



A Discriminant Analysis of Human Development Index 2022: Analysis of Life Expectancy at Birth, Schooling, and Gross National Income per Capita

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ABSTRACT

This study aimed to examine life expectancy at birth, expected years of schooling, mean years of schooling, and gross national income (GNI) per capita across four distinct Human Development Index (HDI) categories (very high, high, medium, and low) for 193 countries worldwide. The HDI 2022 data from the United Nations Development Programme was used in this study. A descriptive data analysis demonstrated a fundamental understanding of the basic information about HDI 2022. Meanwhile, a discriminant analysis was employed to examine the different HDI levels associated with the various predictors in the study. The result revealed that 69 countries are labelled as having very high HDI, 49 as having high HDI, 42 as having medium HDI, and 33 as having low HDI. The discriminant analysis revealed that mean years of schooling is the highest contributor to a country's Human Development Index, followed by life expectancy at birth and expected years of schooling. Gross national income per capita makes the least contribution to the HDI. Education and health are the most significant factors in the country's Human Development Index. The countries should recognize the importance of health and education in advancing the lives of their citizens.

1. Introduction

Globally, human development has become increasingly intertwined with inequalities in education, health, and income [2] [3]. In the 21st century, technology's benefits, including rapid economic growth and increased quality of life, are unevenly distributed, with some nations effectively leveraging these advancements for their communities. In contrast, others lack the necessary resources to do so [7]. The United Nations Development Programme (UNDP) emphasized that human development involves creating an environment that allows people to enjoy their lives fully. The Human Development Index (HDI) is an essential measure that captures the advancement in three critical areas of an individual's life: health, education, and income [15]. However, from 2020 to 2022, the pandemic has challenged every country with the multisystem complexities it has brought, affecting community responses, families, schools, and individuals, thereby challenging human development [8].

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Due to the sudden changes in life caused by the worldwide pandemic, HDI per country has been challenged in many ways. Countries with a high HDI can conduct more per capita testing, resulting in higher confirmed case counts than countries with lower HDI levels [5]. In education, there has been a notable rise in the number of children unable to attend school due to challenges accessing the internet [14]. Additionally, the healthcare sector is facing alarming statistics, with around 6,000 children dying daily from preventable causes, which is expected to continue over the next six months [14]. As the world faced the challenges of the pandemic, the capabilities of each country in terms of income, education systems, and healthcare were tested.

Consequently, human development is expanding people's power of choice in their lives, not just on the ability to attend school and afford good health, but also the ability to use the people's acquired capabilities [10]. The HDI signifies a vital shift in the understanding of development; it is not solely about economic figures and wealth, but about expanding the choices and opportunities available to individuals, such as the opportunity to live longer and be healthy, get to school and earn a degree, and get a job for a sustainable life [10] [15]. In the context of the United Nations' (UN) Sustainable Development Goals (SDGs), adopted in 2015 as part of the 2030 Agenda for Sustainable Development, offer a comprehensive blueprint for global peace and prosperity [15]. While the Human Development Index (HDI) and the SDGs are distinct frameworks, they are deeply interconnected with human development [13]. The HDI, focusing on health, education, and income, is a crucial indicator of progress towards several SDGs and a beneficiary of broader sustainable development efforts. The goal of good health and well-being (SDG 3) focuses on life expectancy at birth, a key component of the Human Development Index (HDI). Quality education (SDG 4) addresses mean and expected years of schooling, highlighting the need for inclusive and equitable education and lifelong learning opportunities. No Poverty (SDG 1) and Decent Work and Economic Growth (SDG 8) relate to the income level aspects of the HDI [17].

The Human Development Index (HDI) offers a valuable global perspective on human development; however, it tends to obscure significant national disparities in health, education, and income [12]. The limitations of the HDI are particularly evident in its failure to account for factors such as inequality between nations and across comparisons [11], as well as environmental sustainability, governance, and essential aspects of political freedoms and cultural contexts. Furthermore, the HDI does not adequately account for the impacts of global challenges such as climate change [6] and pandemics [19], which can significantly affect developmental outcomes. As such, relying solely on the HDI could provide a distorted or incomplete understanding of the nuanced realities and developmental challenges in specific local, national, and regional contexts.

