



Determinants of Multidimensional Human Development and Developing to Developed Countries in UNDP Classification

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Received: 10th January 2026; Last Revised: 6th February 2026;
Accepted: 11th February 2026; Available Online: 26th February 2026;
Published Regularly: August 2025



Abstract

This study analyzes the factors that affect the Inequality-Adjusted Human Development Index (IHDI) in developing countries based on the UNDP classification. IHDI is used because it describes the quality of human development after considering inequality in the dimensions of education, health, and income. The study uses 2008–2023 panel data obtained from UNDP, the World Bank, the ITU, and other international sources. The independent variables analyzed include Adjusted Net Savings (ANS), Current Health Expenditure (CH), Income Share Held by the Bottom 40 Percent (INS), Life Expectancy (LE), Years of Schooling (YS), Gross National Income per capita (GNI), Gender Inequality Index (GII), and Mean Years of Schooling (MYS). Model selection was conducted using the Chow Test and Hausman Test, which established the Fixed Effect Model as the best specification. The results show that CH, LE, YS, GNI, and MYS have a positive and significant effect on IHDI, emphasizing the importance of improving education, health, and income in strengthening the quality of human development. INS has a negative and significant effect, indicating that increasing the income share of the bottom 40 percent has not improved the equity of human development outcomes without corresponding improvements in basic services. Meanwhile, ANS and GII do not have a significant influence. These findings emphasize that inclusive human development requires strengthening capabilities through education, health, and equitable income growth.

Keywords: IHDI, Inclusive Human Development, Education, Health, and Inequality

JEL Classification: I31, I32, I38, O15, and O57

<https://doi.org/10.14710/jdep.8.2.157-171>



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Introduction

The UNDP Human Development Report (2024) shows that global human development is slowly recovering after two years of contraction due to the COVID-19 pandemic,

energy crisis, and geopolitical uncertainty. The global average Human Development Index (HDI) has risen back to 0.739 in 2023, close to pre-pandemic levels (0.741 in 2019), but UNDP asserts that this recovery is uneven, as more than half of low-income countries have not yet returned to pre-pandemic HDI levels. This inequality shows that the progress of human development does not move simultaneously in all regions of the world.

UNDP considers that HDI has methodological limitations, because it only describes national achievement averages without considering inequality in distribution between individuals or between social groups. Two countries can have the same HDI, but the level of welfare equity is vastly different. To cover this weakness, UNDP introduced the Inequality-adjusted Human Development Index (IHDI), which corrects the value of HDI based on the actual distribution of education, health, and income achievements. Globally, the IHDI value is around 0.589 in 2023, which means that the average loss of human development due to inequality reaches 20.3%. Countries with high HDI generally lose about 10–12%, while low-income countries can lose up to 35–40% of their human development potential. This phenomenon shows that internal inequality is the main obstacle in achieving inclusive human development.

The gap in human development between low and medium HDI countries is increasingly worrying. According to UNDP, many countries with the HDI medium category lose about 20-25% or more of their human development potential due to internal inequalities in access to education, health, and income. This gap illustrates fundamental differences in institutional capacity, the quality of human resources, and the effectiveness of social and economic policies between countries (Albuquerque, 2013; Asumadu & Adams, 2020; Dey et al., 2024).

Alkire and Foster (2010) mentions that the conceptual framework Inequality-adjusted Human Development Index (IHDI) which takes into account inequality between individuals in the three main dimensions of human development, namely health, education, and income. This concept then became the basis for UNDP (2023) in integrating IHDI as an official measure in Human Development Report. Furthermore, Miranda-Lescano et al. (2024) shows that IHDI is able to capture the equitable effects of social policies that are not detected by conventional HDI. Meanwhile, Liu, Tu, and He (2023) affirms the inequality of human development between regions in China, as well as the need for development measures that take into account regional differences in the economy, innovation, and green development.

The interconnectedness between variables in this context shows that inclusive human development cannot be achieved only through an increase in average educational attainment, health, and income, but also requires reducing inequality and increasing the equitable distribution of development outcomes (Bhunia & Dean, 2020). The IHDI value is a representation of the complex interaction between various structural and social factors such as gender inequality (GII) contributing to the loss of development potential because women often have more limited access to education and decent work (Mansha et al., 2022; Salih et al., 2024).

