

## DEMOCRACY, EDUCATION, AND GENDER INEQUALITY: EVIDENCE FROM PROVINCIAL PANEL DATA DYNAMICS

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### Abstract

This study aims to analyze the dynamics of inclusive development at the provincial/district level in Indonesia by emphasizing the differences in the short-term and long-term influences of its determinants. This study uses panel data and applies the Panel Autoregressive Distributed Lag (Panel ARDL) method. This method was chosen because it is able to accommodate differences in regional characteristics and varying degrees of variable integration. The estimation results show a stable long-term relationship between the democracy index in Indonesia and the explanatory variables, as indicated by the negative and significant *error correction term coefficient*. In the short term, gender inequality has a negative and significant effect on the democracy index, while economic participation has a positive and significant effect. The long-term results confirm that gender inequality is a structural obstacle to the democracy index, while economic participation is a key driver of increasing sustainable inclusive development at the regional level. Other social variables show relatively weaker effects, both in the short and long term. The findings of this study emphasize the importance of regional development policies oriented towards reducing gender inequality and strengthening economic participation as key strategies for boosting democracy in Indonesia. Methodologically, this study contributes to the literature by applying the ARDL Panel approach to the Indonesian subnational context, thus providing a more comprehensive understanding of the dynamics of inclusive development across regions.

**Keywords:** *Democracy Index, Social Inclusion, Education Level, and Gender Inequality*

### Introduction

Democracy No only understood as mechanism electoral , but also as system potential institutions push justice social , expansion access to source power , as well as subtraction inequality between group social . In context development sustainable , quality democracy the more often associated with achievements inclusion social and gender equality , both of which is objective main in the Sustainable Development Goals agenda (Assembly and Goals 2015) . However Thus , the relationship between democracy and gender inequality are not always linear and automatic , especially in developing countries with characteristics diverse social , economic , and institutional levels Province (Favetti, Vermiglio, and Naciti 2025) . Gender inequality still exists become problem significant structural , reflected in gap access education , participation economy , representation politics , and decision making public decisions (Suryani and Wardana 2024) . Various studies show that improvement quality democracy can create room more participation wide for group women , good through policy affirmative and strengthening right civil and political . However , the effectiveness democracy in lower gender inequality is highly dependent on factors supporters others , especially level education and degree inclusion social in Society (Politics, Kendal, and Election 2024; Rambe, Dompak, and Salsabila 2025) .

Education is a key mechanism bridging democracy and gender equality. Education not only enhances individual capabilities but also shapes critical awareness, political preferences, and the ability to participate in social and political processes (Nur and Komariah 2024) . Higher levels of education tend to correlate with more egalitarian attitudes towards gender roles, increased female participation in the labor market, and more balanced representation in public institutions. Thus, education serves as a crucial channel through which democracy can produce more inclusive social outcomes (Bellani and Hidalgo-Hidalgo 2025) . Besides education, social inclusion is a crucial

dimension that often receives less attention in analyses of the relationship between democracy and gender inequality. Social inclusion reflects the extent to which individuals and groups have equal access to basic services, economic opportunities, social protection, and decision-making processes. Democracy operating in a context of social exclusion has the potential to create new inequalities, as the benefits of democratic institutions are enjoyed only by certain groups. Therefore, without adequate levels of social inclusion, democracy may fail to achieve substantial gender equality (Zhang and Zhu 2024) .

At the provincial level, variations in the quality of democracy, educational attainment, and levels of social inclusion are often striking. Differences in fiscal capacity, governance quality, sociocultural characteristics, and regional policy priorities create heterogeneous development dynamics. This makes subnational analysis, particularly at the provincial level, highly relevant for understanding how democracy works in more concrete and institutionalized contexts. However, most empirical literature still focuses on cross-national analysis, overlooking the internal heterogeneity that is crucial for formulating more targeted policies. Furthermore, the relationship between democracy, education, social inclusion, and gender inequality is dynamic over time. The impacts of democratic policies and education investments are not always immediate but rather accumulate over the medium and long term. Therefore, a dynamic panel approach is crucial to capture the persistence of effects and structural adjustments occurring at the provincial level. Static analyses risk biased conclusions by ignoring temporal dependencies and potential endogeneity between variables. Based on this background, this study aims to analyze the relationship between the Democracy Index, social inclusion, education level, and gender inequality at the provincial level using panel data. Specifically, this study explores the extent to which democracy contributes to reducing gender inequality, both directly and through the mediating role of education and social inclusion. By leveraging interprovincial variation and temporal dynamics, this study is expected to provide a more comprehensive understanding of the institutional and social mechanisms that influence gender equality in Indonesia.

