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Research Paper

Linking Public Service Availability to Village Welfare

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Abstract

This study aims to provide a village-level analysis explaining the link between the availability of essential services and welfare, which is scarce in this study area. The accessibility of state-provided facilities is related to poverty reduction. On the other hand, the village, the lowest administrative level in Indonesia, is entrusted with a particular delegation of authority and budget. Therefore, the efficient management of delegated authority and budget at the village-level should be reflected in good infrastructure. By employing logistic regression, this study examines the relationship between the village development's status as a proxy for people's welfare and the availability of essential services in Maluku and Maluku Utara, two neighboring provinces with significant differences in poverty rates. The main finding of this research is that infrastructure plays an important role in improving people's welfare at the village level. In addition, surprisingly, crimes contribute to the village's development.

Keywords: Infrastructure; Poverty; Indonesia; Village

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1. Introduction

Studies in poverty discourse have found that infrastructure development has emerged as a prominent and decisive dimension in determining people's poverty status. Adequate infrastructure improves people's access to human, social, financial, and natural resources, thereby enhancing their quality of life economically and socially over time (Ge et al., 2021). Infrastructure has become a crucial factor in categorizing a country's success or failure. Indeed, basic infrastructure facilities significantly impact people's daily lives and ensuring accessible public services for the sustainability of households and business affairs presents a significant challenge in achieving sustainable economic development. Primarily, poverty is closely linked to access to state-provided facilities (Zhang et al., 2023). The availability of basic infrastructures such as transportation, clean water, health care, and electricity can sometimes be the determining factor in labeling individuals as poor or not. As infrastructure development aims to fulfill people's fundamental needs, its availability and quality directly influence their quality of life. Naraya et al. (2000), in "Can Anyone Hear Us?: Voices of the Poor," utilize community-level poverty to depict the absence of critical infrastructure in particular communities, highlighting that poverty reduction is inseparable from accessible basic infrastructure. Similarly, high poverty rates in Indonesia are concentrated in areas with inadequate infrastructure (Pramono & Marsisno, 2019).

SDG 2 focuses on ending hunger, achieving food security, improving nutrition, and promoting sustainable agriculture through the enhancement of rural infrastructure. The SDGs employ localized development approaches that cater to local demands and resources to attain this objective (Vazeer, 2021). By doing so, the SDGs remind governments worldwide to prioritize small-area development, particularly their role in providing essential services, considering that providing "a package" of infrastructure is more effective in reducing poverty compared to addressing it partially (Robles Aguilar & Sumner, 2020). "Localizing" refers to actions taken at the subnational, local governments, cities, and regional levels. In the context of Indonesia, this also includes villages.The village, being the lowest administrative level in Indonesia, receives delegated authority and budget to oversee governance and manage finances in the government's efforts to improve people's quality of life, foster community empowerment, and enhance services for the community. According to Article 4 Law No. 6/2014, village development aims to improve public services for community members, thereby accelerating the realization of the general welfare. In alignment with this objective, since 2015, Indonesia has been disbursing *Dana Desa* (Village Funds) to balance the funds allocated to villages through the district government. This initiative aims to narrow the gap between urban and rural areas across various dimensions of life, particularly in the area of poverty reduction. It indicates that, to some extent, the village administration is also responsible for providing public infrastructure. However, the reality is that many areas still grapple with high poverty rates. This situation suggests inefficiencies in fund management, which include constraints in human resources within village administration, as highlighted by the World Bank (2019),

> *"Village governments have yet to realize the full potential of the Law, with institutional capacity and the scale and diversity of the country among the main challenges."*

Numerous village-level studies have explored the issue of poverty, with a notable focus on Dana Desa as a variable in the context of Indonesia. Darmi and Mujtahid (2020) discovered that *Dana Desa* contributed to poverty alleviation. Sunu and Utama (2019) state that Dana Desa positively impacts poverty reduction, indicating that higher *Dana Desa* allocations correlate with lower poverty rates. Sigit (2020) reached the conclusion that *Dana Desa,* alongside *Alokasi Dana Desa* (Allocation of Village Funds), *Produk Domestik Regional Bruto* (*Gross Regional Domestic Product*), and *Belanja Modal* (Capital Spending), collectively influence poverty in Indonesia. However, contrasting views also exist. Some researchers have argued that connecting *Dana Desa* to the poverty situation is premature (Pramudyasmono, 2020; Riyanda et al., 2022). While *Dana Desa* aims to alleviate poverty, its effectiveness depends on various factors, including the competence of its managers (Azhari et al., 2022), the severity level of the village (Joetarto et al., 2020; Saragi, 2021), and the presence of stringent supervision (Akbar & Sihaloho, 2019; Hermawan & Ahmad, 2019).

In the end, well-delivered public funds such as *Dana Desa* should be reflected in a satisfactory level of development (Vaishar & Šťastná, 2021). The effective management of *Dana Desa* that is most relevant for poverty analysis, is its physical utilization, specifically in terms of infrastructure performance. This

study emphasizes that using the availability of public services is a better indicator to assess the effectiveness of *Dana Desa*'s implementation. Moreover, given the contemporary emphasis on SDGs, this study finds it crucial to incorporate SDGs-related variables in the analysis. By doing so, this study simultaneously provides insights into the progress of SDG achievement at the village level in the regions under scrutiny. Several variables used in this study are standard in the poverty analysis, such as electrification, sanitation, clean water, educational institutions, transportation, and access to credit. However, studies that combine these variables into a village-level analysis remain scarce. In addition, this study introduces crimes and access to police services as variables to gain insights into the safety perspective's role in enhancing village-level welfare, which is the first endeavour in conducting a village-level analysis related to poverty.

