

Analysis Of The Influence Of Health Workforce, Educational Infrastructure, And Non-Food Per Capita Expenditure On The Human Development Index (HDI) In Humbang Hasundutan Regency

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Abstract – This study delves into the factors influencing the Human Development Index (HDI) in Indonesia, particularly in North Sumatra and Humbang Hasundutan Regency. While Indonesia holds the 114th position globally, North Sumatra ranks 15th among provinces, and Humbang Hasundutan Regency's specific rank within the 33 regencies/cities in North Sumatra awaits clarification. Employing multiple linear regression with SPSS 26 and analyzing 2005-2022 time series data, the research identifies the number of health workers and educational infrastructure as significant determinants positively impacting HDI. In contrast, non-food per capita expenditure shows no substantial influence. These findings underscore the pivotal role of prioritizing health and education for sustained socio-economic development in the specified regions, urging policymakers to concentrate efforts on bolstering these key determinants.

Keywords – HDI, Health Workers, Educational infrastructure, non-food expenditure.

I. INTRODUCTION

The government endeavors to enhance the welfare of its citizens through various developmental programs, aiming to create prosperity for the nation's residents. However, the assessment of a nation's welfare cannot be meaningful without clear benchmarks.

One notable approach to measuring development is the Physical Quality of Life Index (PQLI), developed by Morris D. Morris. PQLI incorporates three indicators: life expectancy at age one, infant mortality rate, and literacy rate, forming a relatively straightforward composite index. In 1990, the Human Development Index (HDI) was introduced as a method to gauge human development progress. HDI integrates three essential dimensions crucial for human life quality, operationalizing a measure reflecting human development efforts. These dimensions encompass long and healthy life, knowledge, and a decent standard of living.

Health dimension in HDI is measured using life expectancy at birth. Meanwhile, the knowledge dimension is assessed through a combination of literacy rate and mean years of schooling. The decent living standard dimension utilizes the indicator of the community's purchasing power, reflected in per capita expenditure as an income approach indicating the achievement of a decent living (BPS, 2018).

This study is motivated by findings in previous research, highlighting specific variables deemed important for examination in Humbang Hasundutan Regency. These variables include the Quantity of Healthcare Personnel, Infrastructure for Education, and

Non-Food Per Capita Expenditure. In line with this, the study aims to provide an in-depth exploration of factors influencing the Human Development Index (HDI) in Humbang Hasundutan Regency, both simultaneously and partially. The analysis will focus on the Quantity of Healthcare Personnel, Infrastructure for Education, and the percentage of Non-Food Per Capita Expenditure, ultimately laying the foundation for policy formulation to enhance HDI in the region.

This research aspires to contribute theoretically by introducing new methods and indicators in HDI measurement. From a practical perspective, it aims to offer a profound understanding of the factors influencing HDI, providing development recommendations to the local government. Additionally, it seeks to serve as a reference for future research in this field, creating a basis for further knowledge development and more effective policies in Humbang Hasundutan Regency.

II. LITERATURE

Human Development Index (IPM) provides an overview of how the population can access the outcomes of development, including aspects of health, education, and income. The development of human resources, in the context of IPM, involves improving human capital, which encompasses not only education but also investments in health. Education and health are considered fundamental goals of development, as both are crucial elements in shaping broader human capabilities, essentially representing the primary meaning of development (Todaro, 2003).

