 | 0.0087 |

**Sources: Author's own estimation**

The selected Kao panel cointegration test was employed for checking the long-run interaction in HDI, LNEE, LNHE and LNGSDP. The test's null hypothesis asserts that there is no cointegration in the variables while the alternative hypothesis states that all panels are cointegrated. The statistics show that the Dickey – Fuller t-statistic and Unadjusted Dickey-Fuller t-statistic have p-values of .0274 and .0087 respectively and are significant at the 5 percent levels. The 5% level is also significant for the t statistic of the MD test unadjusted Despite the Augmented Dickey–Fuller t statistic being statistically non-significant, the majority of the test's statistics support rejection of the null hypothesis of no cointegration. Hence, the study shows that a long-run equilibrium relationship exists among HDI, education expenditure, health expenditure and Gross State Domestic Product for Indian States selected for the study. This finding legitimizes the use of panel regression models for empirical analysis.

**Table 6: Fixed Effect and Random Effect Model Results (HDI Model)**

| Variables | Fixed Effect (FE) | Random Effect (RE) |
|---|---|---|
| **LNEE** | 0.0327*** | 0.0345*** |
| | (0.0070) | (0.0071) |
| **LNHE** | 0.1648*** | 0.1774*** |
| | (0.0168) | (0.0166) |
| **LNGSDP** | -0.1542*** | -0.1728*** |
| | (0.0256) | (0.0255) |
| **_cons** | 0.7083*** | 0.8460*** |
| | (0.1795) | (0.1776) |
| **Observations** | 322 | 322 |
| **Number of Groups** | 14 | 14 |
| **Within $R^2$** | 0.9558 | 0.9557 |
| **Between $R^2$** | 0.2271 | 0.2501 |
| **Overall $R^2$** | 0.5164 | 0.5349 |
| **F/Wald Statistic** | 2199.11 | 6351.08 |
| **Prob > Test** | 0.0000 | 0.0000 |
| **Hausman Test (p-value)** | 0.0048 | |

**Sources: Author's own estimation**

**Note:** *** p<0.01, ** p<0.05, * p<0.10.

The table provides a comparison of the results from the Fixed Effect (FE) and Random Effect (RE) models which assess the effects of education expenditure (LNEE), health expenditure (LNHE) and Gross State Domestic Product (LNGSDP) on the Human Development Index (HDI) across selected Indian states. The output of both FE and RE models suggest that education expenditure (LNEE) has a positive and significant effect on HDI. In the FE model, LNEE is 0.0327 and in the RE model, it is 0.0345, so any increase of education expenditure promotes human development positively. More acute it is to the states listed above that a substantial public investment in education adds to literacy, skill formation, and the quality of life of people. Likewise, health expenditure (LNHE) is positively related to HDI in both the models and it is highly significant. The FE model coefficients of 0.1648 and the RE model coefficients of 0.1774 reveal that health expenditure can improve human development. The fact that the health expenditure coefficient is relatively large means that the development of private and public health services can enhance human development in a significant way. Conversely, the coefficient of the Gross state domestic product (LNGSDP) is negative and statistically significant in both models. According to the FE model coefficient of –0.1542 and the RE model coefficient of –0.1728, economic growth alone cannot guarantee improvement in human development unless it is coupled with distribution of income and efficient expenditure in social sector. The states with higher economic growth may have faced human development disparities due to uneven benefits resulting from growth. Both models have a fairly high explanatory power overall. The near-equal within $R^2$ values of 0.9558 (FE) and 0.9557 (RE) imply that the HDI values of the states vary a lot over time but are very similar over the average. Substantial proportion is covered by the explanatory variables. In addition, the Hausman specification test demonstrates a p-value of 0.0048, which is meaningful at 1 percent level. This study does not support (rejects) the null hypothesis of the Random Effect model, which means the Fixed Effect model is supported. According to the findings of the study, social sector expenditure, say, health and education expenditure helps improve human development across Indian states. Further, economic growth at 6% alone is not sufficient for inclusive human development.

**Table 7: Diagnostic Test Results for HDI Model**

| Diagnostic Test | Null Hypothesis | Test Statistic | P-value | Decision |
|---|---|---|---|---|
| **Hausman Test** | Random Effect model is appropriate | $\chi^2 = 12.94$ | 0.0048 | Reject $H_0$; Fixed Effect model preferred |
| **Modified Wald Test for Heteroskedasticity** | Homoskedasticity exists | $\chi^2(14) = 443.48$ | 0.0000 | Reject $H_0$; Heteroskedasticity present |
| **Wooldridge Test for Autocorrelation** | No first-order autocorrelation | $F(1,13) = 1121.237$ | 0.0000 | Reject $H_0$; Autocorrelation present |
| **Pesaran Cross-Sectional Dependence Test** | No cross-sectional dependence | $CD = 16.258$ | 0.0000 | Reject $H_0$; Cross-sectional dependence present |

**Sources: Author's own estimation**

According to the result of the diagnostic test, the Fixed Effect model is a better option in comparison to the Random Effect model as Hausman test statistic is significant. Additionally, heteroskedasticity exists in the panel using the Modified Wald test using the panel data model. The Wooldridge test shows first-order serial correlation and the Pesaran's Cross-Sectional Dependence test shows significant dependence of one cross-section on another. Because the panel dataset suffers from simultaneous heteroskedasticity, autocorrelation, and cross-sectional dependence, the standard errors of the conventional Fixed Effect estimator may be biased. Hence, Driscoll–Kraay Fixed Effect estimator was used as final robust estimation to obtain reliable and consistent results of the study.

