Human capital and gender development in economic growth: A case study of Sumatera Barat, 2010–2022

Fita Dinda Rahmasari; Ratih Ramadhani*

Department of Economics, Faculty of Economics and Business, Universitas Andalas Indonesia

* *To whom correspondence should be addressed. Email: ratihramadhani@eb.unand.ac.id*

DOI: 10.22437/ppd.v12i5.37777	Received: 17.10.2024	Revised: 10.12.2024	Accepted: 27.12.2024	Published: 31.12.2024

Abstract

This study analyzes the impact of the Human Development Index (HDI), Gender Development Index (GDI), and unemployment rate on economic growth in Sumatra Barat from 2010 to 2022. Economic growth, measured by Gross Regional Domestic Product (GRDP) per capita, reflects regional welfare. It is essential to understand the factors influencing it, particularly the quality of human resources and employment opportunities. According to data from BPS, economic growth in Sumatera Barat remains low compared to other provinces on the island of Sumatra. This study employs a dynamic panel data model using the Generalized Method of Moments (GMM) approach to address potential endogeneity issues arising from the reciprocal relationship between independent variables and economic growth. The findings indicate that HDI has a positive and significant effect on economic growth, suggesting that improvements in education, healthcare, and living standards contribute to economic expansion in Sumatera Barat. Similarly, GDI has a significant positive effect, highlighting the crucial role of gender equality in human development and driving economic growth. In contrast, the unemployment rate has a negative and significant impact, demonstrating that high unemployment hinders regional economic progress.

Keywords: *Gender Development Index, GRDP per capita, GMM, Human Development Index, Unemployment rate*

JEL Classification: C33, J64, O15, O47, R11

INTRODUCTION

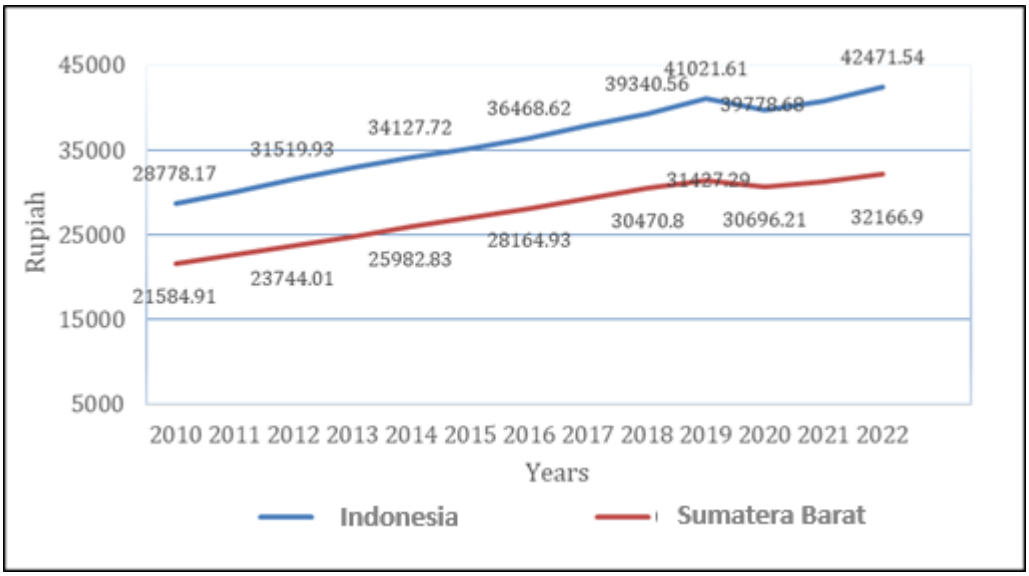
Economic growth is not solely about increasing production; it also involves enhancing people's quality of life through higher per capita income and overall welfare. Sustained growth is essential for long-term prosperity, enabling nations to address social challenges, invest in future generations, and strengthen their global competitiveness. Real GDP per capita, which accounts for inflation and population growth, serves as a key indicator of a country's welfare.

Sumatera Barat is one of the provinces in Indonesia with a relatively low GRDP per capita. Economic growth in the region has generally followed an upward trend, reflecting broader national patterns. However, disparities persist when compared to the

national average.

According to data from the Badan Pusat Statistik (BPS) presented in Figure 1, both Indonesia's GDP and Sumatera Barat's GRDP have shown a consistent increase over time, with the exception of a decline in 2020 due to the economic downturn caused by the COVID-19 pandemic. This setback affected multiple sectors, leading to slowed economic activity and job losses.