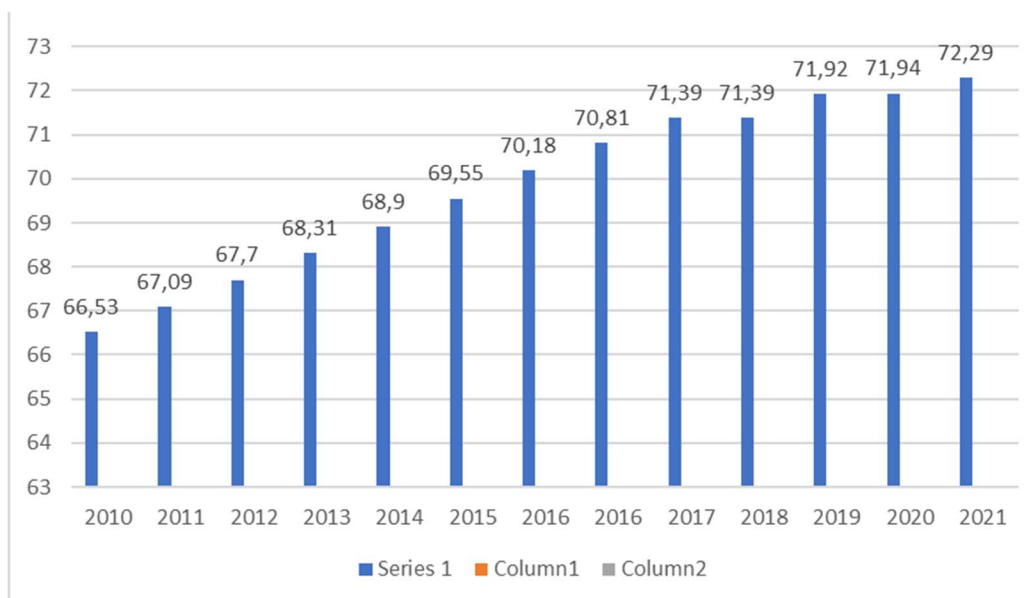
The Human Development Index (HDI) is a composite index calculated as the simple average of three indices that depict the basic capabilities of humans in expanding their choices, namely:

1. Life Expectancy Index
2. Knowledge Index
3. Income Index

The general formula used is as follows:

$$IPM = \sqrt[3]{(\text{Life Expectancy Index} + \text{Knowledge Index} + \text{Income Index}) \times 100}$$

As of 2021, Indonesia's Human Development Index (HDI) is ranked 114 out of 191 countries, reflecting a 0.55 increase from the previous year. Despite a temporary dip in its trend in 2019 and 2020 due to the Covid-19 pandemic, Indonesia's HDI continues to exhibit improvement.



Source: BPS

Figure 1. The Progress of Indonesia's Human Development Index (HDI)

In the context of the ASEAN region, Indonesia's HDI stands at the 5th position among the 10 member countries and one observer nation

Table 1 Ranking of HDI values for ASEAN countries

| No | Country | HDI Value | | | | | | |
|----------|------------------------|-------------|-------------|-------------|-----------|-------------|-------------|-------------|
| | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
| 1 | Singapore | 93 | 93,4 | 93,5 | 94 | 94,3 | 93,9 | 93,9 |
| 2 | Brunei Darussalam | 83,6 | 83,5 | 83,4 | 83 | 83 | 83 | 82,9 |
| 3 | Malaysia | 79,7 | 80,3 | 80,5 | 80,7 | 81 | 80,6 | 80,3 |
| 4 | Thailand | 78,1 | 78,5 | 79 | 79,5 | 80,4 | 80,2 | 80,0 |
| 5 | Indonesia | 69,5 | 69,9 | 70,4 | 71 | 71,6 | 70,9 | 70,5 |
| 6 | Vietnam | 68,4 | 68,8 | 69,2 | 69,7 | 70,3 | 71 | 70,0 |
| 7 | Filipina | 69,8 | 70 | 70,4 | 71 | 71,8 | 71 | 69,9 |
| 8 | Laos | 59,9 | 60,4 | 60,7 | 60,7 | 61 | 60,8 | 60,7 |
| 9 | Cambodia | 57,1 | 58,1 | 58,6 | 59,1 | 59,8 | 59,6 | 59,3 |
| 10 | Myanmar | 56,2 | 57,2 | 58 | 59 | 59,8 | 60 | 58,5 |
| 11 | Timor Leste (observer) | 61,4 | 60,4 | 60,6 | 60,5 | 61,4 | 61,4 | 60,7 |