Therefore, in the collective pursuit of poverty reduction, governments at all levels, including the grassroots, are actively engaged. This study proposes that electrification, sanitation, clean water, educational institution, public transportation, access to credit, the prevalence of crimes, and access to police services collectively influence people's welfare at the village level. This study also offers insights into governance efficiency at Indonesia's lowest administrative level, particularly in the administration of *Dana Desa*. Such insights could prove invaluable in assessing current policies and their effectiveness in providing essential public services people need to obtain a better quality of life.

2. Methods

This study utilizes the 2018 *Podes* data – village-based data from the Village Potential Statistics of Indonesia – as provided by BPS-Statistics Indonesia and the village development status is obtained from the 2018 publication of *IDM* (*Indeks Desa Membangun* – Village Development Index) by the *Kementerian Desa Republik Indonesia* (2018) – Ministry of Villages, Development of Underdeveloped Areas and Transmigration, the Republic of Indonesia. The choice of the year 2018 is based on the availability of village-level data and its positioning in the pre-pandemic era. The data processing is conducted using IBM SPSS Statistics 20.

Referring to the publication Maluku Province in Figures 2019 (Badan Pusat Statistik Provinsi Maluku, 2019), Maluku consists of 118 sub-districts and 1,233 villages+*kelurahan,* while Maluku Utara has 116 sub-districts and 1195 villages+*kelurahan* (Badan Pusat Statistik Provinsi Maluku Utara, 2019). In Indonesia's administration, alongside *kelurahan*, the village is a subdivision of the sub-district. However, *IDM* only covers villages and excludes *kelurahan* and areas in preparation to be villages, such as *Unit Pemukiman Transmigrasi* (*UPT* – Transmigration Unit). Consequently, the data's coverage in this analysis is slightly less than the actual total number of villages. This analysis incorporates 1176 villages for Maluku Province and 1049 for Maluku Utara.

The Ministry of Villages, Development of Underdeveloped Areas and Transmigration, the Republic of Indonesia initiated the publication of IDM (*Indeks Desa Membangun* – Village Development Index) in 2016. This index assigns a specific rating and development status to each village, sub-district, district, and province. Village development progress and independence rate, as determined by *IDM*, are classified into five groups: Autonomous Village, Advanced Village, Developing Village, Underdeveloped Village, and Very Underdeveloped Village. *IDM* was compiled based on the enumeration conducted by The Ministry of Villages, Development of Underdeveloped Areas and Transmigration, the Republic of Indonesia. At the same time, *Podes* (*Potensi Desa* - Village Potential Statistics) is a village-level dataset provided by *BPS*. While some questions in these enumerations overlap, *IDM* and *Podes* are independently developed. This study also draws data from the National Socio-economic Survey (*Survei Sosial Ekonomi Nasional* – *Susenas*) 2018 to further elucidate several independent variables.

This study examines the relationship between the Village Development Status as the dependent variable (Y) and essential services across all villages in Maluku and Maluku Utara as independent variables (Xs). Despite their close proximity, the former is among the most underprivileged provinces in Indonesia, while the latter fares better in comparison. The rationale for employing village development status lies in the perception that it can serve as an indicator of the poverty circumstances of its residents (Handoyo et al., 2021).

Table 1. Variables

Variable	Description	Codes
Dependent Variables		
Vil_Dev_St	Village's Development Status	1 = Developing or more 0 = Underdeveloped or less
Independent Variables		
No_electricity	Less than or equal to 25 percent of households without electricity.	1 = Yes 0 = No
Toilet	The use of defecation facilities by most families	1 = Yes 0 = No
Drinking_water	Source of drinking water	1 = Bottled/refilled and tap water 0 = Else
Middle_edu_access	Ease of access to middle school	1 = Easy 0 = Not easy
Public_transport	Public transportation with regular routes passing through the village	1 = Available 0 = Not available
Credit	Received credit for the past year	1 = Yes 0 = No
No_crime	No crime incidents in the last year	1 = Yes 0 = No
Police_access	Ease of access to a police station	1 = Easy 0 = Not easy

The logistic regression is conducted because it can robustly classify the unit of analysis in this study (villages) as developing or underdeveloped and reveal the underlying factors driving this categorization. Logistic regression aims to estimate the relationship between a binary categorical variable as the dependent variable and a set of independent variables, which can be either metric or nonmetric. This study follows the five stages of logistic regression as outlined by Hair et al. (2019). The initial stage involves defining the objectives of the logistic regression, which encompass both explanation and classification. The measurement of predictive accuracy emphasizes accurate classification, accounting for various types of misclassifications and their associated costs. The second stage revolves around designing research for logistic regression. The dependent variable with binary values is represented as 0 and 1. Logistic regression employs maximum likelihood estimation (MLE) and requires a substantial overall sample size to adequately support its estimation. While there is no consensus on an exact ideal sample size, it is crucial to remember that small samples yield significant sampling errors. Hosmer et al. (2013) recommend sample sizes exceeding 400.