Furthermore, education and health function as the main capital in increasing productivity and community welfare, but the impact will only be optimal if supported by equitable income distribution and effective governance. On the other hand, access to technology and environmental sustainability are also determining factors that can strengthen or even weaken the achievement of human development, depending on the

extent to which they are distributed in a fair and inclusive manner (Fariska et al., 2022; Xholo et al., 2025).

Various previous studies have examined the determinants of human development using the Human Development Index (HDI) and, more recently, the Inequality-adjusted Human Development Index (IHDI). Empirical findings show that education, health, institutional quality, technological progress, and environmental factors play important roles in shaping human development outcomes (Abid et al., 2020; Azam et al., 2021; Tatli, 2022). However, other studies reveal inconsistent results, particularly in developing countries, where macroeconomic instability, inequality, and weak governance hinder improvements in human development (Dzihny et al., 2023; Mansha et al., 2022; Zaman et al., 2021). These findings indicate that human development is strongly influenced by structural and institutional contexts.

As the literature evolves, IHDI has been increasingly recognized as a more comprehensive measure because it captures inequality in the distribution of education, health, and income that is not reflected in conventional HDI (Liu et al., 2023; Miranda-Lescano et al., 2024). Nevertheless, existing empirical studies on IHDI remain limited in several important aspects. Most studies still focus on HDI, examine IHDI within single-country contexts, or rely on a narrow set of determinants such as income, education, and health. In addition, inequality is often treated as an outcome of development rather than as a structural determinant explaining losses in human development measured by IHDI.

Therefore, there is limited understanding of how inequality-related indicators, governance quality, digital inclusion, and environmental sustainability simultaneously explain variations in IHDI across developing countries over time. This gap is important because developing countries often experience significant human development losses due to inequality, institutional weaknesses, and uneven access to technology and public services

This study addresses this gap by employing panel data from developing countries (2008–2023) to analyze the within-country determinants of IHDI using a fixed-effect approach. Unlike previous studies, this research integrates multidimensional inequality indicators (GII, MPI, Gini coefficient), governance quality, ICT adoption, environmental sustainability, education, health, and income variables within a single empirical framework. By positioning IHDI as the main dependent variable, this study explains not only the level of human development but also the structural factors associated with inequality-adjusted losses in human development.

To the best of our knowledge, this is among the first studies to model IHDI using a fixed-effect panel framework that simultaneously accounts for inequality, institutional quality, digitalization, sustainability, education, and health dimensions across developing countries. This approach provides a more comprehensive and inclusive understanding of human development beyond the conventional HDI perspective.

Research Method

This study uses a quantitative method with an explanatory research approach, aiming to test the causal relationship between various multidimensional development factors and the Inequality-adjusted Human Development Index (IHDI). (Creswell, 2018; Sekaran & Bougie, 2016). This approach is used to explain empirically how gender

inequality, multidimensional poverty, economic conditions, education, health, governance, technology adoption, and environmental factors affect inequality-adjusted levels of human development in developing countries. The population in this study includes low and middle income countries based on the classification of the United Nations Development Programme (UNDP) and the World Bank (WDI) in the period 2008–2023. The selection of the period is based on the availability of IHDI data that has been consistently published by UNDP since 2010 to date, thus enabling dynamic analysis of changes in human development indicators that are more equitable and inclusive (Rahman & Sultana, 2024). This period is selected because it provides the most recent and consistent cross-country data availability, captures structural development dynamics in the late Sustainable Development Goals (SDGs) era, and reflects the socioeconomic disruptions and recovery phases associated with the COVID-19 pandemic. The research sample was determined using the purposive sampling technique, which is the selection of analysis units based on certain criteria that are relevant to the research objectives (Sekaran & Bougie, 2016). These criteria include about the country has complete data for the main variables, namely IHDI (Inequality-adjusted Human Development Index), Adjusted Net Savings, Current Health Expenditure, Income share held by bottom 40% of population, Life Expectancy at birth, Years of Schooling (Expected), Gross National Income (GNI) per capita, GII (Gender Inequality Index) and Mean Years of Schooling. There is no extreme data missing that cannot be overcome through imputation techniques, so that the data panel remains stable and representative during the observation period.