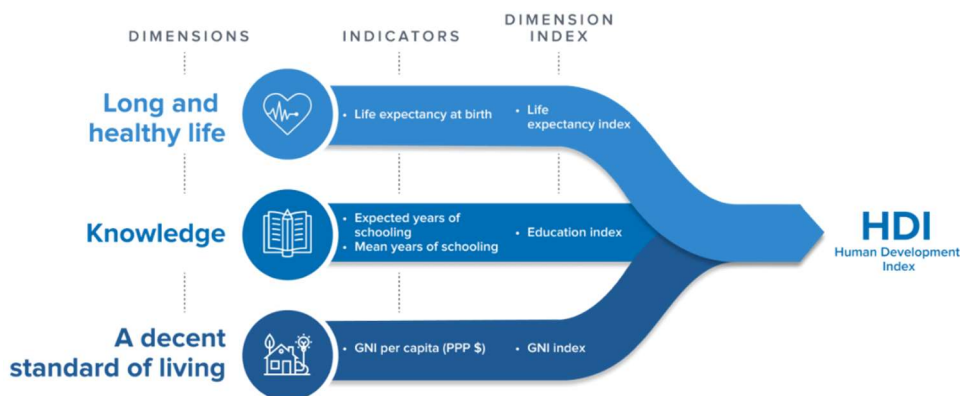
Source: Human Development Report UNDP

In the context of North Sumatra Province, the HDI for the year 2022 positions it at 15th out of 34 provinces in Indonesia. Notably, North Sumatra's HDI has consistently been on an upward trajectory compared to previous years. The HDI for North Sumatra in 2022 is recorded at 72.71, reflecting a growth of 0.99 percent (an increase of 0.71 points) compared to the achievements in 2021.

As the HDI for North Sumatra Province advances, all districts and cities within the province have also witnessed an improvement in their respective HDI values. In the comparison among districts and cities, no significant changes were observed in the categories of achievements and rankings for each area. However, noteworthy status changes occurred in Tapanuli Tengah Regency, Humbang Hasundutan Regency, and Gunung Sitoli City, all of which achieved a "high" status in 2022.

The lowest HDI in North Sumatra is still held by West Nias Regency at 62.93, while the top position is retained by Medan City at 81.76. Medan City stands out as the only city with a "very high" human development achievement status ($HDI \geq 80$) in the region (BPS, 2023).

Health is considered an integral aspect of well-being, while education is regarded as the essential foundation for achieving a meaningful and satisfying life. The positive trends in HDI values signify ongoing efforts and progress in enhancing the overall human development landscape in North Sumatra Province.



Source: UNDP

Figure 2 dimensions and indicators that form the Human Development Index (HDI)

Humbang Hasundutan Regency is ranked 22nd out of 33 regencies/cities in North Sumatra Province in terms of the Human Development Index (HDI). Specifically, among the ten regencies in the highlands of North Sumatra, Humbang Hasundutan Regency holds the 8th position. Despite achieving the 8th rank in 2022, surpassing Tapanuli Tengah Regency, this position is still considered unsatisfactory given the substantial efforts made by the local government.

The regency has garnered notable achievements, including receiving an Unqualified Opinion (WTP) for seven consecutive years. Additionally, Humbang Hasundutan Regency scored high in the Government Performance Accountability System (SAKIP), making it the only regency/city in North Sumatra with a BB rating.

Several earlier studies have explored factors influencing the Human Development Index (HDI). For instance, a study by Mongan (2019) titled “The Influence of Government Expenditure on Education and Health on the Human Development Index in Indonesia.” The findings indicated that central government spending on education did not significantly impact the HDI. However, central government spending on the health sector and local government spending on education positively and significantly influenced the HDI.