In stage 3, we ensure that the underlying assumption is met: independence of observations. Stage 4 involves the estimation of the logistic regression model and the evaluation of the overall fitness of the model. Logistic regression estimates coefficients for the independent variables, using the logit value as the dependent measure, which ensures that any predicted value can be converted back into a probability within the range of 0 and 1. The model's formulation is as follows:

$$Logit_i = ln\left(\frac{prob_{event}}{1 - prob_{event}}\right) = b_0 + b_1X_1 + \cdots + b_nX_n \quad (1)$$

However, the coefficients estimated in the aforementioned model pertain to effects on a logged odds value, rendering the model less straightforward to interpret. Dealing with this issue requires transforming the model formulation into an equivalent form that pertains to changes in odds, thus facilitating easier interpretation.

$$Odds_i = \left(\frac{prob_{event}}{1 - prob_{event}}\right) = e^{b_0 + b_1X_1 + \cdots + b_nX_n} \quad (2)$$

Two methods are employed to evaluate the fitness of logistic regression model. The first method involves an overall measure of the statistical significance of the model fit and "pseudo" R2 value. The

second method pertains to predictive accuracy, which is the model's ability to classify the outcome measure correctly. Regarding the "pseudo" R^2 value, there are two measures to be considered: the Cox and Snell R2 and Nagelkerke. These measures offer insights into the extent of variation accounted for by the model. Logistic regression employs a classification matrix and a chi-square-based fit measure to assess overall predictive accuracy. A classification matrix is a cross-tabulation of the outcome variable with the predicted outcome, thereby quantifying the accuracy of predicted group membership and any associated misclassifications. The associated statistical test of significance used in logistic regression is the Hosmer and Lemeshow Test. This test evaluates the classification-based significance of actual outcomes compared to predicted outcomes. A nonsignificant value in the Hosmer and Lemeshow Test indicates a well-fitted model aligning actual and predicted outcomes.

Stage 5 entails the interpretation of the results. The sign of the original coefficients (positive or negative) indicates the direction of the relationship. In addition, we also need an exponentiated logistic coefficient for the transformation (antilog) of the initial logistic coefficient, a feature predominantly accessible in various computer programs. The exponentiated coefficients above 1.0 indicate a positive relationship; less than 1.0 represent negative relationships.

3. Results and Discussion

Before proceeding with the analysis, it is essential to ensure that the utilized independent variables do not exhibit multicollinearity issues, considering that the presence of multicollinearity can reduce the distinct impact of these independent variables, along with their estimated coefficients and standard errors.

Table 2. The Results of Collinearity Statistics

	Maluku		Maluku Utara	
	Tolerance	**VIF**	**Tolerance**	**VIF**
No_electricity	.869	1.150	.813	1.230
Toilet	.891	1.122	.910	1.099
Drinking_water	.952	1.051	.885	1.130
Middle_edu_access	.817	1.224	.791	1.264
Public_transport	.805	1.243	.920	1.086
Credit	.828	1.207	.917	1.091
No_crime	.938	1.066	.909	1.100
Police_access	.739	1.354	.716	1.396

The more pronounced degrees of multicollinearity are represented by the lower tolerance values and higher VIF values (Hair et al., 2019). Tolerance values greater than 0.1 and VIF values significantly less than 10 serve as evidence of low multicollinearity within the dataset.

Table 3. Categorical Variables Coding

	Category	**Parameter coding**	**Frequency**	
			Maluku	**Maluku Utara**
No_electricity	Else	0	254	198
	Lowest through 25 percent	1	922	851
Toilet	No	0	169	69
	Yes	1	1007	980
Drinking_water	Else	0	1014	731
	Bottled/refilled and tap water	1	162	318
Middle_edu_access	Not easy	0	216	122
	Easy	1	960	927
Public_transport	Not available	0	732	178
	Available	1	444	871
Credit	No	0	623	620
	Yes	1	553	429
No_crime	No	0	320	378
	Yes	1	856	671
Police_access	Not easy	0	479	349
	Easy	1	697	700

There is no consensus regarding an ideal size in logistic regression, but it is crucial to remember that small samples can result in high sampling errors. Logistic regression is sensitive to small or empty cells, leading to an unstable model, large logistic coefficients, and an odd ratio for independent variables (Hair et al., 2019). Table 3 indicates that the data used in this analysis has sufficient overall and cell sample sizes.

3.1 Baseline Analysis

The classification in Table 4 shows that in the absence of any independent variables, the optimal prediction is to classify all villages as underdeveloped or less. By adopting this approach, we can accurately classify 76.0 percent of villages in Maluku Province and 76.5 percent of villages in Maluku Utara Province.

Table 4. Classification Table

Observed		Predicted		
		Village Development Status		Percentage Correct
		Underdeveloped or less	Developing or more	
Maluku				
Village Development Status	Underdeveloped or less	894	0	100.0
	Developing or more	282	0	.0
Overall Percentage				**76.0**
Maluku Utara				
Village Development Status	Underdeveloped or less	802	0	100.0
	Developing or more	247	0	.0
Overall Percentage				**76.5**

3.2 Model Fit

The omnibus tests of model coefficients in Table 5 provide insight into the predictive capability of the model in contrast to having no independent variables. The model exhibits statistical significance (p < 0.05; **"Sig."** column) at the significance level α=0.05, where $\chi^2(8) > \chi^2$ distribution table = 15.5073.