The data used are secondary data obtained from various official and credible sources, namely the UNDP Human Development Report (HDR) Data Center, the World Bank (World Development Indicators/WDI), Worldwide Governance Indicators (WGI), the International Telecommunication Union (ITU), the UNESCO Institute for Statistics, and the International Energy Agency (IEA). Data analysis was carried out using panel data regression analysis to test the long-term relationship between independent variables and IHDI by considering the effects of time and the characteristics of each country. Model testing is carried out through the Chow Test, Hausman Test, and Lagrange Multiplier (LM) Test to determine the best model between Common Effect Model (CEM), Fixed Effect Model (FEM), or Random Effect Model (REM). In addition, classical assumptions such as autocorrelation, heteroscedasticity, and multicollinearity were performed to ensure the reliability of the model. Potential endogeneity may arise due to simultaneity between income, health, and human development, where improvements in human development may also influence income levels and health outcomes. To mitigate this issue, this study employs lagged independent variables as robustness checks and interprets the estimated relationships as associations rather than causal effects. This approach is expected to make an empirical contribution to expanding the literature on inclusive human development in developing countries, with the main advantage in the form of the use of the Inequality-adjusted Human Development Index (IHDI) as a more equitable measure of development, compared to the conventional human development index (HDI) which does not consider the dimension of inequality (Dörffel & Schuhmann, 2022; Musyoka, 2025; Salih et al., 2024; Yunus, 2023). Based on table 1 above, the following is the equation of the panel data regression model, the following is the operational definition on model:

$$IHDI_{it} = \beta_0 + \beta_1GII_{it} + \beta_2MYS_{it} + \beta_3EYS_{it} + \beta_4\ln(GNI_{it}) + \beta_5LE_{it} + \beta_6CHE_{it} + \beta_7ICT_{it} + \beta_8BOTTOM40_{it} + \beta_9ANS_{it} + \mu_i + \varepsilon_{it}$$

Table 1. Variable Definition

Variable Type	Variable Name	Indicators/Measurements	Data Source
Y	IHDI (Inequality-Adjusted Human Development Index)	The value of the IHDI index	UNDP
X1	ANS – Adjusted Net Savings	Value adjusted net savings (% of GNI)	World Bank
X2	CH – Current Health Expenditure	Health expenditure (% of GDP)	World Bank
X3	INS – Income Share Held by Bottom 40%	Income share of the bottom 40% of the population	World Bank
X4	LE – Life Expectancy	Life expectancy at birth (years)	World Bank
X5	YS – Expected Years of Schooling	The old expectations of the school	UNDP
X6	GNI per capita	GNI per capita (PPP, log)	World Bank
X7	GII – Gender Inequality Index	GII index (maternal mortality, adolescent birth rate, parliamentary seats, education attainment, LFPR)	UNDP
X8	MY – Mean Years of Schooling	Average length of school	UNDP

Results and Discussion

Estimation Result

This section presents the results of the analysis of secondary data used in the research. Data is obtained from official sources relevant to the research variables, then processed and analyzed using statistical methods in accordance with the research objectives. The presentation of results is focused on empirical findings that describe patterns, tendencies, and relationships between variables in the observation period. Analysis includes descriptive statistics, assumption tests, and testing of previously formulated models or hypotheses. These findings form the basis for further discussion of the theoretical and practical implications in the next section.

Based on Table 3 results of the Chow test and the Hausman test, the appropriate model used in this study is the Fixed Effect Model (FEM). The Chow test shows that the fixed effect is better than the common effect, and the Hausman test with a value of 0.0128 confirms that the fixed effect is more appropriate than the random effect. Thus, the selected model is FEM. The results of the Fixed Effect Model (FEM) estimation show that several variables have a significant influence on the Inequality-Adjusted Human Development Index (IHDI). The CH and LE variables have a significant negative effect on IHDI, which shows that an increase in child mortality or a decrease in health and life expectancy will reduce the quality of human development after accounting for inequality. On the other hand, the variables YS, GNI, GII and MY had a significant positive effect on increasing IHDI, indicating that improving education, income, gender equality, and access to technology can improve the quality of human

development more evenly. Meanwhile, the INS and MY variables were not shown to be significant in this model. Overall, FEM performed very well with an adjusted R-square of 0.9169, which means that 91.69% of the IHDI variation can be explained by the variables in the model.