Despite this overall growth trend, the gap between Indonesia's GDP per capita and Sumatera Barat's GRDP per capita remains substantial, averaging IDR 8,530 thousand. This disparity highlights structural economic differences between the region and the national economy, underscoring the need for targeted policies to enhance local economic productivity and reduce regional income inequality.



Source: BPS (2024a), processed.

Figure 1. GDP per capita of Sumatera Barat and Indonesia, 2010–2022 (IDR thousand)

Sumatera Barat possesses significant economic potential, particularly in agriculture, fisheries, and tourism. Key exports such as palm oil, coffee, and fish offer strong opportunities in international markets, while the tourism sector continues to expand, attracting both domestic and international visitors (Adiprayoga & Samiaji, 2021; Harist et al., 2018; Nesti et al. 2020; Zefnihan & Alhadi, 2018). However, to fully capitalize on this economic potential, it is essential to enhance the quality of human resources in the region.

Human capital is a critical factor influencing economic growth (Munir & Arshad, 2018; Teixeira & Queirós, 2016). Increasing West Sumatra's GRDP per capita requires several key factors to be considered. The primary drivers of economic growth include human resources, natural resources, capital, socio-cultural development, and technological advancements. Economic growth is more effective when accompanied by improvements in the quality of human resources.

Human capital encompasses the knowledge, skills, abilities, ideas, and health that contribute to an economy's productive capacity. Enhancing these components can lead to higher productivity, adaptability, and creativity, fostering long-term economic growth (Goffe & Monusova, 2017; Goldin, 2024; Jibir et al., 2023; Kholifaturrohmah et al., 2022; Kuznetsova & Skvortsova, 2022). Consequently, countries can invest in human resource development to strengthen human capital. The success of human development

is measured using the Human Development Index (HDI). In 2022, Sumatera Barat's HDI exceeded the national average, ranking third out of ten provinces in Sumatra.

While HDI provides a broad measure of human development, it does not account for disparities between men and women in accessing opportunities and resources (Dwyer-Lindgren et al., 2024; Foster et al., 2005). A high HDI does not necessarily indicate gender equality in development outcomes. Addressing gender disparities is crucial, as inclusive human development ensures that both men and women can fully contribute to and benefit from economic progress.

Recognizing the importance of gender equity, the United Nations Development Programme (UNDP) introduced the Gender Inequality Index (GII) in the Human Development Report 2010 to quantify the loss of achievement due to gender disparities in three key dimensions: reproductive health, empowerment, and employment (UNDP, 2010). To further refine gender-related assessments, the Gender Development Index (GDI) was introduced to track progress by measuring differences in human development outcomes between men and women. In the case of Sumatera Barat, the GDI has consistently remained above the national average (BPS, 2024b), suggesting a relatively balanced contribution of men and women to overall human development.

In 2022, Sumatera Barat's total population reached 5.6 million, with 2.79 million women and 2.84 million men (BPS, 2023a). The percentage of higher education graduates in Sumatera Barat was 13.02%, with 10.06% being men and 15.94% women (BPS, 2022). Education plays a crucial role in improving both economic and social well-being and is essential for reducing disparities, achieving equality, and fostering prosperity (Roza & Satrianto, 2021).

Meanwhile, in Sumatera Barat, the male labor force participation rate was 82.58%, while the female labor force participation rate was 56.28%. This suggests that approximately 43.72% of women in the region primarily fulfill household roles (BPS, 2022). Interestingly, despite a higher percentage of women completing higher education, men have a significantly higher labor force participation rate. This discrepancy suggests that women face barriers in accessing economic opportunities, particularly in the labor market. The Minister of Women's and Children's Empowerment has noted that such challenges hinder women's full participation in various economic sectors.

This gender gap in labor force participation raises important questions about the broader relationship between human capital development, gender equality, and economic growth. Many studies have highlighted the importance of human capital development in driving economic growth (Purwaningsih et al., 2023; Schlossarek et al., 2016; Zhang & Danish, 2019). Similarly, numerous studies have examined the impact of gender equality and inequality on economic growth (Girón & Kazemikhasragh, 2022; Karoui & Feki, 2018; Mirziyoyeva & Salahodjaev, 2023; Mitra et al., 2015).