Table 5. Omnibus Tests of Model Coefficient

		Chi-square	df	Sig.
Maluku				
Step 1	Step	279.835	8	.000
	Block	279.835	8	.000
	Model	279.835	8	.000
Maluku Utara				
Step 1	Step	191.062	8	.000
	Block	191.062	8	.000
	Model	191.062	8	.000

In addition, the overall predictive accuracy of the model, assessed using the Hosmer and Lemeshow goodness of fit test, demonstrates a strong alignment between actual and predicted values, which suggests a good predictive model.

Table 6. Hosmer and Lemeshow Tests

	Step	Chi-square	df	Sig.
Maluku	1	2.629	8	.955
Maluku Utara	1	6.436	8	.599

The Hosmer and Lemeshow test are not statistically significant, yielding p = .955 for Maluku and p = .599 for Maluku Utara (as shown in the "**Sig.**" column). This suggests that both models do not exhibit poor fit. Similarly, both $\chi^2(8) > \chi^2$ distribution table = 15.5073. Table 7 illustrates that the variation in the dependent variable based on this model ranges from 21.2 percent to 31.7 percent for Maluku and from 16.7 percent to 25.1 percent for Maluku Utara.

Table 7. Model Summary

	Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
Maluku	1	1015.752[a]	.212	.317
Maluku Utara	1	954.011[b]	.167	.251

Upon inclusion of the independent variables, the overall model's correct classification is observed to improve for both provinces, as presented in Table 8. Overall, the model correctly classifies 79.2 percent of villages in Maluku and 78.4 percent of villages in Maluku Utara into their accurate categories: underdeveloped as underdeveloped and developing as developing. In other words, the model inaccurately classifies 20.8 percent of villages in Maluku and 21.6 percent of villages in Maluku Utara into erroneous classifications.

Table 8. The Results of Classification Table

Observed		Predicted		
		Village Development Status		Percentage Correct
		Underdeveloped or less	Developing or more	
Maluku				
Village Development Status	Underdeveloped or less	843	51	94.3
	Developing or more	194	88	31.2
	Overall Percentage			**79.2**
Maluku Utara				
Village Development Status	Underdeveloped or less	771	31	96.1
	Developing or more	196	51	20.6
	Overall Percentage			**78.4**

*S*ensitivity refers to the proportion of villages with the status of "developing or more," which were accurately predicted by the model (true positives), and it stand at 31.2 percent for Maluku Province and 20.6 percent for Maluku Utara. Specificity, on the other hand, represents the true negative rate, signifying the percentage of actual negative outcomes that were correctly predicted for both provinces that exceeds 90 percent.

Table 9. Measures of Predictive Accuracy: Overall, Actual Outcomes, and Predicted Outcomes

Measure	Maluku	Maluku Utara
	Overall Predictive Accuracy (%)	
Accuracy	79.2	78.4
	Predictive Accuracy for Actual Outcome (%)	
Sensitivity	31.2	20.6
Specificity	94.3	96.1
	Predictive Accuracy for Predicted Outcome (%)	
Positive Predictive Value	63.3	62.2
Negative Predictive Value	81.3	79.7

To enhance our classification performance assessment, the Receiver Operating Characteristic (ROC) graphs presented below offer a useful tool for visualizing and evaluating classifiers.

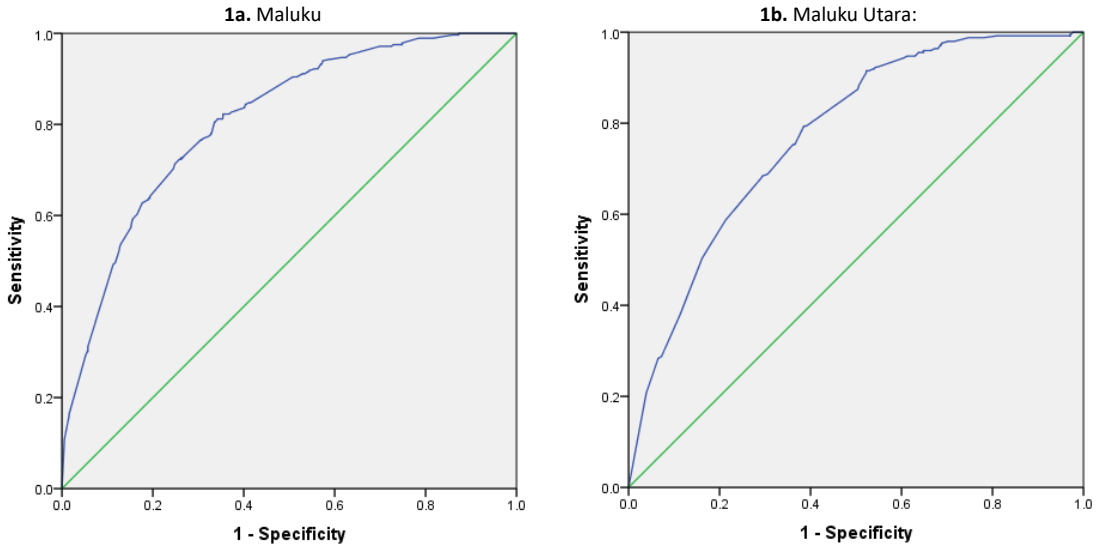

Figure 1. ROC Curves

The green diagonal line that equally divides the areas on the ROC curve, represents a null model, the lowest acceptable threshold. The blue line positioned above the green one measures discrimination – the higher it is, the better the discrimination. Figure 1 depicts Maluku Province exhibiting superior discrimination. The Area Under Curve (AUC) measure, as shown in Table 10, serves as a comprehensive assessment of predictive accuracy.