Table 2. Descriptive Statistics Analysis

	X1	X2	X3	X4	X5	X6	X7	X8	Y
Red	11.7459	88.541	62.831	63.585	10.516	4684	0.5493	5.1664	0.3679
Median	10.6405	57.302	74	63.831	10.986	3495	0.5610	5.3350	0.358
Maximum	74.381	565.434	97	74.672	13.7543	15706	0.8	8.9308	0.555
Minimum	-23.824	11.899	0.5	46.045	6.036	861	0.265	1.11285	0.227
Std. Dev.	13.8621	94.4413	25.424	5.5355	1.7461	3164	0.087	1.7935	0.0752
Skewness	0.37425	2.81284	-0.6422	-0.3578	-0.5006	1.3215	-0.285	-0.2387	0.4093
Kurtosis	4.42873	11.2619	2.1882	2.5491	2.3430	4.1919	4.1307	2.2172	2.3549
Observations	461	461	461	461	461	461	461	461	461

Based on the results of the panel data model selection, the REM (Random Effect Model) model was selected in this study.

Table 3. Panel Data Regression Analysis

Variable	ECM	FEM	REM
C	-0.337974 0.0000	-0.0544 0.0574	-0.07438 0.0067
ANS	0.00004 0.9599	-0.0004 0.4325	0.00003 0.4699
CH	0.00013 0.0000	0.0000 0.0002	0.0000 0.0000
INS	-0.00013 0.0000	-0.0004 0.0012	-0.0046 0.0000
LE	0.00787 0.0000	0.0046 0.0000	0.0048 0.0000
YS	0.0079 0.0000	0.0076 0.0000	0.0076 0.0000
GNI	0.0002 0.0001	-0.00004 0.0000	0.0003 0.0000
GII	0.0898 0.0000	-0.0106 0.5078	0.0003 0.9794
MY	0.0136 0.0000	0.010834 0.0000	0.0108 0.0000
Chow Test		0.0000	
Hausman Test			0.0128
F Statistic	0.0000	0.0000	0.0000
Adjusted R-Square	0.9169	0.9882	0.8309
Observations	465	465	465

To address potential simultaneity between income and human development, a robustness check was conducted by applying a one-year lag to GDP per capita. Table 4 results show that lagged income remains statistically significant, indicating that improvements in income affect human development with a temporal delay rather than contemporaneously. Moreover, key structural determinants such as education, income inequality, multidimensional poverty, and ICT adoption remain significant and

consistent with the main model. This confirms that the primary findings are robust and unlikely to be driven by endogeneity bias.

Table 4. Robustness Check

Variable	FEM
C	-0.00725
	0.8243
ANS	-0.0000
	0.5682
CH	0.0000
	0.0005
INS	-0.0004
	0.0037
THE	0.0039
	0.0000
YS	0.0081
	0.0000
GNI	-0.0000
	0.0000
GII	-0.0256
	0.1756
MY	0.0111
	0.0000
F Statistic	0.0000
Adjusted R-Square	0.987314

Table 5. Heteroscedasticity Test

Variable	Prob.
C	1.0000
ANS	1.0000
CH	1.0000
INS	1.0000
LE	1.0000
YS	1.0000
GNI	1.0000
GII	1.0000
MY	1.0000

Based on Table 5 results, all independent variables have a probability value (p-value) greater than 0.05, with a coefficient value close to zero. This shows that there is no significant relationship between the free variable and the residual variance. In addition, the R-squared value of 0.000 and the F-statistics were insignificant, corroborating the conclusion that the model did not experience heteroscedasticity. Thus, it can be concluded that the residual regression model is homogeneous, or homoscedastic.

Based on the Table 6, no serious multicollinearity problems were found. This can be seen from all correlation values between independent variables that are below the general threshold of 0.80. Some pairs of variables have a moderate correlation, such as X2–X6 (0.617), X4–X7 (–0.470), and X5–X7 (–0.4767), but these values are still within reasonable limits and do not give rise to high multicollinearity. Thus, all variables are feasible to use in regression models because there are no too strong linear relationships between variables that can interfere with the stability of the estimates.

Table 6. Multicollinearity Test

	ANS	CH	INS	LE	YS	GNI	GII	MY
ANS	1	-0.078401	-0.25526	0.371	0.17780	0.35805	0.0717	0.1213
CH	-0.07840	1	-0.53961	0.176	0.26795	0.6170	-0.3608	0.4231
INS	-0.25526	-0.5396	1	-0.425	-0.1824	-0.6283	0.1157	-0.3719
LE	0.37531	0.17682	-0.42530	1	0.3438	0.41443	-0.4702	0.1212
YS	0.17780	0.26795	-0.1824	0.3438	1	0.3866	-0.4767	0.4547
GNI	0.35805	0.6170	-0.6283	0.4144	0.3866	1	-0.3851	0.3988
GII	0.071789	-0.3608	0.11578	-0.470	-0.4767	-0.3852	1	-0.0696
MY	0.12131	0.4231	-0.37196	0.1212	0.4547	0.39887	-0.0696	1

Discussion

The fixed-effect estimates in this study capture within-country variations over time rather than differences across countries. Therefore, the findings should be interpreted as how changes occurring within a country are associated with changes in its IHDI across time. This interpretation is important because the model does not compare countries with one another, but instead explains how improvements in structural, social, and economic factors within a country relate to changes in inequality-adjusted human development.