While the Human Development Index (HDI) effectively categorizes countries into different development groups (low, medium, high, very high), there is a limited understanding of the specific socio-economic, political, and environmental predictors that most accurately discriminate between these established HDI groups. Furthermore, the robustness and generalizability of predictor models across different periods and global regions remain underexplored. This research gap necessitates applying discriminant analysis to identify the most potent and parsimonious set of predictors for HDI group membership and to evaluate the stability and transferability of these predictive models.

This research aims to identify the most significant health, education, and income predictors that effectively predict a country's classification into the established Human Development Index (HDI) groups (low, medium, high, very high). This study aims to move beyond correlational analyses and determine the optimal combination of predictors that maximizes the statistical differentiation between these HDI categories by employing discriminant analysis. The current research objectives aim to address the following:

1. To identify the discriminatory indicators of life expectancy at birth, expected years of schooling, mean years of schooling, and gross national income (GNI) per capita on the ability to classify countries into the following HDI categories: Very high, high, medium, and low.
2. To evaluate the predictive accuracy of the discriminant function models in classifying countries into their correct HDI groups.

2. Methodology

Research Design. A quantitative design employing discriminant analysis was used to identify and analyze variables that statistically differentiate predefined groups in this research study. Specifically, this method allows for determining which independent variables best predict group membership in the human development index, with levels low, medium, high, and very high. By constructing discriminant functions, this approach identified significant predictors and classified new cases into the established groups based on their discriminant scores.

Data Sources. The data used in this study are from the United Nations Development Programme (UNDP). The UNDP Human Development Index (HDI) 2022 report was made available on the UNDP website. The researcher used this recent HDI report for analysis using discriminant analysis to provide measurements for research purposes.

Statistical Analysis Method. This study employed a preliminary analysis using descriptive statistics of all the predictors: life expectancy at birth, mean years of schooling, expected years of schooling, and gross national income per capita. The discriminant analysis identified the discriminant functions between analytical techniques. Moreover, discriminant analysis appropriately distinguishes between groups based on HDI levels (very high, high, medium, and low).

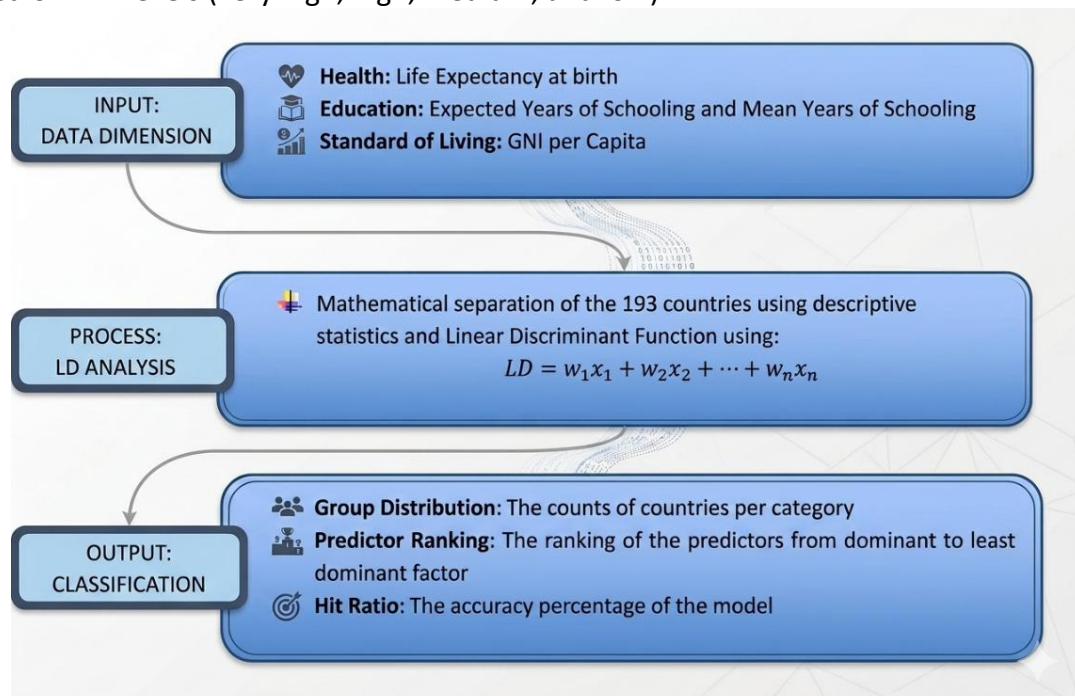


Fig. 1. Human Development Index Discriminant Framework

HDI levels were the outcome variable, while life expectancy at birth, mean years of schooling, expected years of schooling, and gross national income per capita were treated as independent variables. Because discriminant analysis can be used to differentiate among groups, the researcher can define the most important variables for distinguishing among groups using functions.

