

The Role of Ethnicity in Rural Development: A Study on the Distribution of Education and Employment

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Abstract

Rural development in multi-ethnic areas requires data-driven approaches that precisely capture social inequalities. This study aims to analyze the relationship between ethnicity, educational attainment, and employment sectors in four villages in East Kalimantan, Indonesia: Kutai Lama, Sidomulyo, Sanga-Sanga Muara, and Muara Pantuan. Employing a quantitative approach using the Bayesian Contingency Table method, along with polarisation and ethnic fractionalization indices, this study utilized microdata from 13,007 individuals based on Data Desa Presisi. The findings indicated no statistically significant relationship between ethnicity and educational or employment outcomes ($BF_{10} < 1$), thus supporting the null hypothesis. Ethnicity was not significantly correlated with educational attainment or employment type. However, descriptive analysis reveals distinct patterns among ethnic groups, such as a higher concentration of informal sector employment among Bugis and Sundanese, and greater representation in the formal sector among Javanese and Banjar communities. These patterns suggest that complex social dynamics are not necessarily reflected in statistical associations. Polarisation and fractionalization indices further indicate that unmanaged ethnic diversity may exacerbate social inequalities. This study underscores the importance of inclusive microdata-based development strategies. This study contributes to the literature on ethnicity-based rural development, while opening new avenues for exploring the intersectionality of ethnicity, education, and employment in rural Indonesia.

Keywords

education; employment distribution; ethnicity; rural development; social polarization

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INTRODUCTION

Ethnic diversity is critical in rural development, particularly in distributing educational opportunities and in the occupational sector. The intersection between ethnic diversity and rural settings often results in disparities in access to education and employment opportunities, potentially hindering equitable development. Ethnic identity can influence community activities, resource allocation, and the sociopolitical influence of specific groups, thereby shaping educational achievement and employment prospects. These disparities are rooted in historical factors, local policy frameworks, and social networks that have evolved within specific ethnic communities. Some ethnic groups may possess strong educational traditions that encourage younger generations to pursue formal education. In contrast, others encounter structural barriers, such as economic hardship or geographical isolation, which limit their access. Building on Bourdieu's et al. (1990) theory of cultural reproduction, these disparities can also be understood as outcomes of unequal cultural and economic capital. Families with stronger cultural capital expressed in values, educational aspirations, and symbolic resources—are more likely to transmit advantages intergenerationally, while those with limited capital face structural constraints that reproduce inequality (Sjaf et al. 2025). This resonates with research by Mukrimin et al. (2023), who demonstrate how engineered multi-ethnic communities created through transmigration policies reveal persistent inequalities shaped by cultural legacies and resource distribution. Conceptually, this study adopts an ethnic diversity measurement approach using the Ethnolinguistic Fractionalization Index (ELF) and the Ethnic Polarization Index to quantify diversity, and draws on Human Capital and Occupational Stratification perspectives to interpret how education relates to occupational outcomes in a multi-ethnic village (Fraenkel et al. 2025; Steele et al. 2025).

While previous studies have highlighted the relevance of ethnicity in rural development, challenges remain in transforming

ethnic diversity into a developmental asset. A core issue in the Indonesian context is the unequal distribution of educational and occupational opportunities among ethnic groups. Some groups dominate sectors, while others are marginalized, leading to economic injustice, potential social discontent, and horizontal conflict. Kutai Lama Village, the site of this study, exemplifies such challenges in a multi-ethnic setting. This village is home to Bugis, Banjar, Kutai, and Javanese communities, each with distinct socioeconomic backgrounds, resulting in unequal educational and employment patterns. Similar dynamics of inequality and displacement are documented by Maring et al. (2019), who highlight how community relocation projects reproduce social stratification and unequal access to opportunities, underscoring the role of social approaches in policy design. In line with this focus, the analysis profiles Ethnic Diversity and Population Characteristics, computes village-level fractionalization and polarization metrics, and examines the Ethnicity-Education and Ethnicity-Occupation relationships (Ananta et al. 2023; Horvath et al. 2019; Schwank 2024).

The limited human and financial capital of minority ethnic rural communities exacerbate this inequality. Livelihood strategies adopted by ethnic minority households heavily depend on access to these forms of capital (Mao et al. 2020). Households with greater financial and human capital are more likely to pursue diverse livelihoods, including employment outside agriculture (Hammada et al. 2024; Mao et al. 2020; Sampean et al. 2021). Thus, educational and employment disparities are particularly complex in multi-ethnic rural contexts. From a Human Capital perspective, differences in schooling accumulation help explain subsequent occupational sorting; Occupational Stratification further clarifies patterned concentration of ethnic groups across job segments (Chareyron et al. 2025; Marson et al. 2021; Pepinsky et al. 2024).

A standard solution for addressing such disparities is to formulate policies tailored to the specific needs of each eth-

nic group. This requires the collection and analysis of Data Desa Presisi (DDP) on the distribution of education and employment, along with the contributing cultural, historical, and geographic factors (Sjaf et al. 2024; Sriwahyuni et al. 2025). Understanding these patterns enables governments to design more effective interventions, such as targeted scholarships for underrepresented groups or skill-training programs for communities in the informal sector. Operationally, DDP provides the micro-scale evidence needed to compute ELF and polarization indices and to run cross-tabulations and association tests by ethnicity for education and occupational profiles.

Specific solutions drawn from the literature include developing vocational education programs and targeted scholarships. Rapp et al. (2023) found that vocational education designed around local needs effectively increases educational participation among communities with limited access to formal schooling. These programs provide practical skills and open employment opportunities that align with traditional competencies. In contrast, Black et al. (2020:340–355) demonstrated that scholarships to reduce geographical disparities can significantly enhance higher-education participation in remote areas, including the Kutai ethnic community. Within this study's lens, such measures are read as human-capital, enhancing pathways that translate educational gains into improved occupational placement.