## LITERATURE REVIEW

Previous research has shown that democracy plays a crucial role in promoting gender equality, particularly through mechanisms of political participation, public accountability, and human rights protection. More mature democratic systems tend to result in more inclusive public policies for women, such as increased political representation, legal protection, and access to basic services (Zhang and Zhu 2024) . However, several studies emphasize that electoral democracy alone is not enough to reduce gender inequality. Patriarchal cultural factors, social norms, and economic inequality often limit the effectiveness of democratic institutions in producing substantive equality (Papers, Change, and Waylen 2014) . Thus, the quality of democracy, beyond simply the existence of elections, is a crucial determinant in reducing gender inequality. In the Indonesian context, the relationship between democracy, education, and gender inequality exhibits subnational and spatial dynamics. Since the era of decentralization, the quality of democracy has not developed evenly across provinces, as reflected in variations in the Indonesian Democracy Index (IDI). The literature shows that regions with better democratic quality tend to have more inclusive public policies for women, particularly in education and social participation.

However, procedural democracy at the regional level has not always been directly proportional to a reduction in gender inequality (Zeng and Jiang 2023) . Patriarchal social norms and unequal access to education remain major limiting factors. Several empirical studies in Indonesia have found that increased women's political participation and civil liberties have not fully translated into improved welfare and substantive gender equality. Education plays a strategic role in this context. Disparities in average years of schooling and expected years of schooling between genders and regions remain significant, particularly between western and eastern Indonesia. The literature shows that increasing women's education significantly contributes to reducing gender disparities in the labor market, health, and household decision-making (Adolph 2016) . The interaction between democracy and education is key. Regions with relatively good democratic qualities but high educational disparities tend to persist with gender inequality. Conversely, provinces that combine inclusive democracy and educational equity perform better in reducing the Gender Inequality Index (GIG). This confirms that democracy and education are complementary, not substitutive, in addressing gender inequality (Deviantony and Susanto 2024) .

## METHOD

Study This use approach quantitative with method dynamic panel econometrics , namely Panel Autoregressive Distributed Lag (Panel ARDL). Approach This used For analyze connection term short and long term long between variables dependent and variable independent on several cross-sectional units during 2009-2024 period from 10 provinces The sample size was 160 samples from the poorest regions in Indonesia ( Aceh, Bengkulu, East Nusa Tenggara, North Sulawesi, Gorontalo, West Sulawesi, Southeast Sulawesi, Maluku, West Papua, and Papua).

The Autoregressive Distributed Lag (ARDL) model has several key advantages that make it a widely used econometric approach in analyzing dynamic relationships between economic and social variables. First, the ARDL model is able to clearly distinguish short-term and long-term effects within a single estimation framework. Through its transformation into an Error Correction Model (ECM), ARDL allows researchers to identify adjustment mechanisms toward long-term equilibrium while simultaneously capturing short-term response dynamics. This advantage is crucial in policy analysis, as the impact of a variable often differs between the short and long term (Amaluddin et al. 2018) .

The ARDL panel model equation in this study is as follows:

$$IDI_{it} = \alpha_i + \sum_{p=1}^P \phi_p IDI_{i,t-p} + \sum_{q=1}^Q \beta_q IKS_{i,t-q} + \sum_{r=1}^R \gamma_r PTSMA_{i,t-r} + \sum_{s=1}^S \delta_s PEI_{i,t-s} + \sum_{s=1}^S \delta_s IKG_{i,t-s} + \varepsilon_{it}$$

**Table I. Analysis statistics descriptive .**

	Obs	Min	Max	Mean	Std. Dev
IDI	160	54.02	83.21	69.9	6.85
PEI	160	2.13	6.41	4.89	0.88
PTSMA	160	25.44	75.01	54.36	12.92
IKS	160	23.21	57.22	42.75	7.44
IKG	160	0.36	0.59	0.51	0.04

*Processed Results 2025*

The provinces of Aceh, Gorontalo, West Nusa Tenggara, Southeast Sulawesi, West Sulawesi, Maluku, West Papua, and Papua, or 8 of the 10 poorest provinces in Indonesia, statistically have low democracy index scores. This is certainly the main focus of this study and provides a concrete foundation and is the latest finding due to the strong correlation between poor provinces in Indonesia and low democracy indexes in these eight provinces. This finding is consistent with previous research showing that corruption can undermine the legitimacy of democratic institutions, reduce government accountability, and hinder political participation (Nettuno 2024) . Conversely, education spending was found to have a positive relationship with the IDI, indicating that investment in education can increase political awareness, civic participation, and the public's ability to oversight of government performance.