The conceptual framework illustrated in Figure 1 is a systematic approach to evaluating the Human Development Index (HDI) through a rigorous tripartite analytical pipeline. The initial phase, Input: Data Dimension, integrates multidimensional indicators spanning health, education, and economic standard of living to ensure a comprehensive evaluation of national progress. The Process follows this: LD Analysis, which uses descriptive statistics and a Linear Discriminant Function to delineate the unique developmental trajectories of 193 distinct countries mathematically. The final stage, Output: Classification, provides critical empirical insights by quantifying group distributions, ranking the primary predictors of development, and verifying model validity through hit ratio accuracy. Collectively, this structured methodology offers a robust quantitative tool for identifying the dominant drivers of human well-being and informing evidence-based policy interventions.

3. Results

Based on the demographic statistics (Table 1), 27.98% of the data were from Africa, with 54 countries included in Human Development Index data, 23.83% were from Europe (46 countries out of 193), 23.32% were from Asia (45 countries), and 11.92% were from North America, with 12 countries. The continents with a small proportion in the data of the human development index are Oceania (6.74%) and South America (6.22%), with 13 and 12 countries, respectively.

Table 1

Human Development Index 2022 frequencies per continent (n=193)

Continent	n	%
Africa	54	27.98
Asia	45	23.32
Europe	46	23.83
North America	23	11.92
Oceania	13	6.74
South America	12	6.22

Africa boasts the highest number of participating countries in HDI 2022. According to the United Nations Development Programme (2022), this presents a valuable opportunity for Africans to engage in a comprehensive global assessment of human development that reflects the continent's diverse cultures, economies, and environments. Over the past few years, HDI reports have consistently shown that the African region has the highest number of participating countries (UNDP, 2024). Currently, there are 195 countries in the world, with 193 being member states of the United Nations (Worldometer, 2019). It is important to note that participation in these HDI reports is voluntary (UNDP, 2019); instead, the reports rely on the availability of recent, reliable, and comparable data from each nation's statistical authorities. In the most recent HDI report, 2022, all 193 United Nations member states participated.

Table 2 depicts the frequency analysis of the Human Development Index (HDI) 2022 categories. The results are outlined as follows: Very High Human Development (69 countries, 35.75%); High Human Development (49 countries, 25.39%); Medium Human Development (42 countries, 21.76%); and Low Human Development (33 countries, 17.10%). This table shows that 118 countries were labeled as having high or very high human development.

Table 2

Frequencies of Human Development Index 2022 categories (n=193)

Category	n	%
Very High Human Development	69	35.75
High Human Development	49	25.39
Medium Human Development	42	21.76
Low Human Development	33	17.10

As a central pledge of the 2030 Agenda for Sustainable Development, the reports showed a consistent increase in human development across countries, towards high to very high human development. Between 2020 and 2021, about 90 percent of countries saw a decline in their national Human Development Index (HDI), with around 30 percent not expected to return to pre-2019 levels by 2023, while all OECD member countries are anticipated to reach or exceed their pre-2019 HDI figures, contrasting with only half of the least developed countries expected to do the same [2] Developed nations are currently witnessing unprecedented levels of human development. In contrast, many of the world's poorest countries are still struggling to regain the progress they made before the recent crisis [21].

Table 3 presents descriptive statistics for life expectancy at birth, expected years of schooling, mean years of schooling, and gross national income (GNI) per capita, grouped by continent.

In life expectancy at birth, Africa has the lowest mean life expectancy at 63.237 years, with a considerable range (Min: 53, Max: 77.1) and moderate variability (SD: 5.739). Asia shows a higher mean life expectancy (73.998) than Africa, with a similar range (Min: 62.9, Max: 84.8) and slightly lower variability (SD: 5.692). Europe exhibits the highest mean life expectancy (77.728) among all continents, with a relatively narrow range (Min: 68.6, Max: 84.7) and low variability (SD: 4.728). North America has a high mean life expectancy (73.9), like Asia, with a slightly wider range (Min: 63.7, Max: 82.8) and lower variability (SD: 4.181). Oceania presents a mean life expectancy (70.685) lower than Europe and North America, with a moderate range (Min: 64, Max: 83.6) and higher variability (SD: 6.226) compared to Europe and North America. South America shows a mean life expectancy (72.9) higher than Africa and Oceania but lower than Asia, Europe, and North America, with a moderate range (Min: 64.9, Max: 79.5) and low variability (SD: 4.606). Europe generally has the longest life expectancy, followed by North America and Asia. Africa has the shortest average life expectancy, with the widest spread at the lower end.