Although earlier research has offered various solutions to address ethnic disparities in education and employment, a notable research gap remains, especially regarding multi-ethnic rural villages in Indonesia. Most previous studies have focused on urban areas or ethnically homogenous regions, leaving a lack of in-depth analysis of the distribution of education and employment in ethnically diverse villages. This study fills this gap by investigating the relationships between ethnicity, education, and employment in Kutai Lama Village. Addressing the reviewer's query: the research analysis is guided by (1) ethnic diversity metrics; ELF

and the Ethnic Polarization Index; (2) the Human Capital perspective to link education with employability; and (3) an Occupational Stratification perspective to interpret ethnic patterns in job profiles. Accordingly, this study offers empirical contributions and policy guidance for designing more inclusive rural development programs.

The primary objective of this study was to analyze the patterns of educational and occupational distribution based on ethnicity in Kutai Lama Village and identify the influencing factors. This study aims to bridge this research gap by providing empirical data to inform evidence-based policymaking. The novelty of this study lies in its integrated quantitative and qualitative approach to examine the complex interplay between ethnicity, education, and employment in a multi-ethnic rural context. This study seeks to generate new insights into the formulation of culturally sensitive and inclusive Indonesian development policies by encompassing social, economic, and cultural dimensions.

METHOD

This study utilized DDP collected through the Drone Participatory Mapping (DPM) approach, integrating quantitative and qualitative analyses to examine the relationship between ethnicity, education distribution, and occupational sectors in rural development. A quantitative method was employed to identify patterns of relationships among variables through statistical analysis. Simultaneously, the qualitative approach explored the social, cultural, and economic factors influencing the distribution of education and employment. Combining these two methods has enabled a deeper understanding of the socioeconomic dynamics of ethnically diverse rural communities.

The research was conducted in four villages in Kutai Kartanegara Regency, East Kalimantan Province, Indonesia, namely Kutai Lama, Sidomulyo, Sanga-Sanga Muara, and Muara Pantuan, chosen due to their varied ethnic compositions and the domi-

nant presence of specific ethnic groups in each village, including Bugis, Banjar, Javanese, and Kutai. This diversity is relevant for examining the role of ethnicity in rural development. The research subjects consisted of purposively selected village residents, ensuring proportional representation of each major ethnic group. The population of this study consists of residents from four villages in Kutai Kartanegara Regency, East Kalimantan Province, namely Kutai Lama, Sidomulyo, Sanga-Sanga Muara, and Muara Pantuan. The research focuses on the productive age group (15–64 years), totaling 8,950 individuals. To ensure coverage and avoid sampling bias, this study employed a census method, including the entire population as the unit of analysis. The census approach was appropriate not only because the population size was manageable, but also because it ensured representativeness and minimized errors from sampling. By encompassing all individuals, the census strengthened the reliability and validity of findings, accurately capturing the socio-economic and demographic characteristics across the four villages.

Quantitative analysis was performed in two stages. The first stage involved measuring the degree of ethnic diversity and inequality using the ELF and ethnic polarisation index/Reynal-Querol Index (RQ Index).

Ethnic Fractionalization Index-ELF Index

The ELF Index measures the probability that two randomly selected individuals belong to different ethnic groups. This index was developed by (Steele et al. 2025) and has since been widely used in social science research (Fraenkel et al. 2025; García Montalvo et al. 2005:1–42; Kaufmann 2015:193–210). The index is derived from the Herfindahl Index and is calculated using the following formula:

$$F_j = 1 - \sum_{i=1}^N s_{ij}^2 \dots\dots\dots (1)$$

Description of variables

F_j = Ethnic Fractionalization Index

s_{ij} = Proportion of ethnic group i in the

population

N = Total number of ethnic groups

The ELF Index measures the level of ethnic diversity in a population. The ELF values range from 0 to 1, where an ELF of 0 indicates a highly homogeneous population dominated by a single ethnic group. Conversely, an ELF value approaching 1 reflects a highly heterogeneous population characterized by multiple ethnic groups with relatively balanced proportions. A higher ELF value suggests a greater likelihood that two randomly selected individuals belong to different ethnic groups. This index has been widely used in various studies to assess the impact of ethnic heterogeneity on economic growth, governance quality, and public-policy outcomes.

Ethnic Polarisation Index-RQ Index

The ethnic polarization index emphasizes ethnic distributions that approximate a bipolar situation, wherein two large ethnic groups exist in mutual opposition. This index is based on the theoretical model developed by Esteban et al. (2012:1310–1342), Esteban et al. (1999:379–415), Ananta et al. (2023), and Montalvo et al. (2005). The formula used for this calculation is as follows:

$$RQ = 1 - \sum_{i=1}^N \left(\frac{1}{2} - \pi_i\right)^2 \pi_i \dots\dots\dots (2)$$

Description of variables

RQ = Ethnic Fractionalization Index

π_i = Proportion of ethnic group i in the population

N = Total number of ethnic groups

The RQ Index is based on the potential for conflict between ethnic groups, considering the distribution of group sizes. Although its values range from 0 to 1, the interpretation differs from the Ethnic Fractionalization Index (ELF). An RQ value of zero indicates the absence of significant ethnic differences within a society or a highly homogeneous condition. In contrast, an RQ value approaching one suggests that the population is divided into two large, nearly equal groups, a configuration that is most

susceptible to social and political conflict. Therefore, this index is widely used in social conflict, civil war, and political instability studies.

