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THE INFLUENCE OF THE HUMAN DEVELOPMENT INDEX FOR WOMEN AND REGIONAL MINIMUM WAGE ON THE PREVALENCE OF WASTING, STUNTING, AND UNDERWEIGHT IN CHILDREN

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ABSTRACT

The issues discuss malnutrition in children, wasting, stunting, and underweight, which has caused serious concerns in global public health and economics, particularly in developing countries. This study aimed to see whether there is a relationship between women's human development index and regional minimum wage on wasting, stunting, and underweight. It used secondary data from thirty-three provinces in Indonesia from 2018-2022. The method used was panel data regression. The results obtained are that women's human development index has a significant negative effect on stunting and underweight. In addition, it was obtained that regional minimum wage significantly negatively affects wasting, stunting, and underweight. These findings highlight the importance of policies supporting increasing the women's human development index and setting a decent regional minimum wage to address malnutrition problems.

Keywords: ***H****uman development index, Regional minimum wage, Wasting, Stunting, Underweight*
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ABSTRAK

Permasalahan mengenai gizi buruk pada anak seperti wasting, stunting, dan underweight yang menyebabkan kekhawatiran serius pada kesehatan masyarakat dan perekonomian global, biasanya terjadi di negara berkembang. Tujuan dari penelitian ini, untuk melihat apakah terdapat hubungan antara indeks pembangunan manusia pada perempuan dan upah minimum regional terhadap wasting, stunting, dan underweight. Data sekunder yang digunakan adalah tiga puluh tiga provinsi di Indonesia dari tahun 2018-2022. Meode yang digunakan dalam penelitian ini adalah regresi data panel. Hasil yang diperoleh adalah indeks pembangunan manusia pada perempuan memiliki pengaruh negatif signifikan terhadap stunting dan underweight. Selain itu upah minimum regional memiliki pengaruh negatif

signifikan terhadap wasting, stunting, dan underweight. Penemuan ini, menggarisbawahi mengenai pentingnya kebijakan yang dapat memberikan dukungan dalam meningkatkan indeks pembangunan manusia pada perempuan dan penetapan upah minimum regional yang layak supaya dapat mengatasi permasalahan gizi buruk yang terjadi.

Kata Kunci: *Indek pembangunan manusia, Upah minimum regional, Wasting, Stunting, Underweight*
JEL : I15, J13, O15

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Introduction

The issues concern malnutrition in children, including wasting, stunting, and underweight, which has caused serious concerns in global public health, particularly in developing countries. According to the World Health Organization (WHO), an estimated 149 million children under five years old suffer from stunting, while 45 million face wasting (WHO, 2021). These problems influence children's physical health and impact cognitive development and future productivity. Hence, understanding the factors affecting the prevalence of malnutrition is crucial.

The Human Development Index (HDI) measures human development involving health, education, and living standards. Research has shown that higher HDI is associated with lower malnutrition rates. A study by Alkire and Foster (2011) found that countries with higher HDI have better access to healthcare and education, contributing to improved child nutrition status. Investment in education and healthcare can serve as an effective strategy to reduce the prevalence of wasting and stunting.

Along with the overall human development index, specific human development index according to gender also significantly impacts child nutrition. The woman-mother is the figure who has a strong bond with the children. When women have better access to education and economic resources, they are more likely to make informed decisions regarding family nutrition and health (Mondal et al., 2014). Research by the McKinsey Global Institute (2015) indicates that amplifying women's participation in education and the workforce can decrease child malnutrition rates. If women can have their wages, they can provide more. Higher minimum wages can also encourage women economically, enabling them to provide nutritious food for their children. Therefore, policies supporting women's human development index and minimum wage enhancement can be vital in addressing malnutrition issues.

Alongside the human development index, regional minimum wages can significantly impact children's nutritional status. Higher minimum wages can improve families' purchasing power, allowing them to access nutritious food and necessary healthcare services (Lenhart, 2017). Research by Ponce et al. (2018) demonstrated that increases in minimum wage levels are associated with reductions in stunting and underweight rates among children. Thus, policies supporting raising the minimum wage can be essential in addressing malnutrition issues.

The combination of women's human development index and regional minimum wages provides a more comprehensive picture of the prevalence of wasting, stunting, and underweight among children. Research by Pellett (1981) showed that regions with higher human development index and better minimum wages tend to have lower malnutrition rates. Therefore, policymakers must integrate a comprehensive approach, focusing on improving the human development index and regulating minimum wages as strategic steps to reduce the prevalence of malnutrition in children.

Literature Review

This literature review aims to provide a comprehensive overview of relevant research. This review will explore existing findings and perspectives and how previous research contributes to a better understanding the issues raised. There are three points in this research literature review.