Unlike previous research, which tends to analyze human capital and gender separately, this study integrates both indicators—the Human Development Index (HDI) and the Gender Development Index (GDI)—to provide a comprehensive perspective on how human capital quality and gender equality simultaneously influence economic growth. This dual-index approach enables a more in-depth analysis of the contributions of each aspect, as well as their interactions, in driving regional economic progress.

The findings of this study are expected to serve as a foundation for policymakers in formulating development strategies that not only prioritize economic growth but also emphasize human capital enhancement and gender empowerment as key pillars for achieving sustainable prosperity.

METHODS

This study employs a quantitative research methodology by examining the relationships between variables measured through research instruments and analyzed using numerical data. The study focuses on 19 regencies and cities in Sumatera Barat over the period 2010–2022 to capture the dynamics of economic growth and fluctuations within the province.

The dependent variable in this study is Gross Regional Domestic Product (GRDP) per capita. The independent variables used in this study include the Human Development Index (HDI), the Gender Development Index (GDI), and the open unemployment rate. The data are sourced from Statistics Indonesia and the West Sumatra Provincial Statistics Agency (BPS, 2022; BPS 2023a; BPS 2023b; BPS 2023c; BPS 2024a; BPS 2024b; BPS 2024c; BPS 2024d).

This study applies a dynamic panel data model using the Generalized Method of Moments (GMM) approach to address endogeneity issues that may arise due to the reciprocal relationship between the independent variables and economic growth. Many economic variables are dynamic, meaning that their values are influenced by other variables as well as by their past values (Arellano & Bond, 1991). Two common estimation procedures in dynamic panel data analysis are First-Difference GMM (FD-GMM) and System GMM (SYS-GMM). SYS-GMM is used when FD-GMM estimation results are not valid. In this study, SYS-GMM is selected because it proves to be more efficient in the GMM test, particularly in addressing the issue of weak instruments when the dependent variable exhibits high persistence. Additionally, SYS-GMM allows for more accurate estimation by preserving information from variables in levels and reducing bias in small samples.

The GMM regression panel equation model is as follows:

$$LogGRDPC_{it} = LogGRDPC_{i,t-1} + \beta 1 LogHDI_{it} + \beta 2 LogGDI_{it} + \beta 3 LogUnemp_{it} + e_{it}$$

Where Y_1 is GRDP per capita; $LogGRDPC_{i,t-1}$ is GRDP per capita in the previous period, $LogHDI_{it}$ is the human development index; $LogGDI_{it}$ is the gender development index; $LogUnemp_{it}$ is the open unemployment rate; e_{it} is residuals.

Residual analysis in regression reveals the presence of outliers, with some observations exhibiting residuals significantly larger than the normal range, indicating the influence of external shocks. The COVID-19 pandemic, for instance, caused extreme economic disruptions, leading to unusual deviations from historical trends. If not addressed, these extreme values could distort panel data regression analysis results and lead to inaccurate interpretations of the relationships between variables.

To address this issue, researchers apply winsorization as a preferred method. Unlike other approaches, winsorization preserves all data while reducing the impact of outliers without eliminating crucial information, thereby enhancing the stability of econometric estimates. According to Blaine (2018), winsorization moderates the influence of outliers on the mean and variance, resulting in more robust estimators of location and variability.

RESULTS AND DISCUSSION

A region's economic growth can be assessed using various indicators, one of which is Gross Regional Domestic Product (GRDP) per capita. Table 1 presents descriptive statistics based on 247 observations from 19 regencies and cities in Sumatera Barat. The province's GRDP exhibited significant fluctuations between 2020

and 2022, primarily due to the impact of the COVID-19 pandemic in 2020. During this period, GRDP in districts and municipalities across Sumatera Barat declined as a result of social restrictions and reduced economic activity.

Table 1 Descriptive statistic

Variable	Mean	Std.Dev	Min	Max
HDI	70.54	5.86	55.56	83.29
GDI	94.36	3.44	86.2	99.75
Unemployment	5.87	2.65	0.4	16.9
GRDP per capita	29,026	8,511	13,679	53,279

From Table 1, the descriptive statistical output indicates that the Human Development Index (HDI) has a mean value of 70.54, with a standard deviation of 5.86. The minimum HDI value recorded is 55.56, while the maximum is 83.29. The Gender Development Index (GDI) has a mean value of 94.36, with a standard deviation of 3.44, a minimum value of 86.20, and a maximum of 99.75.