Bayesian Contingency Table Test

The analysis was performed using JASP software version 0.19.3, which supports Bayesian Contingency Table Analysis. The analytical process consisted of the following steps: 1) selection of categorical variables; 2) construction of contingency tables; 3) selection of the multinomial sampling method; 4) calculation of the Bayes Factor (BF_{10}); 5) testing of directional hypotheses (Group One > Group Two); and 6) interpretation of results based on the scale proposed by Litton et al. (1984:432) and the guidelines by Kass et al. (1995). The interpretation of BF_{10} follows the likelihood ratio of the data's likelihood under the null hypothesis (H_0 : no association between variables) versus the alternative hypothesis (H_1 : an association exists). The Bayes Factor was interpreted using the framework developed by Kass et al. (1995:773–95) where H_0 : $OR \leq 1$ and H_1 : $OR > 1$. The Bayesian approach enables more flexible decision-making than conventional methods, as it accommodates directional hypotheses and provides a measure of the strength of evidence through the Bayes Factor (BF_{10}) (van Doorn et al. 2021:813–36). The interpretation of BF_{10} in this study is as follows: $BF_{10} > 1$ indicates that the data provide evidence in favor of the alternative hypothesis (H_1), suggesting an association between the ethnicity variable and education and employment; $BF_{10} < 1$ indicates that the data support the null hypothesis (H_0), meaning no association exists between ethnicity, education, and employment; A minimal BF_{10} value (< 0.01) reflects strong (extreme) evidence in favor of the null hypothesis (H_0). In this case, the data provided convincing support that no association existed between the two variables.

The analysis placed ethnicity as the column variable, education and employment as the row variables, and village as the layering variable in JASP. BF_{10} values were reported for each village and the overall

dataset, along with the sample size (N) to reflect the strength of the evidence in each local context.

Qualitative Analysis

In the second phase, qualitative analysis used a thematic approach to examine interviews and observations, identifying patterns that explain the relationship between ethnicity, education, and employment. Local perspectives on barriers and opportunities in accessing education and work were explored to complement quantitative findings (Mao et al. 2020; Sjaif et al. 2024). Data were collected through Focus Group Discussions (FGDs) across villages. A total of 28 informants participated, comprising government officials, community leaders, and residents with knowledge of village history. Validity was ensured through triangulation across sources, methods, and times, enhancing credibility and ensuring findings reflected the realities of multi-ethnic communities.

RESULT AND DISCUSSION

Ethnic Diversity and Population Characteristics in Kutai Lama Village

This study was conducted in four villages in Muara Pantuan Subdistrict, each representing dominant ethnic characteristics: Kutai Lama, Sidomulyo, Sanga-Sanga Muara, and Muara Pantuan, as presented in Figure 1.

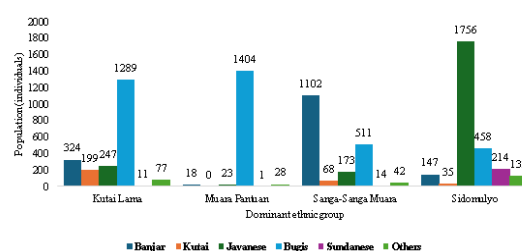


Figure 1. Population by Ethnicity in Kutai Lama, Sidomulyo, Sanga-Sanga Muara, and Muara Pantuan

Figure 1 presents the population distribution by ethnic background in the four research villages: Kutai Lama, Muara Pantuan, Sanga-Sanga Muara, and Sidomulyo. The

data revealed a noticeable concentration of specific ethnic groups in each village, reflecting a tendency toward culturally homogeneous communities at the local level.

In Kutai Lama Village, the Bugis ethnic group is dominant, comprising 1,289 individuals out of a total population of 3,400, or approximately 38% of the village's population. Other significant ethnic groups include Banjar (324 individuals), Javanese (247), and Kutai (199), indicating a degree of ethnic diversity despite the dominance of a single majority group in the province of South Kalimantan. In contrast, Muara Pantuan Village exhibits a much stronger Bugis dominance, with 1,404 individuals out of 2,276, highlighting a single ethnic majority composition.

Sanga-Sanga Muara Village shows a different pattern of ethnic dominance, with the Banjar ethnic group forming the majority at 1,102 individuals, followed by the Bugis (511) and Javanese (173). This indicates the presence of two relatively large ethnic groups, although the Banjar remains dominant. Sidomulyo displays a significantly different structure, where the Javanese form the largest group, with 1,756 individuals out of 4,372 residents, or more than 40% of the population. Other ethnic groups, including the Bugis (458), Sundanese (214), and Others (132), contributed to a relatively high level of heterogeneity. This ethnic clustering across villages reflects a strong tendency toward community concentration based on ethnocultural origins. The detailed ethnic composition of each village is presented in Table 1.

Table 1 presents the distribution of basic population characteristics across the four research villages: Kutai Lama, Sidomulyo, Sanga-Sanga Muara, and Muara Pantuan. The characteristics analysed included gender, age group, highest level of education attained, primary employment status, and secondary employment. Overall, the demographic and socioeconomic distributions across the four villages appear to be relatively balanced. Regarding gender, the proportion of female residents was slightly higher than that of males in all villages. Muara Pantuan

recorded the highest proportion of females (52.7%), followed by Sanga-Sanga Muara (51.5%), Kutai Lama (50.8%), and Sidomulyo (50.5%), indicating a nearly even gender distribution. For age groups, the majority of the population in each village falls within the productive age group (15–64 years), with the highest Proportion in Sanga-Sanga Muara (69.9%) and the lowest in Sidomulyo (66.9%). The child population (0–14 years) is relatively large, particularly in Sidomulyo (27.3%) and Kutai Lama (27.1%), while the proportion of elderly residents (65 years and above) is relatively small. However, it was highest in Sidomulyo (5.8%).

There were notable differences in educational attainment among the villages. Junior high school (SMP or equivalent) is the most prevalent level of education, particularly in Muara Pantuan (39.0%) and Sanga-Sanga Muara (29.3%) areas. Sidomulyo demonstrates a more advanced educational profile, with the highest proportion of vocational high school graduates (24.3%) and higher education attainment (5.8%). Conversely, Muara Pantuan had the highest percentage of residents without formal educational certificates (24.8%), followed by Kutai Lama (21.7%).