Women's Human Development Index (HDI)

The Human Development Index (HDI) plays a crucial role in determining the incidence of child malnutrition, including wasting, stunting, and underweight. As a composite measure of life expectancy, education, and per capita income, a negative correlation exists between the Human Development Index (HDI) and the prevalence of stunting and wasting, where higher HDI levels are linked to lower rates of these malnutrition indicators (Soheylizad et al., 2016; Ssentongo et al., 2021). Stunting and wasting are more widespread, primarily due to factors such as inadequate healthcare services, low maternal education, and restricted access to nutritious food (Okutse & Athiany, 2025; Soheylizad et al., 2016; Ssentongo et al., 2021). Previous studies prove that the prevalence of underweight is notably higher in countries with lower HDI. Socioeconomic conditions, including household income and parental education, play a significant role in shaping this relationship (Okutse & Athiany, 2025; Soheylizad et al., 2016; Ssentongo et al., 2021). Research further highlights that socioeconomic disparities contribute substantially to the incidence of underweight children, with impoverished households being disproportionately affected (Okutse & Athiany, 2025; Singh et al., 2019).

Studies indicate that components of the HDI, specifically for women, including education, income, and health, are significantly associated with child malnutrition. A survey by Eom et al. (2024) has two key points. First, women's empowerment has been shown to reduce the prevalence of stunting, underweight, and wasting in children. Second, a higher Gender Inequality Index (GII) is linked to increased rates of underweight and wasting, highlighting the direct impact of gender disparities on child nutritional outcomes. Maternal education plays a critical role in mitigating child malnutrition. Studies have demonstrated that higher maternal education levels are associated with improved child nutritional status (Singh et al., 2019; Singh et al., 2020). Although existing research has explored the relationship between individual components of Women's HDI and child malnutrition, studies explicitly examining Women's HDI as a comprehensive index remains limited. Further research is necessary to provide a more holistic understanding of the impact of Women's HDI on child malnutrition and to inform targeted policy interventions.

Regional Minimum Wage

Several studies have examined the impact of regional minimum wage increases on child malnutrition, including wasting, stunting, and underweight. The results remain mixed for these three indicators, as Ponce et al. (2018) stated that higher minimum wages can contribute to lowering stunting rates. However, the study found no significant link between minimum wage growth and reductions in underweight or wasting. Minimum wage regulations influence the total

income earned by a household. Children from low-income families and those whose mothers have lower levels of education are at a higher risk of experiencing stunting and underweight (Caleyachetty et al., 2023; Hasan et al., 2020). A study by Utami et al. (2019) concluded that household income is one of the most significant factors influencing the incidence of stunting among children under five in South Jakarta, Indonesia. Similarly, research by Ayuningtyas et al. (2022) in Indonesia identified substantial disparities in child undernutrition across different districts, with the highest prevalence of underweight, wasting, and stunting found in the most economically disadvantaged areas. This variation underscores the potential influence of regional minimum wage policies on child malnutrition. Household income is the factor that is most responsible for influencing the incidence of stunting in children under five. Therefore, ensuring fair wage policies could improve household financial stability and reduce malnutrition prevalence among vulnerable children.

Prevalence of Wasting, Stunting, and Underweight

Wasting, stunting, and underweight are terms that reveal malnutrition problems in children. These three terms are the main malnutrition problems that significantly impact children's overall development and growth, especially in developing countries (Budzulak et al., 2022). Based on Bahar et al. (2023) and Leal et al. (2020), the three terms of malnutrition, such as wasting, are problems that occur in children's weight that are disproportionate to the child's height caused by short-term nutritional deficiencies or caused by disease. Stunting is usually caused by height that is below the standard for the child's age due to chronic malnutrition in the long term. The last indicator is underweight, a child's weight that is not underage due to chronic malnutrition.

Research on malnutrition conditions that occur in children, such as stunting, wasting, and being underweight, is still limited. Still, according to Chai et al. (2022), continuous malnutrition affects the quality of life from childhood to adulthood. In addition, according to several other studies, the prevalence of wasting, stunting, and underweight among children under five varies significantly across different regions, influenced by various maternal and socio-economic factors in many other countries such as China, Timor Leste, and the Republic of Congo (Geng & Xavier, 2022; Maulina et al., 2022; Siddiqa et al., 2023; Luzingu et al., 2022). These disparities highlight the influence of maternal conditions and socio-economic factors on child nutrition.