Another study conducted by Dzulhijjy (2021) titled “Analysis of the Influence of Government Spending on the Human Development Index and Poverty Reviewed from the Levels of Education and Health (A Case Study of the Special Region of Yogyakarta)” showed that government spending variables in the Education and Health sectors directly significantly influenced the Human Development Index. The Human Development Index also significantly and negatively impacted poverty. While spending on Education and Health directly but insignificantly affected poverty, it significantly and negatively affected poverty through the Human Development Index.

Novitasari (2015), in the research titled “Analysis of the Influence of Education Expenditure, Health Expenditure, Poverty, and Regional Gross Domestic Product on the Human Development Index (A Case Study of 38 Cities/Regencies in East Java 2009-2013),” demonstrates that collectively, education expenditure, health expenditure, poverty, and Regional Gross Domestic Product (RGDP) significantly impact the Human Development Index (HDI). The findings suggest that enhancing HDI can be achieved by increasing investments in education and health, boosting per capita RGDP, and reducing poverty levels.

III. METHOD

This study centers on Humbang Hasundutan Regency in North Sumatra Province, chosen for its notable shift in the Human Development Index (HDI) from “medium” in 2021 to “high” in 2022. Despite this improvement, the regency still ranks 22nd out of 33 regencies/cities in North Sumatra, significantly trailing behind Medan City, which boasts a “very high” HDI.

3.1. Data Collection Methodology

Quantitative methods, relying on secondary data, were employed for data collection. Primary data sources included official documents from relevant institutions in Humbang Hasundutan, such as the Regional Planning and Development Agency, the

Departments of Education and Health, the Regional Financial Management and Asset Agency (BPKAD), and the Central Statistics Agency. Additionally, pertinent literature and journals were used as references.

3.2. Data Coverage and Analysis

The data spanned from 2005 to 2022, forming an 18-year time series. The applied data analysis techniques involved statistical tests and multiple linear regression.

This research aims to comprehensively understand the dynamics influencing HDI in Humbang Hasundutan Regency and contribute valuable insights for future development strategies.

IV. RESULT

The Human Development Index (HDI) is shaped by key variables, specifically in this study: the Number of Healthcare Personnel, the Number of Educational Infrastructure, and Non-Food Per Capita Expenditure.

4.1. Statistical Test Results for Partial Effects

Table 2 Statistical Test Results

| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. | Collinearity Statistics | |
|-------------------------------------|-----------------------------|------------|---------------------------|-------|------|-------------------------|-------|
| | B | Std. Error | Beta | | | Tolerance | VIF |
| 1 (Constant) | 39.468 | 9.913 | | 3.981 | .001 | | |
| Health Personnel (Number) | .007 | .001 | .736 | 6.952 | .000 | .143 | 6.983 |
| Educational Infrastructure (Units) | .097 | .033 | .293 | 2.919 | .011 | .160 | 6.266 |
| Non-Food Per Capita Expenditure (%) | -.020 | .037 | -.031 | -.529 | .605 | .478 | 2.092 |

a. Dependent Variable: HDI

From the table, based on the significance values, we can conclude that:

- Health Personnel with a significance value of $0.000 < 0.05$ implies that Health Personnel, partially, significantly influences the HDI.
- Educational Infrastructure with a significance value of $0.011 < 0.05$ implies that Educational Infrastructure, partially, significantly influences the HDI.
- Non-Food Per Capita Expenditure with a significance value of $0.605 > 0.05$ implies that Non-Food Per Capita Expenditure, partially, does not significantly influence the HDI.

4.2 Multiple Linear Regression Analysis Results

The research findings indicate that the factors influencing the Human Development Index in Humbang Hasundutan Regency can be expressed in the form of a regression equation:

$$Y = 42,138 + 0,008 X_1^{**} + 0,087X_2^* - 0,023X_3^n$$

Y = Human Development Index (HDI).

X₁ = represents the Number of Health Personnel.

X₂ = represents the Number of Educational Infrastructure.

X₃ = represents Non-Food Per Capita Expenditure.