Regarding primary employment, most residents in all four villages were not engaged in formal employment. The highest proportions of non-working residents were found in Sanga-Sanga Muara (68.6%) and Muara Pantuan (67.0%). The proportion of residents who reported being employed ranged between 31% and 36%, with Sidomulyo having the highest percentage of primary workers (35.6%). Secondary employment is also limited across all villages, with most residents reporting no additional income-generating activities. Only 11.2% of Sidomulyo residents reported having a secondary occupation, which was the highest among the four villages. This trend suggests that the rural economic structure remains monosectoral, with limited diversification of household income sources. The lack of engagement in side jobs may also reflect restricted access to micro-capital or low levels of entrepreneurial skills among residents.

Table 1. Population Characteristics of Kutai Lama, Sidomulyo, Sanga-Sanga Muara, and Muara Pantuan

Description	Characteris- tics	Kutai Lama		Sidomulyo		Sanga-sanga Muara		Muara Pan- tuan	
		Num- ber	(%)	Num- ber	%	Num- ber	%	Num- ber	%
Gender	Female	1727	50,8	2207	50,5	1523	51,5	1199	52,7
	Male	1673	49,2	2165	49,5	1436	48,5	1077	47,3
Age	0-14	922	27,1	1192	27,3	784	26,5	587	25,8
	15-64	2357	69,3	2925	66,9	2069	69,9	1589	69,8
	65+	121	3,6	255	5,8	106	3,6	100	4,4
Educational At- tainment	No Diploma	738	21,7	691	15,8	623	21,1	564	24,8
	Primary School/Equiv- alent	316	9,3	508	11,6	160	5,4	128	5,6
	Junior High School/Equiv- alent	872	25,6	1036	23,7	868	29,3	888	39,0
	Senior High School/Equiv- alent	682	20,1	746	17,1	565	19,1	326	14,3
	Vocational High School	551	16,2	1062	24,3	551	18,6	274	12,0
	Higher Edu- cation	92	2,7	253	5,8	80	2,7	55	2,4
Primary Em- ployment	Employed	1103	32,4	1556	35,6	929	31,4	751	33,0
	Not Employed	2297	67,6	2816	64,4	2030	68,6	1525	67,0
Secondary Em- ployment	Yes	299	8,8	489	11,2	251	8,5	155	6,8
	No	3101	91,2	3883	88,8	2708	91,5	2121	93,2
Total Population		3400	100	4372	100	2959	100	2276	100

These findings were further confirmed by examining the occupational profiles of the residents of the four villages, as presented in Table 2.

The occupational distribution presented in Table 2 reinforces earlier findings that the majority of residents across the four villages are not currently employed, with consistently high proportions in all areas—the highest in Sanga-Sanga Muara (68.6%) and the lowest in Muara Pantuan (64.4%). These figures are consistent with the results in Table 1, which show that although more than two-thirds of the population falls within the productive age group, only about 31%–36% reported being employed. This gap reflects limited access to formal

employment opportunities and a likely high dependency on informal or seasonal labour employment.

Among those employed, private sector employees represented the most common occupation in three of the four villages. The highest proportions were found in Sanga-Sanga Muara (16.9%) and Kutai Lama (14.8%), followed by Muara Pantuan (13.0%), while Sidomulyo recorded a significantly lower Figure (3.1%). This pattern indicates that the informal private sector is a key pillar of the local economy, particularly in villages that are more closely connected to industrial zones or service hubs.

Fishermen are notably prominent in Sidomulyo (10.3%) and are also present in

Table 2. Occupational Profile of Residents in Kutai Lama, Sidomulyo, Sanga-Sanga Muara, and Muara Pantuan Villages

Job Type	Kutai Lama		Sidomulyo		Sanga-sanga Muara		Muara Pantuan	
	Number	(%)	Number	(%)	Number	(%)	Number	(%)
Domestic Worker	22	0,6	134	5,9	6	0,2	31	0,7
Construction Laborer	10	0,3	2	0,1	5	0,2	70	1,6
Factory Worker	7	0,2	7	0,3	8	0,3	28	0,6
Teacher / Educator	35	1,0	13	0,6	25	0,8	79	1,8
Fisherman	130	3,8	234	10,3	112	3,8	20	0,5
Government Employee	5	0,1	2	0,1	9	0,3	42	1,0
Casual Labourer/Odd Job Worker	98	2,9	17	0,7	112	3,8	214	4,9
Private Sector Employee	502	14,8	71	3,1	500	16,9	567	13,0
Sailor/Seafarer	11	0,3	2	0,1	3	0,1	5	0,1
Driver	15	0,4	2	0,1	3	0,1	24	0,5
Fish Farmer/Aquaculture Worker	16	0,5	196	8,6	6	0,2	8	0,2
Farmer/Plantation Worker	83	2,4	23	1,0	45	1,5	220	5,0
UMKM	118	3,5	34	1,5	71	2,4	147	3,4
Others	51	1,5	14	0,6	24	0,8	101	2,3
Not Yet Employed/Unemployed	2297	67,6	1525	67,0	2030	68,6	2816	64,4
Total Population	3400	100	2276	100	2959	100	4372	100

significant proportions in Kutai Lama and Sanga-Sanga Muara (each 3.8%). This supports the assumption that geographic location and proximity to aquatic resources influence occupational structure. Similarly, fish farmers (aquaculture workers) appear to be a distinctive occupational group in Sidomulyo, accounting for 8.6%, suggesting that aquaculture specialization in this village is absent from the others.

In addition, informal jobs such as domestic and casual labor are relatively common in Sidomulyo and Muara Pantuan, indicating the presence of domestic and freelance labor sectors. UMKM entrepreneurs were recorded in all villages, notably Kutai Lama and Muara Pantuan, reflecting micro-enterprises' roles as alternative livelihoods. However, formal professions, such as teachers/educators and government employees, remain limited in all villages, accounting for less than 2% of the workforce. These

findings suggest that although there is variation in occupational types across villages, the overall employment structure is dominated by informal and nonstructured work.