Data and Research Methods

This study uses secondary data from the Central Statistics Agency to perceive the relationship between Women's HDI and regional minimum wage on the prevalence of wasting, stunting, and underweight. The data used is panel data from 33 provinces in Indonesia in 2018-2022. The data variables used in this study are as follows:

Table 1: Variables Data

Dependent Variables	
Prevalence of Wasting	Percentage of wasting children in the province
Prevalence of Stunting	Percentage of stunting children in the province
Prevalence of Underweight	Percentage of underweight children in the province
Interest Variables	
Women's Human Development Index	Women's Human Development Index of the province
Regional Minimum Wage	Real minimum monthly wage (by province)
Independent Variables	
Women Head of Household	The percentage of women who are head of household is based on the number of family members.
Working Women	Percentage of women as head of household who work based on place of residence
Women Internet User	Percentage of women who have internet access by age
Special Index for Handling Stunting	Special Index for Handling Stunting of the Province
Economics Growth	GDP of the province

From the variable data table above, the data will be processed using the panel data regression method to analyse the relationship between the existing variables. This method allows us to consider variations between individuals and time to provide a more accurate estimate of the influence of independent variables on dependent variables (Baltagi, 2005).

Common Effect Model

The Common Effect Model is the most straightforward, operating under the premise that the interception and slope remain consistent across different individuals and periods. The equation for this model can be expressed (Chudik et al., 2013):

$$Y_{it} = \beta_0 + \sum_{k=1}^{n} \beta_k X_{kit} + \varepsilon_{it}$$

Fixed Effect Model

Every object is subject to varying conditions, leading to potential discrepancies during analysis. An object may exhibit significantly different situations over time. Consequently, regression outcomes should reflect differences in constants across objects, even if the coefficients remain identical. The Fixed Effect Model is a type of regression incorporating a fixed effect, indicating that the constant for a particular observation remains unchanged across different periods. Thus, the equation can be expressed as follows (Hilpert & Blasi, 2020):

$$Y_{it} = \beta_0 + \sum_{k=1}^{n} \beta_k X_{kit} + \varepsilon_{it}$$

Random Effect Model

Residuals and random differences between units and periods influence the assumptions regarding the variations in intercepts and constants. This model has one requirement. The cross-section data must be better than the number of coefficients. The equation of this model is (Gujarati, 2015):

$$Y_{it} = \beta_{0i} + \sum_{i=1}^{m}\sum_{k=1}^{n} \beta_{ki} X_{kit} + \varepsilon_{it}$$

The explanation of all the formulas above is that *i* refers to the number of observations, which can be a number from 1 to *n*, where n is the total analysis units observed. Furthermore, *t* indicates the amount of time, expressed in numbers from 1 to *t*, where *t* is the observation period for each unit. Therefore, the combination of *n x t* reflects the total amount of panel data obtained from observations of *n* units at *t* different times. In addition, the symbol ε represents the residual, which is the difference between the observed value and the value predicted by the model.

Finding and Discussion

Table 2: Result of Panel Data Regression

Variables	(Y_W) Wasting	(Y_S) Stunting	(Y_U) Underweight
Women's Human Development Index	-0.102	-0.830***	-0.432***
	(0.0708)	(0.197)	(0.156)
Regional Minimum Wage	-1.57e-06***	-2.04e-06	-1.85e-06*
	(4.64e-07)	(1.28e-06)	(9.63e-07)
Women Head of Household			
1 Person	16.53	18.47	38.20
	(25.50)	(67.27)	(43.78)
2-3 People	16.64	18.56	38.54
	(25.51)	(67.27)	(43.78)
4-5 People	16.61	18.48	38.21
	(25.50)	(67.27)	(43.78)
≥6 People	16.71	18.80	38.46
	(25.50)	(67.27)	(43.78)
Working Women			
Urban	0.0264	0.0263	-0.00790
	(0.0299)	(0.0805)	(0.0555)
Rural	-0.0296	0.0261	0.0479
	(0.0281)	(0.0761)	(0.0534)
Women Internet User			
Age 13-15	0.0461	0.0739	-0.0884
	(0.0680)	(0.180)	(0.118)
Age 16-18	0.193**	0.574**	0.00823
	(0.0915)	(0.243)	(0.161)
Age 19-24	0.320***	0.895***	0.641***
	(0.112)	(0.297)	(0.196)
≥ Age 25	-0.157	-1.060***	-0.0961

Variables	(Yw) Wasting	(Ys) Stunting	(Yu) Underweight
	(0.108)	(0.295)	(0.215)
Special Index for Handling Stunting	-0.122**	0.237*	0.0361
	(0.0502)	(0.140)	(0.108)
Economics Growth	0.0863**	0.785***	0.441***
	(0.0378)	(0.1000)	(0.0657)
Constant	-1,653	-1,817	-3,815
	(2,550)	(6,727)	(4,378)
Observations	170	170	170
Number of provinsi	34	34	34

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The panel data regression analysis results show that the regional minimum wage significantly negatively affects wasting. The regional minimum wage decreases by Rp 1. Assuming ceteris paribus, wasting will increase by 1.57e-06 percent.