The unemployment rate has a mean of 5.87, with a standard deviation of 2.65. The minimum unemployment rate observed is 0.40, while the maximum reaches 16.90. Meanwhile, GRDP per capita has an average value of 29,026, with a standard deviation of 8,511. The minimum GRDP per capita recorded is 13,679, while the maximum value is 53,279.

The first step in the Arellano-Bond Generalized Method of Moments (GMM) dynamic panel estimation is to test the significance of the parameters simultaneously using the First Difference GMM (FD-GMM) approach. Table 2 presents the results of the model specification test to determine the most appropriate model.

Table 2 FDGMM regression.

Variable	Coefficient	Std.Error	Z-value	P-value
GRDPCt-1	0.538858	0.0013836	389.46	0.0000
HDI	1.035802	0.0445458	23.25	0.0000
GDI	8.256244	0.0598399	137.97	0.0000
Unemployment	-0.2952817	0.0008002	-369.01	0.0000

To achieve a more accurate examination of the relationship between the independent and dependent variables, researchers employ the System GMM (SYS-GMM) approach. This method is used when FD-GMM results are found to be invalid, as SYS-GMM offers improved estimation by addressing weak instrument problems and enhancing efficiency (Table 3).

Table 3 SYSGMM regression

Variable	Coefficient	Std.Error	Z-value	P-value
GRDPCt-1	0.6049253	0.0006014	1005.86	0.0000
HDI	0.3141375	0.0225277	13.94	0.0000
GDI	7.735696	0.014526	532.54	0.0000
Unemployment	-0.3071965	0.0003271	-939.12	0.0000

To assess the validity of the instrumental variables, researchers conduct the Sargan test (Table 4). This test evaluates whether the number of instrumental variables exceeds the number of estimated parameters (overidentifying restriction condition). The model is considered valid if the probability value (J-statistic) is greater than 0.05.

Table 4. Sargan test

FD-GMM Statistic Value	P-Value	SYS-GMM Statistic Value	P-Value
18,99953	1,0000	18,99999	1,0000

As shown in Table 4, the probability values for both FD-GMM and SYS-GMM are 1.0000, which is greater than 0.05. This indicates that the model is valid based on the Sargan test results.

To ensure consistent estimation results, researchers perform the Arellano-Bond autocorrelation test. This test examines the presence of serial correlation in the residuals using AR(1) and AR(2) statistics (Table 5). A valid dynamic panel model should exhibit first-order autocorrelation (AR(1)) due to the dependency of the current dependent variable on its previous values. However, second-order autocorrelation (AR(2)) should not be significant, as proper first-differencing should eliminate serial correlation beyond the first lag. If AR(2) is significant, it suggests an unresolved serial correlation, which can bias the estimation.

Table 5. Arrelano Bond test

	FD-GMM Statistic Value	P-Value	SYS-GMM Statistic Value	P-Value
AR (1)	-0,08166	0,9349	-0,45835	0,6467
AR (2)	-0,03781	0,9698	-0,18861	0,8504

As shown in Table 5, the probability values for AR(1) in both FD-GMM (0.9349) and SYS-GMM (0.6467) exceed 0.05, indicating that first-order serial correlation is present, as expected. More importantly, the probability values for AR(2) in FD-GMM (0.9698) and SYS-GMM (0.8504) are also greater than 0.05, confirming the absence of second-order serial correlation. This suggests that the model is correctly specified and the estimation results are reliable.

In dynamic panel data regression, the model unbiasedness test is conducted by comparing the coefficient values of the lagged dependent variable (L1). This test evaluates whether the estimated coefficients meet the unbiasedness criteria by comparing the First-Difference GMM (FD-GMM) and System GMM (SYS-GMM) estimators with those from the Fixed Effects Model (FEM) and Pooled Least Squares (PLS) model (Table 6). The FEM estimator tends to be biased downward, while the PLS estimator is biased upward. A model is considered unbiased if its lagged dependent variable coefficient falls between the FEM and PLS estimates.

Table 6. Unbiasedness test

Coefficient FD-GMM	Coefficient SYS-GMM	Coefficient FEM	Coefficient PLS
0,538858	0,6049253	0,5737365	0,62361231

From Table 6, the FD-GMM coefficient of 0.538858 is not between the FEM estimate of 0.5737365 and the PLS estimate of 0.62361231, as it is lower than both. In contrast, the SYS-GMM coefficient of 0.6049253 falls between the FEM and PLS values.