Popularization Index, Fractionalization Index, and Ethnic Diversity

In the context of rural development, understanding the social structure, including ethnic distribution, is crucial for designing inclusive and responsive policies tailored to the needs of local communities. The level of ethnic diversity within a given area may influence social cohesion, access to employment, and educational attainment. In particular, ethnic polarization serves as a key indicator for assessing the potential for social segregation or the dominance of specific groups within the local economic structure of the area. Therefore, the EPI and EFI were used to evaluate the extent of diversity and the potential for societal fragmentation

in each research village. Table 3 presents the results of this assessment.

Table 3 presents the composition of the two dominant ethnic groups in each village and the percentage difference between them (dominance gap), accompanied by the values of the Ethnic Polarization Index and Ethnic Fractionalization Index. In Kutai Lama Village, the two dominant ethnic groups comprise 76% of the population, with a 47% gap between them, meaning that the second-largest group accounts for only 38% of the size of the largest group. A polarization index of 0.94 and a fractionalization index of 0.58 indicate that while two major ethnic groups exist, the overall level of ethnic diversity is relatively high, and the potential for social fragmentation is also significant. Residents acknowledged that social status is strongly linked to asset ownership and type of employment, as captured in the following FGD excerpt:

“If someone owns large fishponds or even runs a tourism business, they are definitely respected. But if they’re just fishermen, even if hardworking, they’re still seen as lower status.” (FGD Kutai Lama, September 17, 2024).

This statement highlights how demographic patterns, economic inequality, and resource access drive ethnic polarization. A similar finding emerged in the FGD in Sidomulyo Village, where historical tensions were noted between transmigrant settlers and native populations. One participant recalled the following:

“There used to be minor conflict bet-

ween newcomers and locals, but now we are more focused on work. Still, permanent jobs are mostly held by Javanese people; others usually work as laborers or farmers.” (FGD, Sidomulyo, September 17, 2024).

These findings cannot be separated from the ethnic diversity observed in Sidomulyo Village, which recorded a RQ of 0.95 and a ELF of 0.57, indicating active inter-ethnic interaction among the Javanese, Bugis, and Sundanese communities. Quantitative and qualitative findings confirm that occupational stratification continues to follow ethnic lines, although this may not always be explicitly visible in formal statistics. A pattern emerges in Muara Pantuan Village, where ethnic polarization is relatively low, with a fractionalization index of 0.08. The two dominant ethnic groups accounted for 97% of the population, with a dominance gap of 94%. This reflects an almost homogeneous ethnic structure with minimal diversity, which is also supported by the relatively low polarization index (0.79).

In Sanga-Sanga Muara Village, the two dominant ethnic groups constitute 85% of the population, with a dominance gap of only 29%, the smallest among all villages. The village recorded the highest Polarization Index (0.96) and Fractionalization Index (0.59), suggesting that, while a few ethnic groups dominate demographically, the ethnic distribution is more balanced than in other villages. This potentially leads to more complex social dynamics and creates opportunities for more intensive intergroup interactions. The two dominant ethnic groups, Banjar and Bugis, control 85% of the population, with only a 29% difference shaping

Table 3. Ethnic Polarization and Fractionalization Index in Kutai Lama, Sidomulyo, Sanga-Sanga Muara, and Muara Pantuan Villages

Village/Subdistrict	Combined Percentage of The Two Dominant Ethnic Groups	Percentage Gap between the Two Dominant Ethnic Groups	Polarization Index	Fractionalization Index
Kutai Lama	76%	47%	0.94	0.58
Muara Pantuan	97%	94%	0.79	0.08
Sidomulyo	80%	44%	0.95	0.57
Sanga-sanga Muara	85%	29%	0.96	0.59

the competitive social structure. This dynamic was reflected in the statement of one of the FGD participants:

“Here, having a formal job is seen as a status symbol. However, many people still work as fishermen or daily laborers. Without a higher education degree, it’s hard to enter the sectors that are considered more ‘respectable’ by the community.” (FGD, Sanga-Sanga Muara, September 12, 2024).

This suggests that high levels of diversity, when accompanied by sharp social segmentation, reinforce perceptions of social hierarchy based on economic and educational access. The qualitative findings from the FGDs support the conclusions drawn from the ethnic polarization and fractionalization indices, which offer critical insights into the structure of diversity and the potential for ethnic-based social tensions in each village. The two indicators used, the Ethnic Polarization Index and the Ethnic Fractionalization Index, reflect distinct but complementary dimensions. The Polarization Index measures the degree of division and potential tension between two dominant groups, whereas the Fractionalization Index captures overall diversity within a community. Both indices were calculated for each village based on the proportion of their dominant ethnic groups.

The Relationship between Ethnicity and Education

Education is one of the fundamental pillars of human and social development and cannot be separated from the sociocultural context of a society. In multi-ethnic rural settings, differences in cultural back-

ground, social status, and inherited group values often shape distinct participation patterns in education. Access to education, preferences for specific levels of schooling, and the perceived value of education in daily life are all significantly influenced by the collective identity of the dominant ethnic group in a given area. Therefore, analyzing the relationship between ethnic background and educational attainment is crucial for understanding structural inequalities and providing a foundation for designing inclusive and responsive rural development policies. The results of the Bayesian Contingency Table Analysis of ethnicity and education for each village are presented in Table 4.

Table 4 presents the results of the Bayesian Contingency Table Test, which examined the relationship between ethnic background and educational attainment across the four research villages. This analysis employed a Bayesian approach to evaluate whether a significant association existed between the two categorical variables. The primary indicator in this test is the Bayes Factor (BF_{+0}), which quantifies the degree of support the data provide for the alternative hypothesis (that there is a relationship between ethnicity and education) compared to the null hypothesis (that no such relationship exists).