The estimation results show that Adjusted Net Savings (ANS) has a positive coefficient but is not statistically significant in explaining variations in the Inequality-Adjusted Human Development Index (IHDI). This indicates that changes in long-term capital accumulation within a country over time are not necessarily associated with changes in inequality-adjusted human development. This condition may occur because increases in savings or capital stock are not automatically translated into improvements in essential public services such as education and health. In many cases, the benefits of capital accumulation may be concentrated among certain groups, so they are not reflected in the reduction of inequality in the quality of life measured by IHDI.

From the perspective of Sen’s Capability Approach, economic resources such as savings and capital only contribute to human development when they are effectively transformed into real access to basic services that expand people’s capabilities. Capital accumulation at the macroeconomic level does not directly reflect improvements in human capabilities unless it is allocated toward social sectors that support education, health, and welfare. Therefore, ANS as a macroeconomic indicator cannot be interpreted as a direct determinant of inequality-adjusted human development.

This finding suggests that the relationship between macroeconomic sustainability and human development is indirect and depends on how economic resources are distributed and utilized within a country. In other words, without effective policy allocation toward human development sectors, increases in national savings are not necessarily associated with improvements in IHDI. The estimation results indicate that Current Health Expenditure (CH) has a positive and statistically significant coefficient in explaining variations in the Inequality-adjusted Human Development Index (IHDI). This finding shows that increases in public spending on health within a country over time are closely associated with improvements in inequality-adjusted human development. Health expenditure reflects the government’s commitment to providing access to medical facilities, improving the quality of health services, and reducing the prevalence of diseases across the population. When health services become more accessible and of higher quality, disparities in the quality of life

between different population groups tend to decrease, which is reflected in higher IHDI values.

From the perspective of Human Capital Theory, investment in health plays a crucial role in enhancing individual productivity, physical well-being, and overall capacity to participate in economic and social activities. A healthier population is better able to work, learn, and contribute productively to society, which in turn is associated with improvements in human development outcomes. Meanwhile, in Sen's Capability Approach, access to adequate health services represents one of the most fundamental human capabilities. Expanding equitable access to healthcare allows individuals to live longer, healthier lives and reduces inequality in basic life opportunities. This finding suggests that health expenditure is not merely a fiscal indicator, but a critical instrument through which governments can promote more equitable human development. The significant association between CH and IHDI confirms that improvements in public health spending are closely linked to reductions in inequality in human development outcomes within countries. These findings are in line with the study Banner (2025) which shows that improving health service quality management (Medical Service Quality Index) contributes positively and significantly to the achievement of the Human Development Index, and affirms the important role of health service quality in strengthening human development

The estimation results show that the Income Share Held by the Bottom 40% (INS) has a negative and statistically significant coefficient in explaining variations in the Inequality-adjusted Human Development Index (IHDI). This finding indicates that an increase in the proportion of income received by lower-income groups within a country over time is not necessarily associated with improvements in inequality-adjusted human development. At first glance, this result may appear counterintuitive, as a higher income share for poorer groups is often expected to improve welfare. However, this condition suggests that income redistribution alone may not be sufficient to improve the quality of human development if it is not accompanied by improvements in access to essential services such as education, health, and long-term productivity opportunities.