Since the SYS-GMM coefficient satisfies the unbiasedness criterion by being positioned between the FEM and PLS estimates, the SYS-GMM model is the more appropriate and unbiased estimator for this study. This further supports its selection as the preferred method for analyzing the relationship between economic growth, human development, and gender equality in Sumatera Barat.

The best model is selected based on the results that meet the assumption test criteria presented in Table 7.

Table 7 Dynamic Panel Data Model Selection.

Criteria	FDGMM	SYSGMM
Sargan Test	Fulfilled	Fulfilled
Arellano-Bond Test	Fulfilled	Fulfilled
Unbiasedness Test	Not Fulfilled	Fulfilled

Based on Table 7, the best model is the SYS-GMM model, as it meets all assumption test criteria.

Based on the SYS-GMM approach, the estimated equation is as follows:

$$LogGRDP_{it} = 0{,}604925GRDP_{i,t-1} + 0{,}314138HDI_{it} + 7{,}735696GDI_{it} - 0.3071965UNEMP_{it}$$

An increase in GRDP in the previous period by 1,000 Rupiah leads to an increase in economic growth by 0.604925 Rupiah. The coefficient for the Human Development Index (HDI) is 0.314138, meaning that if the HDI increases by one index point, economic growth rises by 0.314138%. The coefficient for the Gender Development Index (GDI) is 7.735696, indicating that, on average, a one-unit increase in GDI leads to a 7.735696% increase in economic growth. The unemployment rate has a coefficient of -0.3071965, meaning that a one-percentage-point rise in unemployment leads to a 0.3071965% decline in economic growth.

The GDI coefficient is notably larger compared to other variables. Schultz (1999) argues that GDI is often closely correlated with HDI, as both relate to access to education, healthcare, and economic participation. This multicollinearity can cause the GDI coefficient to appear larger in the model, as it captures much of the variation also explained by HDI.

This study finds that the Human Development Index significantly influences economic growth in Sumatera Barat, with a probability value of 0.0000. The regression results indicate a positive impact of HDI on economic growth, with a coefficient of 0.314138, meaning that an increase of one index point in HDI leads to a 0.314138% rise in economic growth. These findings align with Gulcemal (2020), who demonstrated that HDI has a significant positive effect on economic growth and development in developing countries. The results also support the argument by Eigbiremolen and Anaduaka (2014) that human capital development plays a crucial role in long-term economic growth. Their study emphasizes that investment in education is essential for improving economic performance, and they recommend that governments and policymakers make concerted efforts to enhance human capabilities through education at all levels.

This study also finds that the Gender Development Index significantly affects economic growth in Sumatera Barat, with a probability value of 0.0000. This underscores the role of GDI in driving economic growth, as gender development highlights how disparities between men and women impact economic and social progress. The regression results show a positive coefficient of 7.735696, meaning that a one-unit increase in GDI leads to a 7.735696% increase in economic growth. These findings align with research by Bhowmik (2020), which examined the impact of GDI on HDI and GRDP per capita, concluding that GDI has a significant and positive effect on regional economic growth. Similarly, studies by Seguino and Were (2014) found that gender equality stimulates economic growth, emphasizing that policymakers should

assess the impact of macroeconomic policies on gender equality to ensure inclusive and sustainable development.

The study also finds that unemployment significantly influences economic growth in Sumatera Barat, with a probability value of 0.0014. The relationship between unemployment and economic growth is complex, as strong economic growth generally reduces unemployment, while high unemployment can hinder economic expansion. The regression results show a negative coefficient of -0.3071965, meaning that a one-percentage-point increase in the unemployment rate leads to a 0.3071965% decline in economic growth. Interestingly, these findings contrast with research by Sadiku et al. (2015), which suggested that changes in unemployment do not significantly affect GRDP per capita. However, the results are consistent with studies by Roșoiu and Roșoiu (2014), which confirmed that unemployment affects GRDP per capita, as explained by Okun's law.

These findings have important policy implications. Governments should invest in education and healthcare to enhance human capital and reduce gender disparities in economic participation. Local authorities can implement targeted strategies such as skills-based job training programs, incentives for companies that employ more women, and support for micro, small, and medium enterprises (MSMEs) managed by vulnerable groups. Additionally, policies aimed at reducing unemployment through investment in productive sectors, such as the creative industry and tourism, can accelerate economic growth and create more inclusive job opportunities.