The test results show that the BF_{+0} values are minimal in all villages, approaching zero, or are technically recorded as 0.000. In Kutai Lama, the BF_{+0} value was 5.561×10^{-293} . In Sanga-Sanga Muara, it was 4.965×10^{-299} , indicating extreme evidence in favor of the null hypothesis that no association exists between ethnic background and educational attainment. A similar pattern was observed in Muara Pantuan and Sidomulyo,

Table 4. Results of the Bayesian Contingency Table Test between Ethnicity and Education

Village	Number of Individuals	Value BF_{+0} Joint multinomial
Kutai Lama	3.400	5.561×10^{-293}
Muara Pantuan	2.276	0000
Sanga-Sanga Muara	2.959	4.965×10^{-299}
Sidomulyo	4.372	0000
Total	13.007	0000

Noted: proportion test restricted to 2 x 2 tables

where the BF_{+0} values were also recorded at 0.000, indicating strong evidence supporting the null hypothesis. In other words, there is insufficient evidence to conclude an associative relationship between these two variables.

Of the 13,007 respondents, the results of this test suggest that ethnic background differences do not significantly correlate with variations in education levels attained by the population. The ethnic composition of a village does not appear to exert a measurable influence on residents' educational outcomes. These findings support the view that access to, participation in, and education outcomes are not solely determined by structural factors, such as school availability or household economy, but also by the sociocultural dynamics embedded in ethnic identities at the community level.

The Relationship between Ethnicity and Occupational Profile

The occupational structure in rural communities is shaped not only by economic factors and access to employment opportunities but also by ethnic background, which influences work culture and the division of social roles within the community. In many multi-ethnic contexts, certain ethnic groups tend to concentrate on professions due to historical factors, cultural values, inherited skills, and the availability of social networks. For instance, ethnic groups that are historically dominant in the marine and agricultural sectors tend to maintain these occupations across generations. In contrast, other groups may be more involved in formal employment, microenterprises, or informal sectors.

Within this framework, it is essen-

tial to understand how the relationship between ethnicity and occupation is distributed across diverse village communities. To statistically address this question, we conducted an analysis using the Bayesian Contingency Table approach. This test aimed to evaluate the extent to which a significant association exists between ethnic background and the type of occupation pursued by individuals. By employing the Bayes Factor (BF_{+0}) as the primary indicator, the analysis identifies whether the data support a non-random relationship between the two variables.

The results of this analysis are presented in Table 5, which details the BF_{+0} values for each village and for the overall sample. These values form the basis for interpreting the strength of the association between ethnic background and occupational choice in the study area.

Table 5 presents the results of the Bayesian Contingency Table Test, which evaluated the relationship between ethnicity and occupational profile across the four villages: Kutai Lama, Muara Pantuan, Sanga-Sanga Muara, and Sidomulyo. In all locations, the Bayes Factor (BF_{10}) was consistently recorded as 0.000 at the individual village level and across the entire sample ($N = 13,007$). These results indicate that in all villages, $BF_{10} = 0.000$ supports the null hypothesis, suggesting no significant association between ethnic background and occupation type. This value demonstrates extreme support for the null hypothesis, meaning that, statistically, no pattern of association was found between specific ethnic groups and specific types of occupations based on the available data.

This result is particularly noteworthy-

Table 5. Results of the Bayesian Contingency Table Test between Ethnicity and Occupational Profile

Village	Number of Individuals	Value BF_{+0} Joint multinomial
Kutai Lama	3.400	0000
Muara Pantuan	2.276	0000
Sanga-Sanga Muara	2.959	0000
Sidomulyo	4.372	0000
Total	13.007	0000

hy compared to previous descriptive distributions, which showed differences in occupational tendencies among ethnic groups. However, from an inferential statistical perspective, these differences were not substantial enough to confirm the existence of a systematic association between ethnicity and occupational choice. Based on this Bayesian analysis, it can be concluded that a community's ethnic structure does not influence occupational selection at the village level. In this context, certain ethnic groups may be more commonly engaged in traditional occupations, such as fishing, farming, or aquaculture. In contrast, others may be more involved in formal or private sectors, such as civil service, education, or entrepreneurship, as illustrated in Table 6.

Table 6 presents the distribution of the population by ethnic group and employment sector, including formal, informal, and unemployed categories. Most individuals across all ethnic groups fell into the "not employed" category, totaling 48.4% of the population (3,876 out of 8,001 individuals). This reflects the structural challenges in accessing employment opportunities, particularly in multi-ethnic rural areas.

More specifically, the Banjar ethnic group shows the highest proportion of non-working individuals (53.5% of 1,595 people), followed by the Kutai (51.3%) and Bugis (49%). The Sundanese group had a relatively balanced distribution; however, the "not employed" category remained dominant (46.5%). Meanwhile, the Javanese group stands out as the only ethnic group with the highest proportion in formal employment (23.8%), slightly surpassing the Banjar group (23.1%). In the informal sector, the

Bugis dominate with the highest proportion (34.1% of 3,661 people), followed by the Sundanese (37.8%) and Javanese (32.6%). This pattern reinforces the tendency of Bugis and Sundanese communities to be more engaged in informal occupations such as fishing, farming, or freelance labor. In contrast, the Kutai and Banjar groups show lower levels of participation in the informal sector, although they are still significant.

This distribution suggests the presence of ethnic segmentation within the employment sectors, which is potentially influenced by factors such as transmigration history, intra-community social networks, and access to resources and job opportunities. The Javanese and Banjar ethnic groups, which have historically been more integrated into institutional and administrative structures, tend to exhibit higher levels of participation in formal employment. Conversely, Bugis and Sundanese people are more concentrated in informal work because of their cultural orientation and history of economic migration.

These findings differ from those of the earlier Bayesian contingency test (Table 5), which statistically showed no significant association between ethnicity and the employment sector. The Bayes Factor (BF_{10}) was extremely small (0.000) across all villages, providing strong support for the null hypothesis (H_0) that no association existed between the two variables. In other words, although the descriptive data suggest variations in employment sectors by ethnicity, the differences cannot be classified as a consistent or significant relational pattern.