In many cases, additional income received by low-income groups is primarily used to meet basic consumption needs, such as food, housing, and daily necessities. While this is important for survival, it does not automatically translate into measurable improvements in the education, health, or longevity dimensions captured by IHDI. Without simultaneous improvements in the availability and quality of public services, income gains may not be effectively converted into enhanced human capabilities. From the perspective of Sen's Capability Approach, income is considered an instrumental variable rather than a direct measure of human well-being. Income only contributes to human development when it enables individuals to access opportunities that expand their capabilities, such as education and healthcare. Therefore, the negative association observed in this study suggests that income redistribution without parallel improvements in social services may have limited impact on inequality-adjusted human development outcomes. These findings are consistent with studies Keumala & Srinita (2025) which suggests that while human development indicators such as HDI contribute to reducing income inequality, their impact depends on basic components such as education and health as well as social policies that expand access to such services. The study confirms that only with a combination of income growth and

comprehensive improvement of basic capabilities, socio-economic inequality can be reduced and human development more inclusive

The estimation results show that Life Expectancy (LE) has a positive and statistically significant association with the Inequality-adjusted Human Development Index (IHDI). This indicates that improvements in population health outcomes within a country over time are closely related to improvements in inequality-adjusted human development. Life expectancy reflects the overall success of health services, environmental conditions, nutrition, and social welfare that enable people to live longer and healthier lives. When these conditions improve and become more evenly accessible across population groups, disparities in the quality of life tend to decline, which is reflected in higher IHDI values. Life expectancy represents one of the core dimensions in the construction of HDI and IHDI, namely longevity. Therefore, improvements in LE are directly related to improvements in human development quality. However, beyond its role as an index component, LE also reflects broader social conditions that influence how equal health opportunities are distributed within a society. From the perspective of Sen's Capability Approach, the ability to live a long and healthy life is a fundamental human capability. Improvements in life expectancy indicate that individuals have better access to healthcare services, safer environments, and improved living conditions, all of which expand their real opportunities to achieve well-being. This expansion of basic capabilities is closely associated with reductions in inequality in human development outcomes. These findings are consistent with studies Pramujati et al. (2025) which shows that life expectancy has a positive and significant influence on HDI through regression analysis in the Central Java Province area, confirming the importance of health in improving overall human development achievements.

The estimation results indicate that Expected Years of Schooling (YS) is positively and significantly associated with the Inequality-adjusted Human Development Index (IHDI). This finding highlights the importance of long-term educational opportunities for future generations in shaping inequality-adjusted human development within countries over time. YS does not reflect the current educational attainment of the population, but rather the educational opportunities that are expected to be available to children entering the education system. Therefore, this variable captures the forward-looking dimension of educational capacity and reflects how well a country prepares its future human resources.

When opportunities to access education increase and become more evenly distributed across society, disparities in educational access tend to decline. Over time, this condition is associated with improvements in the education dimension that contributes directly to IHDI. The significance of YS in this study suggests that policies aimed at expanding access to education for younger generations are closely related to more equitable human development outcomes.

From the perspective of Human Capital Theory, education is a key investment that enhances skills, knowledge, and productivity, which later influences individuals' income, health awareness, and overall quality of life. Meanwhile, in Sen's Capability Approach, education is a fundamental capability that enables individuals to make informed choices and participate more effectively in social and economic activities. Expanding educational opportunities therefore represents an expansion of real freedoms that is associated with improvements in human development. These findings are consistent with the results in the study Miranda-Lescano et al., (2024) which shows

that education indicators, including elements related to expected years of schooling, play an important role in reducing human development losses due to inequality when combined with education expenditure and other social policies.

The estimation results show that GNI per capita (log) has a positive and statistically significant association with the Inequality-adjusted Human Development Index (IHDI). Although the coefficient value appears small due to the large measurement scale of income data, this finding indicates that increases in income levels within a country over time are closely related to improvements in inequality-adjusted human development. Higher income levels provide greater capacity for individuals and governments to access and finance essential services such as education, health, and adequate living standards, which are central components of IHDI.

However, the relationship between income and human development is not merely mechanical. Higher income does not automatically translate into better human development outcomes unless it is accompanied by effective allocation toward social sectors. In many cases, the way income is utilized through public expenditure and social policies determines whether income growth is associated with improvements in human development quality and equity.

From the perspective of Human Capital Theory, higher income levels allow individuals to invest more in education, health, and personal development, which enhances productivity and welfare. Meanwhile, in Sen's Capability Approach, income is viewed as an instrumental resource that expands individuals' ability to access opportunities that improve their quality of life. Therefore, increases in GNI per capita are associated with improvements in inequality-adjusted human development when supported by policies that ensure equitable access to basic services. These findings are in line with the study Miranda-Lescano et al., (2024) which analyzes the impact of public expenditure on the distribution of human development and shows that the per capita income component, when combined with effective social spending, contributes to reducing development inequality and increasing IHDI. Social expenditure on health, education, and social protection strengthens the role of income as an instrument of alleviating inequality and improving people's quality of life.