The second indicator, which is the expected years of schooling, is that Africa has the lowest mean expected years of schooling (10.848), with a wide range (Min: 5.6, Max: 15.5) and moderate variability (SD: 2.365). Asia shows a higher mean expected years of schooling (13.298) than Africa, with a broader range (Min: 7.4, Max: 17.8) and moderate variability (SD: 2.326). Europe exhibits the highest mean expected years of schooling (16.193), with a relatively narrow range (Min: 12.4, Max: 20) and low variability (SD: 2.007). North America presents a high mean expected years of schooling

(13.965), with a moderate range (Min: 10, Max: 18.4) and moderate variability (SD: 2.21). Oceania shows a mean expected year of schooling (14.062) like North America, with a broader range (Min: 10.3, Max: 21.1) and higher variability (SD: 3.419). South America has a mean expected years of schooling (13.298), like Asia, with a moderate range (Min: 11, Max: 19) and low variability (SD: 2.115). Thus, Europe has the highest expected years of schooling. Africa has the lowest. Oceania shows the most considerable variability in expected schooling years.

For the mean years of schooling, Africa has the lowest mean years of schooling among the adult population (5.78), with a wide range (Min: 1.3, Max: 11.6) and moderate variability (SD: 2.519). Asia shows a higher mean year of schooling (9.122) than Africa, with a moderate range (Min: 2.5, Max: 13.4) and moderate variability (SD: 2.893). Europe exhibits the highest mean years of schooling (12.111), with a relatively narrow range (Min: 8.8, Max: 14.3) and low variability (SD: 1.198). North America presents a high mean year of schooling (9.622), with a moderate range (Min: 5.6, Max: 13) and moderate variability (SD: 2.189). Oceania shows a mean year of schooling (9.654) like North America, with a moderate range (Min: 4.9, Max: 13) and moderate variability (SD: 2.674). South America has a mean year of schooling (9.4), like Asia, North America, and Oceania, with a relatively narrow range (Min: 8.3, Max: 11.1) and low variability (S: 0.951).

Overall, Europe has the highest educational attainment among its adult population. Africa has the lowest. South America shows the least variability in mean years of schooling.

For GNI per capita, Africa has the lowest mean GNI per capita (5452.574) by a significant margin, with an extensive range (Min: 691, Max: 28386) and very high variability (SD: 5798.045). This indicates substantial economic disparities within the African continent. Asia shows a considerably higher mean GNI per capita (22725.889) than Africa, with an extensive range (Min: 1106, Max: 95944) and very high variability (SD: 24413.571), suggesting significant income differences across Asian countries. Europe exhibits the highest mean GNI per capita (42291.804), with a wide range (Min: 11416, Max: 146673) and high variability (SD: 23932.123), indicating economic diversity within Europe. North America presents a high mean GNI per capita (18881.826), with a wide range (Min: 2802, Max: 65565) and high variability (SD: 14715.332). Oceania shows a mean GNI per capita (13146.077) lower than Europe and Asia, with a wide range (Min: 2273, Max: 49257) and high variability (SD: 15685.968). South America has a mean GNI per capita (16362.583) higher than Africa and Oceania but lower than Asia, Europe, and North America, with a moderate range (Min: 6184, Max: 35783) and moderate variability (SD: 8344.456). Europe has the highest average GNI per capita. Africa has the lowest average and the most significant relative income disparities. Asia and Europe also show very high-income variability.

This continental breakdown reveals significant global disparities for these key development indicators. Europe generally performs well across all four variables, exhibiting higher life expectancy, expected and mean years of schooling, and GNI per capita. Africa consistently shows the lowest values for these indicators and often the highest relative variability, particularly for GNI per capita. Asia, North America, Oceania, and South America occupy intermediate positions with varying degrees of range and variability depending on the specific indicator. This data highlights the substantial heterogeneity in socio-economic development across the continents.