CONCLUSION AND RECOMMENDATIONS

Conclusion

Based on the regression analysis using the SYS-GMM approach for data from 2010 to 2022, human capital development in Sumatera Barat, which consists of 19 cities and districts, has a positive and significant impact on economic growth, as measured by Gross Regional Domestic Product (GRDP) per capita. This study finds that the Human Development Index (HDI) and Gender Development Index (GDI) both have a favorable and significant influence on economic growth, highlighting the importance of improving human resources and reducing gender disparities in development. Strengthening these factors contributes to overall economic welfare and regional prosperity.

Unemployment, on the other hand, has a negative impact on economic growth. The decline in economic activity, particularly in the tourism sector, has led to significant job losses. Many hotels, restaurants, and related businesses have been forced to reduce their workforce due to the drop in tourism. Workers in the informal sector, including small traders and day laborers, have also faced economic hardship due to reduced economic activity. With limited access to stable employment and social safety nets, many informal workers have lost their livelihoods, leading to a rise in unemployment in Sumatera Barat.

The findings of this study are particularly important for Sumatera Barat, as they provide evidence-based insights into how human and gender development influence economic growth. Given the province's unique characteristics, including its matrilineal system, reliance on micro, small, and medium enterprises (MSMEs), agriculture, and tourism, as well as regional development disparities, these results are highly relevant for shaping policies aimed at promoting sustainable economic growth.

Recommendations

To effectively address economic challenges and reduce poverty in West Sumatra, policymakers should prioritize several measures to enhance human capital development, promote gender equality, and stimulate job creation. First, the government should focus on improving the quality of education and healthcare, particularly in remote areas. Equitable access to these essential services is crucial for strengthening human capital, ensuring that individuals have the knowledge, skills, and well-being necessary to contribute effectively to economic growth. Investments in educational infrastructure, teacher training, and healthcare facilities will help bridge regional disparities and improve overall development outcomes.

Second, strengthening women's empowerment programs, particularly in the economic sector, is essential. Providing better access to credit, skills training, and employment opportunities can enhance women's economic participation and financial independence. Encouraging female entrepreneurship and increasing representation in the labor market will contribute to more inclusive economic growth while addressing gender disparities in development.

Third, job creation should be prioritized through strategic investments in labor-intensive infrastructure projects and support for industrial sectors with high employment potential. Encouraging the growth of industries that can absorb large numbers of workers, such as manufacturing, tourism, and agribusiness, will help reduce unemployment and drive economic expansion. Additionally, policies that support micro, small, and medium enterprises (MSMEs) can further stimulate job opportunities, particularly for marginalized communities.

By implementing these policies, Sumatera Barat can foster sustainable economic growth, reduce unemployment, and create a more inclusive and resilient economy. Ensuring that human capital development and gender equality remain central to economic strategies will not only enhance regional prosperity but also contribute to long-term social and economic stability.

ACKNOWLEDGMENT

This research is funded by LPPM, Universitas Andalas, under Grant RTA - PSS 2024 (Contract No.: 232/UN16.19/PT.01.03/PSS/2024).

REFERENCES

Adiprayoga, S. N., & Samiaji, J. (2021). Opportunities and Strategies for the Blue Economy Through the Empowerment of Sumatera Coastal Communities in Supporting the Realization of the National Food Security. *IOP Conference Series: Earth and Environmental Science*, 934(1), 012039. https://doi.org/10.1088/1755-1315/934/1/012039

Badan Pusat Statistik. (2022). *Indikator Kesejahteraan Rakyat Provinsi Sumatera Barat 2022*. Padang: BPS

Badan Pusat Statistik. (2023a). *Penduduk, Laju Pertumbuhan Penduduk, Distribusi Persentase Penduduk Kepadatan Penduduk, Rasio Jenis Kelamin Penduduk Menurut Kabupaten/Kota di Provinsi Sumatera Barat, 2022***.** Retrieved from https://sumbar.bps.go.id/id/statistics-table/3/V1ZSbFRUY3lTbFpEYTNsVWNGcDZjek53YkhsNFFUMDkjMw==/penduduk--laju-pertumbuhan-penduduk--distribusi-persentase-penduduk--kepadatan-penduduk--rasio-jenis-kelamin-penduduk-menurut-kabupaten-kota-di-

provinsi-sumatera-barat--2022.html?year=2022

Badan Pusat Statistik. (2023b). *Indeks Pembangunan Gender (IPG) Menurut Kabupaten/Kota (Persen), 2010–2023*. Retrieved from https://sumbar.bps.go.id/indicator/40/261/1/indeks-pembangunan-gender-ipg-menurut-kabupaten-kota.html