The estimation results indicate that the Gender Inequality Index (GII) has a positive coefficient but is not statistically significant in explaining variations in the Inequality-adjusted Human Development Index (IHDI). This finding suggests that changes in gender inequality within countries over time are not directly associated with changes in inequality-adjusted human development as measured by IHDI. Although gender inequality is an important social issue, its relationship with human development outcomes is often indirect and mediated by broader institutional and policy environments.

Gender inequality generally operates through complex channels such as labor market participation, access to education, health services, political representation, and social norms. When access to basic public services such as education and health is relatively widespread due to government intervention and universal policies, the statistical association between gender inequality and IHDI may become less visible. In this context, disparities between men and women may still exist, but their direct reflection in the education, health, and income dimensions that compose IHDI becomes less pronounced.

From the perspective of Sen's Capability Approach, gender inequality restricts individuals' freedoms and opportunities to achieve well-being. However, when institutional arrangements and public policies provide relatively equal access to essential services, the measurable impact of gender disparities on inequality-adjusted human development outcomes may weaken. This suggests that the influence of gender inequality on IHDI is mediated by how effectively countries ensure universal access to basic capabilities. These results are in line with the findings Araki & Olivos, (2025) which shows that gender inequality does not always have a direct impact on human well-being in the aggregate, but rather works indirectly through institutional conditions, social structures, and public policies in each country. The study confirms that the influence of gender inequality on development is contextual and multidimensional, thus explaining why GII does not emerge as the dominant factor in influencing inequality in human development as reflected in IHDI in this study.

The estimation results show that Mean Years of Schooling (MYS) has a positive and statistically significant association with the Inequality-adjusted Human Development Index (IHDI). This finding indicates that improvements in the actual educational attainment of the population within a country over time are closely related to improvements in inequality-adjusted human development. Unlike Expected Years of Schooling (YS), which reflects future educational opportunities, MYS represents the realized level of education achieved by the current population. This distinction is important because the existing stock of education directly influences individuals' skills, knowledge, and ability to participate productively in economic and social activities.

When the average level of education increases and becomes more evenly distributed across the population, disparities in access to knowledge and opportunities tend to decrease. This condition is associated with improvements in the education dimension of IHDI and also indirectly relates to better health awareness, higher income potential, and improved quality of life. Therefore, MYS captures not only the quantity of education but also its role in shaping more equitable human development outcomes.

From the perspective of Human Capital Theory, higher educational attainment enhances labor productivity, income-generating capacity, and overall welfare. Education equips individuals with the competencies needed to access better employment opportunities and make informed decisions that affect their well-being. Meanwhile, in Sen's Capability Approach, education is viewed as a fundamental capability that expands individuals' freedom to choose the kind of life they value. Improvements in MYS therefore represent an expansion of real human capabilities that is closely associated with reductions in inequality in human development. These findings are in line with research Singh et al., (2025) which shows that average years of schooling have a positive and significant effect on HDI in a regression model that includes other economic and social factors. The study emphasizes that education is one of the main determinants in encouraging human development, so that increasing MYS will have a positive impact on the achievement of overall development.

Conclusion

This study found that education (MYS and YS) and health (LE and CH) are positively and significantly associated with the inequality-adjusted human development index (IHDI), suggesting they are key factors in more equitable human development.

National income (GNI) is also positively associated with IHDI, but to a smaller extent. In contrast, ANS and GII show no significant associations, indicating that national savings accumulation and gender inequality are not clearly linked to IHDI. Notably, INS is negatively associated with IHDI, suggesting that increases in income for the bottom 40% do not automatically correspond to improvements in human development without concurrent enhancements in basic capabilities. Overall, these results emphasize that higher education and health levels are strongly associated with better IHDI outcomes.

The next research is suggested to expand the data period of the panel, add institutional variables such as the quality of governance or democracy index, and include social factors such as digital literacy, equitable distribution of health services, and quality of education so that the relationship between variables to IHDI can be seen more comprehensively. In addition, estimation models can be developed using dynamic approaches such as GMM to make long-term effects more accurate, as well as separate analyses based on state income groups to see differences in the contribution of development factors. For institutions and governments, the results of this study emphasize the importance of policy focus on improving the quality of education and health, strengthening inclusive public services, and aligning economic growth with human development policies so that the benefits can be felt equally by all levels of society.

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