Table 3
Descriptive Statistics of Independent Variables

Variables	Continents	Mean	SD	Min	Max
Life Expectancy at Birth	Africa	63.237	5.739	53	77.1
	Asia	73.998	5.692	62.9	84.8
	Europe	78.867	4.728	68.6	84.7
	North America	73.9	4.181	63.7	82.8
	Oceania	70.685	6.226	64	83.6
	South America	72.9	4.606	64.9	79.5
Expected Years of Schooling	Africa	10.848	2.365	5.6	15.5
	Asia	13.298	2.326	7.4	17.8
	Europe	16.193	2.007	12.4	20
	North America	13.965	2.21	10	18.4
	Oceania	14.062	3.419	10.3	21.1
	South America	14.942	2.115	11	19
Mean Years of Schooling	Africa	5.78	2.519	1.3	11.6
	Asia	9.122	2.893	2.5	13.4
	Europe	12.111	1.198	8.8	14.3
	North America	9.622	2.189	5.6	13.9
	Oceania	9.654	2.674	4.9	13
	South America	9.4	0.951	8.3	11.1
Gross national income (GNI) per capita	Africa	5452.574	5798.045	691	28386
	Asia	22725.889	24413.571	1106	95944
	Europe	42291.804	23932.123	11416	146673
	North America	18881.826	14715.332	2802	65565
	Oceania	13146.077	15685.968	2273	49257
	South America	16362.583	8344.456	6184	35783

The world map in Figure 2 provides a vibrant visual representation of the Human Development Index (HDI) across different countries. In this map, countries shaded in darker shades of blue signify a higher HDI, which typically correlates with better health outcomes, enhanced educational opportunities, and a greater standard of living for their populations. These nations often offer their citizens access to quality healthcare, extensive educational resources, and a higher average income.

On the other hand, countries displayed in various shades of green and red are indicative of a lower HDI. These hues suggest that these nations may face significant challenges in key areas such as healthcare access, educational attainment, and economic stability. The distinctions in color usage effectively highlight the disparities in human development around the globe, inviting viewers to consider the complexities and variations in living conditions across different regions.

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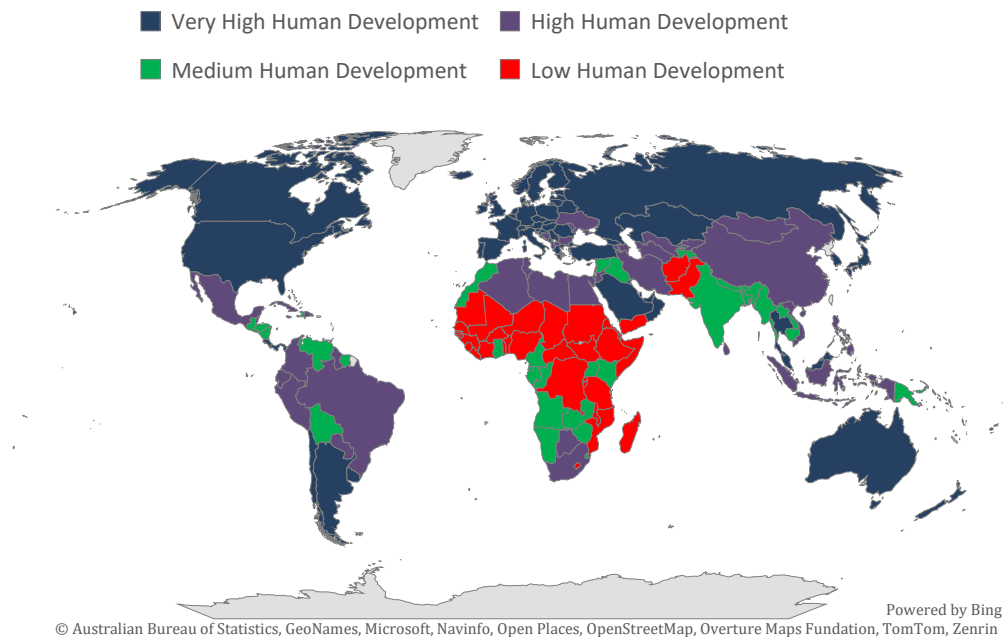


Fig. 2. The World Map and its Human Development Index

The Construct Correlation Matrix in Table 4 indicates that all variables exhibit a statistically significant positive correlation. Life expectancy strongly correlates positively with Expected Years of Schooling (0.748) and Mean Years of Schooling (0.718). This suggests that, generally, higher educational attainment leads to improved health outcomes. This relationship could be due to better health education, access to healthcare, and healthier lifestyle choices among more educated populations. The correlation with GNI per capita is also significant (0.740), indicating that countries with higher income levels have better healthcare systems, nutrition, and living conditions, all contributing to longer life expectancy.