Badan Pusat Statistik. (2023c) *Tingkat Pengangguran Terbuka (TPT) Sumatera Barat (Persen) , 2010–2023*. Retrieved from https://sumbar.bps.go.id/indicator/6/129/1/tingkat-pengangguran-terbuka-tpt-sumatera-barat.html

Badan Pusat Statistik. (2024a). *(roduk Domestik Regional Bruto per Kapita Atas Dasar Harga Berlaku Menurut Provinsi (ribu rupiah), 2022* . Retrieved from https://www.bps.go.id/id/statistics-table/3/YWtoQlRVZzNiMU5qU1VOSlRFeFZiRTR4VDJOTVVUMDkjMw==/produk-domestik-regional-bruto-per-kapita-atas-dasar-harga-berlaku-menurut-provinsi--ribu-rupiah---2022.html?year=2022

Badan Pusat Statistik. (2024b). *Indeks Pembangunan Gender (IPG), 2010–2023*. Retrieved from https://www.bps.go.id/id/statistics-table/2/NDYzIzI=/indeks-pembangunan-gender--ipg-.html

Badan Pusat Statistik. (2024c). (Seri 2010) *Produk Domestik Regional Bruto Menurut Kabupaten/Kota di Sumatera Barat*. Retrieved from https://sumbar.bps.go.id/indicator/52/170/1/-seri-2010-produk-domestik-regional-bruto-menurut-kabupaten-kota-di-sumatera-barat.html

Badan Pusat Statistik. (2024d). *(Metode Baru) Indeks Pembangunan Manusia 2010–2023*. Retrieved from https://www.bps.go.id/id/statistics-table/2/NDEzIzI=/-metode-baru--indeks-pembangunan-manusia.html

Bhowmik, D. (2020). Impact of gender development index on human development index and gross domestic product per capita. *Vidyasagar University Journal of Commerce*, *25*, 41-56

Blaine, B. E. (2018). Winsorizing. In *The SAGE encyclopedia of educational research, measurement, and evaluation* (p. 1817). SAGE Publications.

Dwyer-Lindgren, L., Kendrick, P., Baumann, M. M., Li, Z., Schmidt, C., Sylte, D. O., Daoud, F., La Motte-Kerr, W., Aldridge, R. W., Bisignano, C., Hay, S. I., Mokdad, A. H., & Murray, C. J. L. (2024). Disparities in well-being in the USA by race and ethnicity, age, sex, and location, 2008–21: an analysis using the Human Development Index. *The Lancet*, 404(10469), 2261–2277. https://doi.org/10.1016/S0140-6736(24)01757-4

Eigbiremolen, G. O., & Anaduaka, U. S. (2014). Human capital development and economic growth: The Nigeria experience. *International Journal of Academic Research in Business and Social Sciences, 4*(4). https://doi.org/10.6007/ijarbss/v4-i4/749

Foster, J. E., Lopez-Calva, L. F., & Szekely, M. (2005). Measuring the Distribution of Human Development: methodology and an application to Mexico. *Journal of Human Development*, 6(1), 5–25. https://doi.org/10.1080/1464988052000342220

Girón, A., & Kazemikhasragh, A. (2022). Gender equality and economic growth in Asia and Africa: Empirical analysis of developing and least developed countries. *Journal of the Knowledge Economy*, *13*(2), 1433–1443. https://doi.org/10.1007/s13132-021-00782-1

Goffe, N. V., & Monusova, G. A. (2017). Labour Productivity: Social and Economic

Prerequisites for Growth. *World Economy and International Relations*, 61(4), 37–49. https://doi.org/10.20542/0131-2227-2017-61-4-37-49

Goldin, C. (2024). *Human Capital. In Handbook of Cliometrics* (pp. 353–383). Springer International Publishing. https://doi.org/10.1007/978-3-031-35583-7_23

Gulcemal, T. (2020). Effect of human development index on GDP for developing countries: A panel data analysis. *Pressacademia*, *7*(4), 338–345. https://doi.org/10.17261/pressacademia.2020.1307

Harist, M. C., Shidiq, I. P. A., Fitriani, A. H., & Santoso, A. D. (2018). A GIS-based model for a land suitability analysis of Amomum compactum Soland ex Maton (cardamom) in West Sumatra. *AIP Conf. Proc.* 17 October 2018; 2021 (1): 030009. https://doi.org/10.1063/1.5062733