Table 10. Area Under the Curve

	Area	Std. Error	Asymptotic Sig	Asymptotic 95% Confidence Interval	
				Lower Bound	Upper Bound
Maluku	.808	.014	.000	.781	.836
Maluku Utara	.774	.016	.000	.743	.805

The AUC value of .808 of Maluku's model categorizes its discrimination within the range of excellent discrimination, while Maluku Utara's model with an AUC value of .774, falls within the level of acceptable discrimination.

3.3 Variables in Equation

The contribution of the eight independent variables to the model and their statistical significance are presented in Table 11.

Table 11. Variables in the Equations

	B	S.E.	Wald	df	Sig.	Exp(B)
Maluku						
No_electricity	.543	.255	4.522	1	.033	1.721
Toilet	1.453	.439	10.943	1	.001	4.276
Drinking_water	.630	.199	10.041	1	.002	1.878
Middle_edu_access	.786	.325	5.840	1	.016	2.195
Public_transport	.733	.164	20.020	1	.000	2.080
Credit	.941	.169	30.848	1	.000	2.562
No_crime	-.521	.165	9.941	1	.002	.594
Police_access	.796	.204	15.256	1	.000	2.217
Constant	-4.852	.558	75.710	1	.000	.008
Maluku Utara						
No_electricity	1.157	.353	10.768	1	.001	3.181
Toilet	1.544	.748	4.264	1	.039	4.683
Drinking_water	.742	.167	19.803	1	.000	2.100
Middle_edu_access	1.115	.544	4.203	1	.040	3.048
Public_transport	1.290	.349	13.671	1	.000	3.632
Credit	.700	.162	18.611	1	.000	2.015
No_crime	-.393	.165	5.683	1	.017	.675
Police_access	.451	.225	4.005	1	.045	1.570
Constant	-6.637	.976	46.277	1	.000	.001

All independent variables hold significance within the model at α = 0.05 significance level. The logistic regression equation uses the B coefficients (**"B"** column) to predict the probability of an event transpiring, considering certain interpretive aspects. Thus, it is common to use the exponentiated logistic coefficient (**"Exp(B)**" column), which involves the transformation (antilog) of the initial logistic coefficient and represents the alteration in odds for every unit increment in the independent variable.

For the context of Maluku Province, the logistic regression formulated between the dependent and independent variables is as follows.

$$ln\left(\frac{p_{event}}{1-p_{event}}\right) = -4.852 + .543\ No_{electricity} + 1.453\ Toilet + .630\ Drinking_{water} + .786\ Middle_{edu_{access}} + .733\ Public_{transport} + .914\ Credit - .521\ No_{crime} + .796\ Police_{access} \quad (3)$$

or,

$$\left(\frac{p_{event}}{1-p_{event}}\right) = \exp(-4.852 + .543\ No_{electricity} + 1.453\ Toilet + .630\ Drinking_{water} + .786\ Middle_{edu_{access}} + .733\ Public_{transport} + .914\ Credit - .521\ No_{crime} + .796\ Police_{access}) \quad (4)$$

The model exhibits statistical significance, $\chi^2(8) = 279.835$, with a significance level of $p < 0.05$. Additionally, there were 27 standardized residuals with values greater than 2.000 standard deviations, which were retained in the analysis. Villages with

- about 25 percent or fewer households that lack electricity experience 1.721 times higher odds of transitioning into developed villages compared to villages with a greater percentage of households without electricity,
- most families utilizing the defecation facilities had 4.276 times higher odds of becoming developed villages compared to villages where most families do not use them,
- most families using bottled/refilled and tap water as their drinking water source had 1.878 times higher odds of becoming developed villages compared to villages where most families lack access to such water sources,

- most families with convenient access to middle school facilities had 2.195 times higher odds of becoming developed villages, in contrast to villages where most families lack such access.
- public transportation passing through them had 2.080 times higher odds of becoming developed villages compared to villages without such transportation,
- most families having access to credit facilities had 2.562 times higher odds of becoming developed villages, compared to villages where most families lack access to such facilities,
- no reported crimes during the past year had 0.594 times higher odds of becoming developed villages, compared to villages with reported crimes, and
- most families having easy access to the police station had 2.217 times higher odds of becoming developed villages, in contrast to villages where most families lack such access.