The discrepancy between the descriptive and inferential results suggests that eth-

Table 6. Ethnic Distribution by Employment Sector

Ethnicity	Formal Sector		Informal Sector		Not Employed		Total
	n	%	n	%	n	%	
Banjar	368	23.1	373	23.4	854	53.5	1595
Bugis	618	16.9	1248	34.1	1795	49	3661
Javanese	525	23.8	717	32.6	960	43.6	2202
Kutai	78	25.8	69	22.8	155	51.3	302
Sundanese	38	15.8	91	37.8	112	46.5	241
Total	1627	20.3	2498	31.2	3876	48.4	8001

nicity is not a deterministic factor in shaping occupational distribution. Instead, differences emerge from interactions between local conditions, employment structures, migration history, and socioeconomic adaptation, rather than ethnic identity alone. Insights from the FGD support this interpretation. For instance, in agriculture, work is limited to basic cultivation, whereas fisheries are confined to capture fishing. Under these conditions, ethnic polarization in occupational choices becomes apparent. Inherited skills and community traditions often shape occupational paths. A notable case is Murara Pantuan Village, which was initially inhabited by Banjar and Kutai ethnic groups, with farming as their main livelihood.

The arrival of Bugis migrants, who brought with them marine and fishery expertise, led to the transformation of the village economy. Agricultural land was converted into fishponds, and the local economy shifted toward the fisheries sector. Occupational differences by ethnicity were also apparent at that time. Decades later, however, this situation began to change with the arrival of an oil company (PT. Total) near the village. Its presence has created new and ambiguous employment spaces for local human resources. Each ethnic group perceives equal participation opportunities. Young people in the village became increasingly drawn to formal employment, reducing occupational polarization by ethnicity. Fishing activities have also declined as catches have decreased, reportedly because of intensified oil refinery operations. These FGD insights highlight that the relationship between ethnicity and village occupational distribution is deeply rooted in the unique historical trajectory of each community.

Thus, an ethnicity-based approach to analyzing village labor structures must be treated with caution. While descriptive data reveal social diversity and variations in economic activity, inferential data indicate that these relationships are not statistically strong enough to generalize a fixed ethnicity-occupation correlation. The key implication is that rural development policies should strengthen employment opportunities across

all communities rather than rely on ethnic-based preferences or stereotypes. The most appropriate strategy was to ensure equitable access to education, job training, and productive capital support for all villagers in the village.

Discussion

The findings of this study, based on Bayesian Contingency Table analysis and a qualitative descriptive approach, reveal a complex picture, with some aspects appearing contradictory. On the one hand, statistical analysis provides insufficient evidence to support an association between ethnic background and educational attainment or occupational status. This is demonstrated by consistently low Bayes Factor values ($BF_{10} < 1$) across all research sites, indicating acceptance of the null hypothesis (H_0). In other words, neither education nor employment was directly associated with ethnicity. Nevertheless, descriptive data revealed variations in the distribution of employment sectors among ethnic groups. For example, informal employment tends to dominate among the Bugis and Sundanese communities, while individuals from Javanese and Banjar ethnic groups show relatively higher participation in the formal sector. However, these differences were not statistically significant enough to suggest a causal relationship.

This apparent contradiction highlights the need for caution and an adequate sociological context when interpreting social statistics. The absence of statistically significant correlations between ethnicity, education, and employment did not negate the presence of observable social patterns identified through descriptive analysis. Instead, these patterns are likely shaped by intersecting structural and cultural factors tied to ethnic identity, such as socioeconomic status, access to resources, geographic proximity to economic centers, and intergenerational occupational inheritance. In other words, although inferential tests indicate no direct causal relationship, ethnic-based social segmentation remains evident and influential in rural communities' daily

lives.

To clarify the sociological insights intended in this study, several theoretical perspectives are employed as analytical tools: (1) Bourdieu's theory of cultural and economic capital, particularly cultural reproduction, to explain how educational advantages are transmitted across generations (Bourdieu 1996); (2) human capital theory, to understand education as an investment shaping labor market outcomes (Sen 1999); (3) occupational stratification perspectives, to highlight how institutional structures and market forces channel ethnic groups into specific economic niches; (4) social capital and network theory, to interpret the role of bonding and bridging ties in shaping access to opportunities; and (5) ethnic fractionalization and polarization measures (ELF and RQ), drawn from political sociology, to capture how group configurations condition cooperation, competition, or conflict (Horvath et al. 2019; Marson et al. 2021). These frameworks jointly allow the study to interpret why descriptive ethnic patterns exist even when statistical associations are weak.

The relationship between ethnicity and education in several study locations reinforces the argument that cultural and economic capital significantly shape educational aspirations. Mao et al. (2020) demonstrate that certain ethnic groups possess stronger cultural legacies and resources that support formal education. Higher levels of secondary and tertiary educational attainment were observed in Sidomulyo and Kutai Lama villages, which are predominantly inhabited by Javanese and Banjar communities. This finding aligns with (Bourdieu 1996) theory of cultural reproduction, which posits that educational advantage is transmitted intergenerationally through family values and expectations. In contrast, Muara Pantuan, an ethnically homogeneous village with a low fractionalization index (0.08), exhibits lower levels of educational attainment.

These findings indicate that ethnic homogeneity does not guarantee educational success; it may limit exposure to progressi-

ve educational values. Ethnic homogeneity does not inherently lead to greater social cohesion; in some cases, it may constrain access to diverse educational perspectives. In contrast, Sanga-Sanga Muara, which exhibits high levels of polarization (0.96) and fractionalization (0.59), demonstrates a complex pattern of ethnic segmentation. The presence of several large ethnic groups in the village appears to foster competitive or collaborative dynamics that encourage cross-group investment in education. This environment stimulates greater educational engagement at the individual level and through inter-ethnic group efforts.

As (Bao et al. 2024:1–28) and Rapp et al. (2023) explain, rural development strategies must be designed with sensitivity to ethnic diversity while maintaining a clear focus on structural dimensions. No ethnic group is inherently productive. What matters more is how historical migration, access to land and capital, and participation in local governance shape socioeconomic positioning. This perspective is crucial for crafting affirmative interventions that reduce inequality and avoid the inadvertent reinforcement of ethnic boundaries.