** = denotes a very significant impact.

* = denotes a significant impact

n = denotes a non-significant impact

4.2.1 Analysis of Health Personnel

The first variable under consideration is the Number of Health Personnel. The development of Health Personnel in Humbang Hasundutan Regency is illustrated in Table 3.

Table 3 Development of Health Personnel

| Year | HDI | Growth Rate |
|------|-----|-------------|
| 2005 | 274 | - |
| 2006 | 296 | 8,03 |
| 2007 | 324 | 9,46 |
| 2008 | 352 | 8,64 |
| 2009 | 366 | 3,97 |
| 2010 | 421 | 15,03 |
| 2011 | 443 | 5,23 |
| 2012 | 497 | 12,19 |
| 2013 | 530 | 6,64 |
| 2014 | 574 | 8,30 |
| 2015 | 607 | 5,75 |
| 2016 | 656 | 8,07 |
| 2017 | 662 | 0,92 |
| 2018 | 678 | 2,42 |
| 2019 | 694 | 2,36 |
| 2020 | 720 | 3,75 |
| 2021 | 755 | 4,86 |
| 2022 | 788 | 4,37 |

The research indicates that the Number of Health Personnel has a positive and significant impact on the Human Development Index (HDI). For every additional health personnel, there is a contribution of 0.008 to the increase in HDI. This aligns with the theory that the availability of health personnel directly affects healthcare services, thereby influencing the overall health of the community.

These findings are also supported by existing literature, such as Blum's theory (1974), emphasizing health investment as a crucial factor in improving health status. Additionally, studies by Stewart (1971), Kabir (2008), and Hamdan (2019) indicate that the number of health personnel significantly influences life expectancy and HDI achievements.

4.2.2 Analysis of Educational Infrastructure

The second variable identified is the Number of Educational Infrastructure. Educational infrastructure encompasses various levels, from elementary schools to universities. However, the research has not yielded specific results regarding the impact of this variable on the HDI.

Table 4 Development of Educational Infrastructure

| Year | IPM | Growth Rate |
|------|-----|-------------|
| 2005 | 304 | - |
| 2006 | 305 | 0,33 |
| 2007 | 305 | 0 |
| 2008 | 313 | 2,62 |
| 2009 | 313 | 0 |
| 2010 | 313 | 0 |
| 2011 | 313 | 0 |
| 2012 | 313 | 0 |
| 2013 | 313 | 0 |
| 2014 | 317 | 1,28 |
| 2015 | 317 | 0 |
| 2016 | 317 | 0 |
| 2017 | 317 | 0 |
| 2018 | 318 | 0,36 |
| 2019 | 318 | 0 |
| 2020 | 320 | 0 |
| 2021 | 320 | 0,33 |
| 2022 | 320 | 0 |

The research results indicate that the Number of Educational Infrastructure has a positive and significant impact on the Human Development Index (HDI), with a coefficient of 0.087 at a significance level of $\alpha = 2.3$. This suggests that adding one unit of Educational Infrastructure contributes to an increase in HDI by 0.087. This finding is consistent with Hanushek's theory (1995), asserting that, in addition to the quantity of educators, the quality, availability of facilities, infrastructure, and access also have a significant impact on the improvement of human capital in education.

This theoretical support is further reinforced by the research findings of Dwi Heryanto, stating that the adequacy of the ratio of the school-age population to educational facilities can enhance human development through the formation of the HDI. Therefore, increasing the Number of Educational Infrastructure in Humbang Hasundutan Regency becomes a crucial strategy for improving well-being and human resource development through the Human Development Index.