The logistic regression analysis between the dependent and independent variables for Maluku Utara Province is as follows.

$$ln\left(\frac{p_{event}}{1-p_{event}}\right) = -6.637 + 1.157\ No_{electricity} + 1.544\ Toilet + .742\ Drinking_{water} + 1.115\ Middle_{edu_{access}} + 1.290\ Public_{transport} + .700\ Credit - .393\ No_{crime} + .451\ Police_{access} \quad (5)$$

or,

$$\left(\frac{p_{event}}{1-p_{event}}\right) = \exp(-6.637 + 1.157\ No_{electricity} + 1.544\ Toilet + .742\ Drinking_{water} + 1.115\ Middle_{edu_{access}} + 1.290\ Public_{transport} + .700\ Credit - .393\ No_{crime} + .451\ Police_{access}) \quad (6)$$

The model was statistically significant, $\chi^2(8) = 191.062$, $p < 0.05$, with 20 standardized residuals having values greater than 2.000 standard deviations, which were retained in the analysis. Villages with

- about 25 percent or fewer households that lack electricity had 3.181 times higher odds of becoming developed villages compared to villages with a higher percentage of households without electricity,
- most families using the defecation facilities had 4.683 times higher odds of becoming developed villages compared to villages in which most families do not use such facilities,
- most families using bottled/refilled and tap water as their primary drinking water source had 2.100 times higher odds of becoming developed villages compared to villages in which most families do not have access to it,
- most families having easy access to middle school facilities had 3.048 times higher odds of becoming developed villages compared to villages where most families lack such access,
- public transportation passing through them had 3.632 times higher odds of becoming developed villages compared to villages that don't have such transportation,
- most families having access to credit facilities had 2.015 times higher odds of becoming developed villages compared to villages where most families lack access,
- no reported crimes during the past year had 0.675 times higher odds of becoming developed villages compared to villages with reported crimes, and
- most families having easy access to the police station had 1.570 times higher odds of becoming developed villages compared to villages where most families do not have such access.

3.4 Discussion

3.4.1 Electricity

Electricity is an essential infrastructure that enables people to lead socially and economically productive lives. Access to electricity has been linked to a reduction in malnourished individuals (Sambodo & Novandra, 2019). Electrification helps generate farm income, promote the development of non-farm activities, and increase the availability and accessibility of education and healthcare services (Wirawan & Gultom, 2021). Indeed, ensuring sufficient access to electricity is instrumental in preventing poverty.

There is a significant disparity in the odds of villages with 25 percent or fewer households lacking electricity being classified as developed villages in Maluku and Maluku Utara. Maluku exhibits a factor of 1.721, whereas Maluku Utara shows a substantially higher factor of 3.181. This discrepancy underscores that electricity significantly influences village development progress in Maluku Utara to a greater extent compared to Maluku.

Table 12. Percentage of Villages by the Households' Electricity Access and Number of Industries, 2018

Districts	Households with access to State-owned_electricity					Number of Micro and Small Industries
	≤ 25%	> 25% and ≤ 50%	> 50% and ≤ 75%	> 75%	Total	
8101 Kepulauan Tanimbar	31.6	10.1	6.3	51.9	100.0	408
8102 Maluku Tenggara	32.1	1.1	2.2	64.7	100.0	875
8103 Maluku Tengah	8.7	1.6	2.2	87.5	100.0	4,685
8104 Buru	12.2	3.7	3.7	80.5	100.0	1,101
8105 Kepulauan Aru	95.7	0.9	0.0	3.4	100.0	886
8106 Seram Bagian Barat	9.0	1.1	11.2	78.7	100.0	2,989
8107 Seram Bagian Timur	29.4	1.0	5.2	64.4	100.0	1,491
8108 Maluku Barat Daya	61.1	0.9	4.4	33.6	100.0	1,435
8109 Buru Selatan	41.6	9.1	9.1	40.3	100.0	712
8171 Ambon	0.0	0.0	0.0	100.0	100.0	2,025
8172 Tual	33.3	0.0	0.0	66.7	100.0	313
MALUKU	**33.8**	**2.4**	**4.1**	**59.8**	**100.0**	**16,920**
8201 Halmahera Barat	11.4	1.2	3.6	83.8	100.0	8,293
8202 Halmahera Tengah	18.0	4.9	9.8	67.2	100.0	786
8203 Kepulauan Sula	30.8	2.6	2.6	64.1	100.0	3,916
8204 Halmahera Selatan	47.3	1.7	5.1	46.0	100.0	1,177
8205 Halmahera Utara	13.3	2.0	6.1	78.6	100.0	9,605
8206 Halmahera Timur	21.6	3.9	2.0	72.5	100.0	1,194
8207 Pulau Morotai	13.6	1.1	1.1	84.1	100.0	585
8208 Pulau Taliabu	78.9	2.8	0.0	18.3	100.0	455
8272 Tidore Kepulauan	4.1	0.0	0.0	95.9	100.0	4,405
MALUKU UTARA	**27.1**	**2.1**	**3.9**	**66.9**	**100.0**	**30,416**

Source: Village Potential Statistics 2018

As one of the primary energy sources for both commercial and non-commercial activities that drive economic growth, electricity stands as a decisive factor influencing the competitiveness of the domestic industry in which its distribution plays a vital role in supporting industrial development (Hadi et al., 2021; Kumari & Sharma, 2018). Therefore, as shown in Table 12, the superior electrification in Maluku Utara prompted the more pronounced industrial development, even at the micro and small-scale industry

levels. As the industry sector absorbs the workforce and boosts economic growth, it helps reduce poverty over time. Using the National Socio-economic Survey 2018 in both provinces, this study provides further evidence of the impact of electricity on people's welfare. The Fisher's Exact Test conducted between households without electricity and household poverty status reveals a statistically significant association between these variables (p = 0.000).