**Table 8: Driscoll–Kraay Fixed Effect Regression Results (HDI Model)**

| Variables | Coefficient | Driscoll–Kraay Std. Error | t-value | P-value |
|---|---|---|---|---|
| **LNEE** | 0.0327** | 0.0130 | 2.52 | 0.019 |
| **LNHE** | 0.1648*** | 0.0294 | 5.61 | 0.000 |
| **LNGSDP** | -0.1542*** | 0.0432 | -3.57 | 0.002 |
| **_cons** | 0.7083** | 0.2863 | 2.47 | 0.022 |

**Sources: Author's own estimation**

| Model Statistics | |
|---|---|
| **Statistics** | **Value** |

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ISSN: 1053-7899
Vol. 36 Issue 2, 2026, Pages 1464-1467

| | |
|---|---|
| **Number of Observations** | 322 |
| **Number of Groups** | 14 |
| **F-statistic** | 493.50 |
| **Prob > F** | 0.0000 |
| **Within $R^2$** | 0.9558 |
| **Maximum Lag** | 2 |

**Sources: Author's own estimation**

To ensure the robustness of standard errors, the Driscoll–Kraay Fixed Effect regression model was estimated to extract the Driscoll–Kraay fixed effect robust standard errors with heteroskedasticity, autocorrelation, and cross-sectional dependence detected in the panel data set. The findings show that spending on education (LNEE) and health (LNHE) has a positive and significant effect on human development index (HDI) This means that a one percent increase in education expenditure improves HDI by around 0.0327 percent. On the other hand, a one percent increase in health expenditure improves HDI by almost 0.1648 percent. The bigger coefficient of health expenditure implies health-related public expenditure has a relatively high impact on human development extensively across Indian states. In contrast, Gross State Domestic Product (LNGSDP) had a statistically significant and negative relationship with HDI. Consequently, economic growth will not automatically lead to human development unless accompanied by equitable distribution and effective expenditure in the social sector. This model is statistically significant at the global level as demonstrated by F-statistic is 493.50. Its probability is 0.0000. In addition, the within $R^2$ value of 0.9558 means that about 95.58 percent of the variation in HDI within the states can be explained by the included independent variables. The Driscoll–Kraay estimator is reliable for the estimated coefficients after correction for heteroskedasticity, serial correlation and cross-sectional dependence in the panel data scenario.

## 6.Summary of Findings

Through the panel data analysis, impact of education expenditure, health expenditure and gross state domestic product (GSDP) on human development index (HDI) has been examined for selected states. The study employed descriptive statistics, correlation analysis, unit root tests, cointegration analysis, and the panel regression models with diagnostic tests and robustness estimation methods. The means and standard deviations of the variables show moderate variation across states and over time. The correlation matrix indicated that HDI is positively correlated with education expenditure, health expenditure, and gross state domestic product. The explanatory variables, however, were very high inter-correlated. The Levin–Lin–Chu panel unit root test established that the variables are all stationary at level, which suggests that the variables are I(0). In addition, the Kao panel cointegration test showed the long-run equilibrium linkage of HDI with education expenditure, health expenditure and Gross State Domestic Product. The analysis involved estimating both Fixed Effect and Random Effect models. The results of the Hausman specification test show that the Fixed Effect model is appropriate in this study as the state-specific effect is correlated with the explanatory variables. The diagnostic tests for the panel data showed the presence of heteroskedasticity, serial correlation, and cross-sectional dependence. Consequently, the Driscoll–Kraay Fixed Effect estimator was used to attain robust standard errors as the final model. The robust regression results found that health expenditure by states and education expenditure exert positive and significant impact on human development in the states of India. Of all these variables, health expenditure has a comparatively greater positive impact on HDI, i.e., health expenditure plays a vital role in improving human development index. Conversely, the Gross State Domestic Product showed a negative and significant relationship with human development index. This means that economic growth in the state does not always lead to human development. It must be backed with inclusive development policy and efficient spending on the social sector.

## 7.Conclusion

The study finds that social sector expenditure, especially expenditure on education and health enhances human development across Indian states. Public investment in education and health is significantly associated with improvements in quality of life and overall development outcomes as per the findings. Although, economic growth, may matter, the negative association between GSDP and HDI indicates that growth per se which is not followed up with an equitable distribution of growth and welfare-oriented expenditure may not contribute to human development uniformly across states. Hence, on the one hand, the policymakers have to accelerate the growth, and on the other hand, the proper allocation towards social infrastructure and human capital formation. Furthermore, the author adds that the use of sound and panel data estimation methods should be employed in a macroeconomic consideration since nothing is wrong in the estimation. The Driscoll-Kraay estimator provided consistent and truthful estimates, which strengthened our confidence in the empirical results. As a whole, sustainable human development in India requires an appropriate balance in the fiscal prioritization of education, health and inclusive welfare policies along with growth.

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