## RESULTS AND DISCUSSION

**TABLE II. RESULTS OF BASIC REGRESSION MODELS AND ARDL**

	<i>Pooled Least Square</i> (PLS)	<i>Fixed Effect Model</i> (FEM)	<i>Dynamic Panel</i> (ARDL)
Variables	IDI	IDI	IDI
IDI (-1)			-0.77* (1.95)
IKG	-34.89 * ( -3.38 )	- 8.79* (-0.67)	-12.46*** (-1.68)
IKS	-0.08 (-1.20)	-0.028 (-0.24)	0.050 (1.08)
PEI	4.70* (5.18)	3.45* (3.20)	3.36* (8.75)
PLSMA	- 0.10* (-1.77)	0.25* (2.77)	0.10 (4.42)
Observations	160	160	140
R-squared	0.62	0.71	
J-statistic	5.06	(0.40)	30.39
Arellano-Bond			0.07
Serial			0.93
Correlation Test			

Estimation results of the PLS model show that Index Gender Inequality (GIG) has an impact negative and significant against IDI. Findings This indicates that improvement gender inequality in general significant lower level development inclusive . On the other hand , Inclusive Economic Participation (PEI) has an impact positive and significant , which indicates that improvement participation economy contribute to the improvement of democratic development inclusive . While that , Index Social Welfare (IKS) does not show significant influence in a way statistics . In the FEM model, the estimation results are generally consistent with the PLS model, although the coefficient values have decreased. The IKG variable continues to show a negative and significant effect on the IDI, while the PEI variable remains positive and significant. Differences in significance and coefficient values between models indicate heterogeneity in characteristics between observation units captured by the fixed effects. The ARDL panel model estimation results in Table II indicate a stable long-term relationship between inclusive development and its determinants at the provincial/district level in Indonesia. The coefficient of the previous year's dependent variable, IDI(-1), is negative and statistically significant, indicating the existence of an error correction mechanism . This finding suggests that any deviation from the long-term equilibrium of inclusive development will be gradually readjusted in subsequent periods. Thus, shocks to the democracy index, whether originating from economic or social factors, are not permanent. In the Indonesian context, this adjustment process reflects the role of regional development policies, central-to-regional fiscal transfers , and coordination of development planning between the central and regional governments. In the short term, gender inequality (GIG) has been shown to have a negative and significant effect on the Indonesian Democracy Index (IDI). This indicates that increasing gender inequality directly reduces the achievement of inclusive development in the regions. This finding confirms that unequal access to education, the labor market, and gender-based economic opportunities has a rapid impact on the performance of regional democracy at the provincial level. Conversely, economic participation (PEI) has a positive and significant effect in the short term, indicating that increasing community involvement in economic activities can quickly drive the development of a more inclusive democracy index. Meanwhile, other social variables, such as social resilience (IKS) and PLSMA, do not show a significant effect in the short term, indicating that their impact is more indirect or requires a longer adjustment period.

The long-term estimation results confirm that gender inequality is a structural barrier to the democracy index in Indonesia. The persistent negative effect indicates that gender-based inequality is not only a temporary impact but also limits the achievement of sustainable inclusive democratic development at the regional level. In contrast, economic participation shows a positive and significant long-term effect, indicating that sustained increases in economic participation will result in permanent improvements in the democracy index in Indonesia. This finding aligns with the Panel ARDL literature, which emphasizes the method's ability to distinguish short-term dynamics from long-term equilibrium relationships (Shin and Smith 2001) , and is consistent with previous empirical studies applying *the PMG-ARDL approach* in the context of regional development and inequality (Feriansyah and Larre 2022; Mensah et al. 2025) . Overall, the results of this study provide empirical evidence that policies to reduce gender inequality and increase economic participation are key to promoting sustainable inclusive democratic development at the provincial and district levels in Indonesia. Several empirical studies have adopted the ARDL Panel to analyze development and inequality issues. (Erlando, Riyanto, and Masakazu 2020) used **the PMG-ARDL approach** to examine the relationship between economic growth, energy consumption, and CO<sub>2</sub> emissions in Africa. The results indicate a significant long-term relationship, while short-term dynamics differ across countries. A similar study by Wong et al. (2021) analyzed the influence of governance quality and government spending on economic growth in the SADC region. Using the PMG-ARDL approach, the study found that improved governance has a long-term positive impact on growth, although the short-term effects are inconsistent.

## CONCLUSION

Study This analyze dynamics development inclusive at the level provinces / districts in Indonesia with use ARDL panel approach , which allows separation influence term short and long term long between variables . Estimation results show existence connection balance term stable length , as indicated by a significant error correction coefficient , so that confirm that index democracy in Indonesia in Indonesia has mechanism strong adjustment to various shock economic and social . In a way Empirically , gender inequality is proven become factor inhibitor main to index democracy , good in term short and term long . Findings This confirm that inequality access to education , opportunities work and participation economy gender- based not only impact temporary , but also limiting achievements development democracy in a way structural at the regional level (Bellani and Hidalgo-hidalgo 2025) . On the other hand , participation economy play a role as driver main development inclusive , with influence consistent and sustainable positive . This is show that



improvement involvement public in activity economy productive is key For strengthen inclusiveness of democratic development in the region . In a way overall , results study This give implications important policies for development regions in Indonesia. Efforts to reduce gender inequality and empowerment participation economy need placed as priority main in planning development national and regional . With utilise framework ARDL panel analysis , research This contribute in enrich literature empirical about Index democracy at the sub- national level as well as give strong foundation for formulation policy further development fair and sustainable .

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