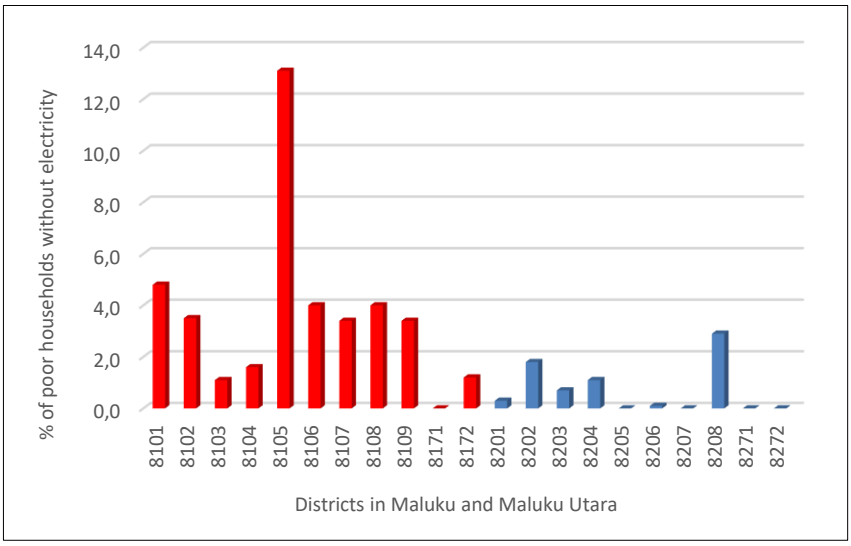

Figure 2. Percentage of poor households without electricity by District in Maluku and Maluku Utara, 2018

Source: Susenas 2018

The discrepancy wherein a greater number of impoverished individuals in Maluku and its districts lack access to electrification compared to Maluku Utara is illustrated in Figure 2. For the sake of clarity in the figure's presentation, Figure 2 and other analogous charts utilize district codes identical to those in Table 12 and subsequent tables. Additionally, further clarification is provided: the code "8271" pertains to Ternate. Ternate is the capital of Maluku Utara Province, and all administrative divisions at the village level are referred to as *kelurahan*, which is not covered in this study.

3.4.2 Toilet

Sanitation plays a significant role in health issues and economic growth, as its availability prevents avoidable issues, including fatalities. It is crucial to adequately grapple with sanitation issues to improve people's well-being and create high-quality living environments within communities. An example highlighting this importance is the toilet revolution in China (Cheng et al., 2018).

Regarding housing defecation facilities, the difference between the odds of villages, where most households have access to the toilet, being classified as developed villages in Maluku and Maluku Utara is minimal. In Maluku, villages with most families using the defecation facilities exhibit 4.276 times higher odds of becoming developed compared to villages where most families lack such facilities. In Maluku Utara, the possibility is 4.683 times. Among the eight independent variables used in this study, "sanitation/toilet" holds the highest odds ratio in Maluku and Maluku Utara. These statistics underscore the importance of proper housing defecation facilities in shaping a village's performance in both provinces.

Table 13. Percentage of Villages by the Majority's Household Defecation Facilities and Population with Health Complaints, 2018

Districts	Housing Defecation Facilities [1]					Percentage of Population Having Health Complaints [2, 3]
	Own Toilet	Shared Toilet	Public Toilet	No Toilet	Total	
8101 Kepulauan Tanimbar	86.1	1.3	11.4	1.3	100.0	20.16
8102 Maluku Tenggara	81.5	1.6	11.4	5.4	100.0	22.59
8103 Maluku Tengah	79.3	3.8	15.2	1.6	100.0	17.27
8104 Buru	69.5	2.4	9.8	18.3	100.0	17.24
8105 Kepulauan Aru	25.6	7.7	41.0	25.6	100.0	17.60
8106 Seram Bagian Barat	62.9	2.2	28.1	6.7	100.0	21.49
8107 Seram Bagian Timur	51.0	4.1	12.9	32.0	100.0	29.71
8108 Maluku Barat Daya	77.0	5.3	13.3	4.4	100.0	23.06
8109 Buru Selatan	35.1	0.0	20.8	44.2	100.0	16.32
8171 Ambon	100.0	0.0	0.0	0.0	100.0	20.69
8172 Tual	85.2	0.0	3.7	11.1	100.0	15.85
MALUKU	**65.7**	**3.2**	**16.7**	**14.4**	**100.0**	**19.99**
8201 Halmahera Barat	72.5	1.8	25.1	0.6	100.0	18.62
8202 Halmahera Tengah	72.1	1.6	19.7	6.6	100.0	26.35
8203 Kepulauan Sula	87.2	1.3	2.6	9.0	100.0	15.33
8204 Halmahera Selatan	56.1	2.1	32.1	9.7	100.0	18.80
8205 Halmahera Utara	53.6	2.6	41.8	2.0	100.0	16.37
8206 Halmahera Timur	58.8	4.9	31.4	4.9	100.0	29.70
8207 Pulau Morotai	64.8	6.8	21.6	6.8	100.0	25.38
8208 Pulau Taliabu	60.6	7.0	5.6	26.8	100.0	30.22
8272 Tidore Kepulauan	89.8	2.0	8.2	0.0	100.0	24.84
MALUKU UTARA	**64.3**	**3.1**	**26.0**	**6.6**	**100.0**	**19.94**

Source: (1) Village Potential Statistics 2018; (2) Statistik Kesejahteraan Rakyat Provinsi Maluku 2018; (3) Provinsi Maluku Utara dalam Angka 2019

The percentage of villages with most households having toilets in Maluku is slightly higher than in Maluku Utara. Conversely, the rate of villages where most families lack toilets is greater in Maluku compared to Maluku Utara. Interestingly, the percentage of the population with health complaints is also identical, despite this seemingly similar level of housing defecation facilities in both areas. This fact should warn the stakeholders to take concrete measures to improve sanitation policies. This is particularly significant considering that one in five people in Maluku and Maluku Utara experienced health issues at this level of housing defecation facilities.