Table 4

Construct Correlation Matrix

Categories	Life Expectancy at Birth	Expected Years of Schooling	Mean Years of Schooling	Gross national income (GNI) per capita
Life Expectancy at Birth	1			
Expected Years of Schooling	0.748*	1		
Mean Years of Schooling	0.718*	0.787*	1	
Gross national income (GNI) per capita	0.740*	0.638*	0.649*	1

Note: * significant at p=0.001

Expected Years of Schooling strongly correlates with Mean Years of Schooling (0.787). A higher expectation of schooling typically translates into a higher mean actual schooling completed,

correlating with overall educational attainment in a population. The correlation with GNI per capita is moderate (0.638), suggesting that while income can influence education, other social and cultural factors are at play. Mean Years of Schooling strongly correlates with Expected Years of Schooling (0.787), indicating that policies or situations that impact educational access and quality can significantly affect the average years that individuals complete in formal education. The relationship with GNI per capita (0.649) is notable, but it also emphasizes that income alone does not determine educational outcomes. GNI per capita displays a moderate to strong correlation with all other variables. The GNI reflects the economic resources available to a country and suggests that increased wealth brings the potential for better healthcare, educational resources, and overall living conditions.

Table 5
Confusion Matrix

		Observed			
		High Human Development (HHD)	Low Human Development (LHD)	Medium Human Development (MHD)	Very High Human Development (VHHD)
Predicted	HHD	0.34	0	0.05	0.00
	LHD	0	0.13	0	0
	MHD	0.03	0.03	0.11	0
	VHHD	0.08	0	0	0.24
ACCURACY		84.2%	97.4%	85.5%	92.1%
PRECISION		76.5%	83.3%	66.7%	100%
RECALL		86.7%	100%	66.7%	100%
F1 SCORE		81.3%	90.9%	66.7%	85.7%

The confusion matrix (Table 5) provides a detailed assessment of a machine learning model's classification performance, revealing its strengths and weaknesses across different human development categories. The model performs exceptionally well in identifying countries with Very High (100% precision, 100% recall) and Low (97.4% accuracy, 100% recall) human development, demonstrating high confidence and accuracy in these groups. Conversely, it struggles with the Medium human development category, evidenced by its lowest precision, recall, and F1 score (66.7%), indicating a significant misclassification rate. This performance disparity highlights a potential area for model improvement, particularly in distinguishing countries within the intermediate development stage.

Table 6
Model Summary: Linear Discriminant Classification

Linear Discriminants	Method	n(Train)	n(Test)	Test Accuracy
3	Moment	155	38	0.816

Table 6 summarizes the performance of a Linear Discriminant Classification model. This model, which uses a "Moment" method to find three linear discriminants, was trained on a dataset of 155 samples and evaluated on a separate test set of 38 samples. The model's key result is its test accuracy of 0.816, indicating that it correctly classified just over 81% of the new, unseen data. This suggests that the model effectively separates the different classes in the dataset based on a linear combination of its features, with a performance that is likely acceptable for many applications.

Table 7
Linear Discriminant Coefficients

	LD1	LD2	LD3
(Constant)	-0.055	-0.044	0.057
Life Expectancy at Birth (LEB)	0.999	0.415	-1.342
Expected Years of Schooling (EYS)	0.652	-0.377	-0.584
Mean Years of Schooling (MYS)	1.342	1.238	1.250
Gross national income (GNI) per capita	0.223	-1.478	0.717

The first linear discriminant, LD1, primarily relates to human development and longevity. This is evident from the high positive coefficients for Mean Years of Schooling (1.342) and Life Expectancy at Birth (0.999), suggesting that these variables strongly influence this function. In simple terms, higher values for these variables will lead to a higher LD1 score. This indicates that a high score on LD1 corresponds to countries with high average education levels and long life expectancies. The predictive equation for LD1 is:

$$\text{LD1} = -0.055 + 0.999 (\text{LEB}) + 0.625(\text{EYS}) + 1.342(\text{MYS}) + 0.223(\text{GNI})$$