Furthermore, descriptive data on occupational distribution show that Bugis and Sundanese groups predominantly hold informal employment, whereas Javanese and Banjar more commonly occupy formal jobs. Although these differences are not statistically significant, they reflect the labor market segmentation rooted in the historical context. For example, the Bugis community has traditionally been engaged in the maritime and agrarian sectors, and thus tends to participate in subsistence or informal occupations. This finding aligns with Hammad et al. (2024), who argues that traditional knowledge systems and geographical constraints limit labor mobility among coastal communities.

The policy implications of these findings bolster arguments in the current literature advocating locally informed, culturally inclusive, and participatory development planning (Billett et al. 2024:200–222; Sampean 2018; Sjaf et al. 2022:1–14; Sriwahyuni

et al. 2025:1–20). For instance, vocational training programs should be developed through direct dialogue with local communities to ensure cultural relevance and gender inclusivity (Malihah et al. 2024). Training in the Bugis and Kutai communities can focus on the marine and aquaculture sectors. By contrast, in Javanese communities, it may be geared toward educational entrepreneurship and service industries, which align with their social investment profiles in education. Moreover, the discrepancy between descriptive and inferential data is an important reminder not to rely solely on surface-level statistics for policymaking. In line with (Lyndon et al. 2020:109–29), statistical analysis must complement ethnographic insights and community knowledge to offer a comprehensive and contextualized understanding. Quantitative data become truly meaningful only when embedded within the sociocultural ecology of the village (Kalpagam 2000:37–55).

RQ and ELF also provide an important lens through which to understand community cohesion and potential conflicts. Although Muara Pantuan has a low fractionalization score and moderate polarization, its ethnic homogeneity has not translated into better social outcomes. In contrast, more ethnically diverse villages, such as Sidomulyo and Sanga-Sanga Muara, exhibited more equitable participation in education and employment. This finding suggests that pluralism can foster greater social resilience when it is supported by inclusive institutions.

Policy responses should leverage DDP not merely as a tool to measure inequalities but also to uncover their sociological roots. As (Sjaf et al. 2024) noted, DDP can serve as a foundation for participatory development planning that aligns infrastructure development, social protection, and economic investment with the lived realities of multi-ethnic rural communities. Accordingly, the relationship between ethnicity, education, and employment in rural Kalimantan cannot be reduced to a deterministic model. Instead, they emerge from a constellation of historical, cultural, economic, and insti-

tutional factors. This study underscores the need to combine Bayesian statistical methods with sociological insights to formulate evidence-based, context-sensitive, and socially transformative policies. Future research should explore the intersectionality of gender, migration, and ethnic identity to inform the design of inclusive development frameworks for rural regions in Indonesia.

CONCLUSION

This study investigates the relationship between ethnicity, education, and employment in multi-ethnic rural areas of East Kalimantan, focusing on four villages: Kutai Lama, Sidomulyo, Sanga-Sanga Muara, and Muara Pantuan. It integrates quantitative and qualitative approaches to explore the social dynamics surrounding the distribution of educational attainment and employment sectors, particularly emphasizing ethnic diversity as a key structural determinant.

The main findings revealed no statistically significant relationship between ethnic background and educational attainment or occupational profile. This conclusion is supported by the Bayesian Contingency Table test, which produced Bayes Factor (BF_{10}) values below one across all study sites, indicating strong support for the null hypothesis. In other words, ethnic background did not significantly influence individuals' educational achievement levels. While descriptive data show some variation in educational outcomes across ethnic groups, for example, the Javanese and Banjar appear to be more represented in secondary and higher education, these differences are not statistically robust enough to infer a causal relationship between ethnicity and educational attainment.

These findings underscore the importance of distinguishing between descriptive patterns and inferential conclusions when formulating equitable development policies. This distinction highlights the need to avoid generalizing statistical tests based solely on ethnicity in policymaking. While no statistical relationship was found between

ethnic background and educational and employment outcomes, the descriptive data revealed distributional differences.

These distributional differences are further contextualized by the findings of the RQ and ELF, which provide additional dimensions for interpreting the social structure of rural villages in the region. High RQ and ELF scores in villages such as Sidomulyo and Sanga-Sanga Muara indicate complex social dynamics, whereas low scores in Muara Pantuan reflect high ethnic homogeneity. However, this homogeneity does not correlate positively with better educational outcomes or labor force participation. More ethnically plural villages demonstrate more diverse educational attainment and greater potential for workforce engagement. This suggests that when managed effectively, ethnic diversity is not a barrier to development but can serve as a social asset.

The scientific contribution of this study lies in its integrative approach, which combines Bayesian statistical analysis with DDP through a rural sociological lens. This study helps fill a gap in the rural development literature, which has rarely addressed ethnic dynamics in the context of multi-ethnic villages. These findings support the need for data-driven, culturally inclusive, village-level development policies that are adaptive to sociocultural diversity. DDP can be a strategic tool for planning development initiatives sensitive to social contexts, including ethnic and gender disparities.

From a policy perspective, this study's main implication is the importance of designing intervention programs that prioritize equitable access to education and employment across ethnic groups, without relying on stereotypes or ethnic preferences. Affirmative interventions, such as community-based vocational training, scholarship provision for ethnic minorities, and strengthening micro-enterprise networks, should be developed using accurate micro-level data. Moreover, such policies must also consider the structural and normative barriers women face, as the study finds that female labor force participation, particularly among Bugis and Banjar women, remains

low despite relatively adequate educational attainment.

This study also recommends that future studies pay closer attention to the intersectionality between ethnicity, gender, and geographic location when analyzing social inequality. In doing so, the findings can enrich our understanding of the complex social structure of rural communities and support the design of participatory and sustainable development policies. This study makes an important contribution to the literature on ethnicity-based development. This reinforces the relevance of DDP as a practical and applicable data collection method within the framework of development policy planning.

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