4.2.3 Non-Food Per Capita Expenditure

The magnitude of the proportion of expenditure for food consumption to total household expenditure can provide an overview of household prosperity. Households with a higher proportion of expenditure on food consumption indicate lower-income households. The higher the household income, the smaller the proportion of expenditure on food to total household expenditure. Therefore, the level of community income can be approximated by the proportion of non-food expenditure (BPS, 2008). The development of Non-Food Per Capita Expenditure in Humbang Hasundutan Regency can be seen in Table 5

Tabel 5 Non-Food Per Capita Expenditure

| Year | HDI | Growth Rate |
|------|-------|-------------|
| 2005 | 34,76 | - |
| 2006 | 34,68 | -0,23 |
| 2007 | 34,28 | -1,15 |
| 2008 | 35,68 | 4,08 |
| 2009 | 36,34 | 1,85 |
| 2010 | 38,59 | 6,18 |
| 2011 | 36,29 | -5,95 |
| 2012 | 34,90 | -3,84 |
| 2013 | 33,93 | -2,75 |
| 2014 | 33,03 | -2,66 |
| 2015 | 37,91 | 14,79 |
| 2016 | 39,51 | 4,21 |
| 2017 | 39,56 | 0,12 |
| 2018 | 39,55 | -0,02 |
| 2019 | 39,98 | 1,1 |
| 2020 | 37,95 | -5,07 |
| 2021 | 42,14 | 11,04 |
| 2022 | 39,73 | -5,74 |

Based on the data in Table 5, Non-Food Per Capita Expenditure in Humbang Hasundutan Regency ranges from 33.03% to a peak of 42.14%. The analysis indicates that a significant portion of the community's per capita expenditure is still directed towards food needs. However, the research results show a negative impact of the Number of Non-Food Per Capita Expenditure on the Human Development Index (HDI), with a coefficient of -0.023. This means that each additional unit of Non-Food Per Capita Expenditure will contribute to a decrease in HDI by 0.023. This result aligns with Engel's theory in Salvatore, stating that the higher the family income level, the lower the proportion of expenditure on food consumption.

V. CONCLUSION

Based on the analysis of variables in this study, it can be concluded that the Number of Health Personnel and the Number of Educational Facilities have a significant positive influence on the Human Development Index (HDI) in Humbang Hasundutan Regency. Conversely, Non-Food Per Capita Expenditure does not show a significant effect on HDI. Although educational

facilities are sufficient from primary to upper secondary schools, there is a shortage of health personnel, especially Dentists, Pharmacy Staff, Nutritionists, and Laboratory Experts. To improve HDI, it is recommended that the Humbang Hasundutan Regency Government increase the recruitment of health personnel through various programs such as Civil Servant (PNS) and Government Employees with Employment Agreements (PPPK) recruitments. The government also needs to allocate adequate funds to maintain and improve the quality of educational facilities and implement community empowerment programs to increase Non-Food Per Capita Expenditure. Additionally, the research supports the recommendation to involve additional variables in future studies to obtain a more comprehensive picture of the factors influencing HDI in Humbang Hasundutan Regency.

REFERENCES

- [1]. Blum, Hendrik L. 1974. Planning for Health, Development and Application of Social Changes Theory. New York: Human Sciences Press.
- [2]. BPS, 2018. Indeks Pembangunan Manusia. Kabupaten Humbang Hasundutan, Book, 12150.1915.
- [3]. Dzulhijjy, Marchahsufi Intan, 2021. Analisis Pengaruh Belanja Pemerintah Terhadap Indeks Pembangunan Manusia dan Kemiskinan Ditinjau dari Tingkat Pendidikan dan Kesehatan, Universitas Brawijaya.
- [4]. Hamdan, Opan Fauzan, 2019. Rasio tenaga pendidik, rasio tenaga kesehatan, dan capaian pembangunan manusia di Indonesia dalam analisis spasial, jurnal Ekonomi dan Kebijakan Publik Indonesia.
- [5]. Novitasari, Evi, 2015. Analisis pengaruh belanja pendidikan, belanja kesehatan, kemiskinan dan Produk Domestik Regional Bruto terhadap Indeks Pembangunan Manusia, FE Brawijaya
- [6]. Todaro dan Smith (2003). Pembangunan Ekonomi di Dunia Ketiga. Erlangga, Jakarta
- [7]. UNDP, 2022-2023. Human Development Report, Uncertain Time. Unsettled Lives: Shaping our future in a Transforming World.