The second linear discriminant, LD2, seems driven by a contrast between income and education. It has a significant positive coefficient for Mean Years of Schooling (1.238) and a significant negative coefficient for GNI per capita (-1.478). This indicates that a high LD2 score is associated with higher levels of education but lower income. A high LD2 score suggests a country has high average education levels but relatively low per capita income. The predictive equation for LD2 is:

$$\text{LD2} = -0.044 + 0.415 (\text{LEB}) - 0.377(\text{EYS}) + 1.238(\text{MYS}) - 1.478(\text{GNI})$$

The third linear discriminant, LD3, presents a more complex, almost contradictory, relationship among the variables. It has a significant positive coefficient for Mean Years of Schooling (1.250) and a significant negative coefficient for Life Expectancy at Birth (-1.342). This suggests that

a high LD3 score is linked to a population with high average educational attainment but surprisingly low life expectancy. A high LD3 score is associated with countries with well-educated populations but surprisingly low life expectancy. The predictive equation for LD3 is:

$$\text{LD3} = 0.057 - 1.342 (\text{LEB}) - 0.584(\text{EYS}) + 1.250(\text{MYS}) + 0.717(\text{GNI})$$

4. Conclusions

This study provides valuable insights into the empirical assessment of the Human Development Index (HDI) across various countries. The findings reinforce the alignment of the Sustainable Development Goals with HDI metrics, particularly in health (as indicated by life expectancy at birth), education (measured by expected years and mean years of schooling), and income (represented by Gross National Income per capita). This research analysis showed three discriminant equations for the three discriminants of the human development levels:

4.1. Countries with high average education levels and long life expectancies

Countries with high average educational levels and long life expectancies are typically classified in the "Very High Human Development" category, reflecting a synergistic relationship between human capital and public health. Extensive mean years of schooling correlate with higher health literacy and socioeconomic stability, which, in turn, facilitate access to superior medical care and higher nutritional standards. Consequently, these nations demonstrate that sustained investment in institutional education serves as a primary catalyst for extending biological longevity and enhancing the overall quality of life for their citizens.

4.2. Countries with high average education levels but relatively low per capita income

Countries with high average educational levels but relatively low per capita income often exhibit a "lag effect," in which substantial investments in human capital have yet to translate into significant economic growth. This discrepancy typically arises in developing economies that possess robust academic infrastructure but lack the industrial diversity or market stability to utilize a highly skilled workforce fully. Consequently, these nations may face challenges such as professional underemployment or the emigration of talent, as the domestic economy struggles to offer competitive salaries commensurate with the population's educational attainment.

4.3. Countries that have a well-educated population but a surprisingly low life expectancy

Countries with a well-educated population and surprisingly low life expectancy often face a "developmental paradox" in which academic capital is high, but public health infrastructure is critically compromised. This disconnect is frequently observed in regions suffering from systemic healthcare inefficiencies, high prevalence of infectious diseases, or socio-political instability that disrupt medical access despite a knowledgeable workforce.

Overall, education, specifically the mean years of schooling, is the most significant contributor to a country's HDI. A higher number of years of education among individuals aged 25 and older correlates with improved quality-of-life outcomes. Health is identified as the second most critical predictor of HDI, particularly in terms of life expectancy at birth. Consequently, this study suggests that a nation's health and education sectors substantially influence its overall quality of life.

5. Recommendation and Future Works

5.1 Comparative Analysis of Regional Policy Interventions

Conduct a comparative regional analysis, such as comparing ASEAN nations to EU member nations. By examining specific geographic locations, researchers can identify localized policies to improve the least important factors in this study, such as GNI per capita. Through this, recommendations for governments to transition from low to medium to high HDI status.

5.2 Trend Analysis

Future researchers may employ a longitudinal design to track the trajectory of these 193 countries over the last decade. This would help the researchers with the same focus to determine if education and health remain stable over time.

5.3 Qualitative Contextualization

Since mean years of schooling emerged as the primary driver of HDI, a future study could investigate the qualitative aspects of education rather than focus solely on quantitative duration. Research could focus on the relationship between Education Quality and Quantity, examining how teacher-to-student ratios, curriculum relevance, and digital infrastructure affect a country's classification. This would address why some countries with high mean years of schooling still struggle to translate that input into higher Gross National Income (GNI) per capita.

Author Contributions

John Raubensun D. Hipulan: Construct title, abstract, introduction, methods, analyze data, interpret data, and write the conclusion

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Data Availability Statement

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Conflicts of Interest

The author declares no conflict of interest.

Declaration of AI use

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