Furthermore, the women's human development index indicates a significant negative result for stunting. The result describes that the women's human development index decreases by 1 point. Stunting will be increased by 0.83 percent with the assuming ceteris paribus. The results above also explain that the regional minimum wage indicates a significant negative result for stunting. If the regional minimum wage decreases Rp 1, stunting will be enhanced by 2.04e-06 percent with the assuming ceteris paribus.

The women's human development index also shows a significant negative result against underweight. If the women's human development index decreases by 1 point, underweight will be enhanced by 0.432 percent, assuming ceteris paribus. The last thing about the result above explains that the regional minimum wage also shows a significant negative result against underweight. If the regional minimum wage decreases by Rp 1, underweight will be increased by 1.85e-06 percent, assuming ceteris paribus.

The Correlation of Women's Human Development Index to Stunting and Underweight in Children

The analysis above showed that the women's human development index significantly negatively affects stunting and underweight in children. The results of this research align with the survey by Eom et al. (2024), which shows that women's empowerment has been shown to reduce the prevalence of stunting, underweight, and wasting in children. The index uses calculations that include health, education, and living standards to reflect women's welfare. This is also in line with Singh et al. (2019) and Singh et al. (2020), who stated that women with higher education levels are associated with improved child nutritional status, which is one of the indicators in calculating the human development index. Low levels of the women's human development index are often associated with stunting or underweight children due to a mother's lack of power and ability to support the quality of life for her children.

Stunting is a condition in children due to chronic malnutrition. The impacts of stunting vary and have long-term health effects, such as impaired brain development. The results of this study are in line with the World Health Organization (2022), which states that what happens when a woman has a low human development index is a tendency to be less able to access

adequate information and health services and to meet daily needs. Become a high number in the contribution of stunting.

While underweight conditions are a crucial problem for children, according to UNICEF (2021), if women lack access to education and nutrition, many children will be born with low birth weight. This situation creates a cycle of poverty. Children will also have other risks. Therefore, the results of this study show that women tend to have inadequate knowledge about nutrition and health, which results in poor diet and lack of attention to children's health (United Nations Development Programme, 2020). This creates a significant negative impact on child development.

The Correlation of Regional Minimum Wage to Wasting, Stunting, and Underweight in Children

Regional minimum wage is an essential indicator of economic welfare for the community in fulfilling basic needs (Ramdhansya & Indrawati, 2022). This research finds that regional minimum wage significantly negatively affects wasting, stunting, and underweight in children. The results of this study are in line with the statements of Caleyachetty et al. (2023) and Hasan et al. (2020) that children from low-income families and those whose mothers have lower levels of education are at a higher risk of experiencing stunting and underweight. This explains the potential for an increase or decrease in wasting, stunting, and underweight rates related to regional minimum wage conditions in meeting children's nutrition (Majid et al., 2016).

Similarly, research by Ayuningtyas et al. (2022) in Indonesia identified substantial disparities in child undernutrition across different districts, with the highest prevalence of underweight, wasting, and stunting found in the most economically disadvantaged areas. In conditions where regional minimum wage decreases, it directly results in a decrease in household income. According to the World Health Organization (2022), it results in the unfulfilled basic needs of the family, including nutritious food. In this study, it can be concluded that families with low incomes (low regional minimum wage) tend to consume less healthy food because they cannot meet basic needs. Thus, decreasing the regional minimum wage can increase wasting, stunting, and underweight rates among children.

A significant negative correlation exists between the regional minimum wage and child wasting, stunting, and underweight rates. A decrease in the regional minimum wage can potentially increase the prevalence of nutritional problems in children, impacting their health. Therefore, the government needs to consider policies that support increasing the regional minimum wage for children's and society's welfare.

Conclusion

This study explains the relationship between women's human development index and regional minimum wage on malnutrition problems, namely wasting, stunting, and underweight. The analysis results show that the women's human development index significantly negatively affects stunting and underweight, meaning that increasing the index can reduce the prevalence of these two nutritional problems. As well as the regional minimum wage also negatively affects three nutritional problems, namely wasting, stunting, and being underweight, indicating that increasing the minimum wage can contribute to improving nutritional status in the community.

These findings highlight the importance of policies supporting increasing the women's human development index and setting a decent regional minimum wage to address malnutrition

problems. By improving the quality of life of women through education, health, and access to resources, it is hoped that the negative impacts of wasting, stunting, and underweight on children can be reduced. In addition, setting an adequate minimum wage can provide economic support for families to meet better nutritional needs. Therefore, integrating women's human development and social protection policies is essential to create an environment supporting children's health and well-being.