Jibir, A., Abdu, M., & Buba, A. (2023). Does Human Capital Influence Labor Productivity? Evidence from Nigerian Manufacturing and Service Firms. *Journal of the Knowledge Economy*, 14(2), 805–830. https://doi.org/10.1007/s13132-021-00878-8

Karoui, K., & Feki, R. (2018). The effect of gender inequality on economic development: Case of African countries. *Journal of the Knowledge Economy, 9*(1), 294–300. https://doi.org/10.1007/s13132-015-0341-9

Kholifaturrohmah, R., Floresti, D. A., & Rosiana, M. (2022). Kontribusi human capital terhadap pertumbuhan ekonomi melalui pendidikan. *Jurnal Ekonomi, Bisnis dan Akuntansi*, *4*.

Kuznetsova, M.V., Skvortsova, N.V. (2022). Determination Methodology for the Regional Level of Human Capital Development. In: Solovev, D.B., Savaley, V.V., Bekker, A.T., Petukhov, V.I. (eds) *Proceeding of the International Science and Technology Conference "FarEastCon 2021". Smart Innovation, Systems and Technologies*, vol 275. Springer, Singapore. https://doi.org/10.1007/978-981-16-8829-4_16

Mirziyoyeva, Z., & Salahodjaev, R. (2023). Does representation of women in parliament promote economic growth? Considering evidence from Europe and Central Asia. *Frontiers in Political Science, 5*. https://doi.org/10.3389/fpos.2023.1120287

Mitra, A., Bang, J. T., & Biswas, A. (2015). Gender equality and economic growth: Is it equality of opportunity or equality of outcomes? *Feminist Economics, 21*(1), 110–135. https://doi.org/10.1080/13545701.2014.930163

Munir, K., & Arshad, S. (2018). Factor accumulation and economic growth in Pakistan: incorporating human capital. *International Journal of Social Economics*, 45(3), 480–491. https://doi.org/10.1108/IJSE-12-2016-0346

Nesti, L., Tan, F., & Hadiguna, R. A. (2020). Competitive analysis of crude palm oil (CPO) in West Sumatera Province to other provinces in Sumatera Island in domestic market. *IOP Conference Series: Earth and Environmental Science*, 583(1), 012015. https://doi.org/10.1088/1755-1315/583/1/012015

Purwaningsih, T., Inderanata, R. N., & Fauziah, M. R. (2023). Spatial analysis of human development index by province in Indonesia 2018–2020. *AIP Conference Proceedings, 020027*. https://doi.org/10.1063/5.0136938

Roșoiu, I., & Roșoiu, A. (2014). The relation between unemployment rate and economic growth in USA. *International Journal of Economic Practices and Theories, 4*(2).

Retrieved from www.ijept.org

Roza, Y. A., & Satrianto, A. (2021). *Analysis of Factors Affecting Education Inequality in Sumatera Barat*.

Sadiku, M., Ibraimi, A., & Sadiku, L. (2015). Econometric estimation of the relationship between unemployment rate and economic growth of FYR of Macedonia. *Procedia Economics and Finance*, *19*, 69–81. https://doi.org/10.1016/s2212-5671(15)00009-x

Seguino, S., & Were, M. (2014). Gender, development and economic growth in Sub-Saharan Africa. *Journal of African Economies*, *23*(1 SUPPL1). https://doi.org/10.1093/jae/ejt024

Schlossarek, M., Harmáček, J., & Pavlík, P. (2016). Economic growth and human development in developing countries: Virtuous or vicious circle? *Politická Ekonomie*, *64*(6), 651–673. https://doi.org/10.18267/j.polek.1102

Teixeira, A. A. C., & Queirós, A. S. S. (2016). Economic growth, human capital and structural change: A dynamic panel data analysis. *Research Policy*, 45(8), 1636–1648. https://doi.org/10.1016/j.respol.2016.04.006

UNDP. (2010). Human Development Report 2010. Retrieved from https://hdr.undp.org/content/human-development-report-2010

Zefnihan, & Alhadi, Z. (2018). Community-based tourism development viewed from economic, social culture and environment aspects in mandeh's integrated marine tourism area. *MATEC Web of Conferences*, 229, 01006.

Zhang, J., & Danish. (2019). The dynamic linkage between information and communication technology, human development index, and economic growth: Evidence from Asian economies. *Environmental Science and Pollution Research*, *26*(26), 26982–26990. https://doi.org/10.1007/s11356-019-05926-0