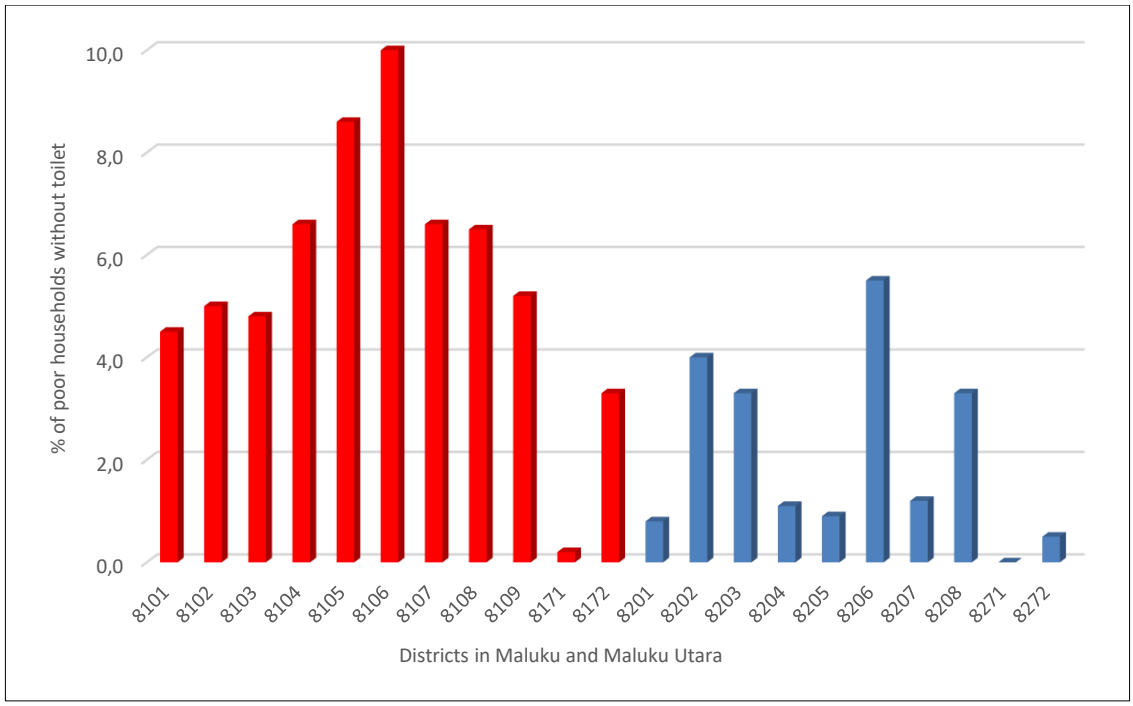

Figure 3. Percentage of poor households without toilets by District in Maluku and Maluku Utara, 2018

Source: Susenas 2018

Figure 3 illustrates a higher number of financially disadvantaged individuals across districts in Maluku who lack housing defecation facilities compared to Maluku Utara. This underscores the imperative for intervention programs in poverty reduction to address this concern effectively. Children growing up in communities with inadequate sanitation are more likely to be deprived and lose the opportunities they deserve for an improved quality of life. Additionally, the detrimental environmental impact of poor sanitation is evident in both the short and long term, including the pollution and adverse health effects resulting from improper disposal and treatment of household wastewater.

Using the National Socio-economic Survey 2018, the Fisher's Exact Test conducted between households without toilet facilities and household poverty status reveals a statistically significant association between these variables (p = 0.000).

3.4.3 Drinking Water

Improving people's welfare is closely tied to the availability of easily accessible clean water. Indonesia's Constitution underscores its significance, emphasizing that government involvement in ensuring access to clean water can effectively contribute to reducing inequality and improving overall welfare (Budiono & Purba, 2022). Moreover, effective management of clean water is essential for improving the well-being of rural communities (Nadeem et al., 2018).

Villages in Maluku where most families use bottled/refilled and tap water as their primary drinking water source have 1.878 times higher odds of becoming developed villages compared to villages where most families lack such access. In Maluku Utara, the odds are 2.100 times. Even though the difference is subtle, these statistics reveal that access to clean drinking water in Maluku Utara has a more considerable effect on village development compared to Maluku.

Table 14. Percentage of Villages by the Household's Drinking Water Source, 2018

Districts	Bottled/Refill and Tap Water[1]	Well/Spring[1]	Others[1]	Percentage of poor people that obtain drinking water by buying[2]
8101 Kepulauan Tanimbar	26.6	70.9	2.5	9.8
8102 Maluku Tenggara	14.1	76.6	9.2	6.3
8103 Maluku Tengah	25.5	70.7	3.8	4.8
8104 Buru	35.4	63.4	1.2	3.4
8105 Kepulauan Aru	0.9	80.3	18.8	0.5
8106 Seram Bagian Barat	2.2	86.5	11.2	17.4
8107 Seram Bagian Timur	3.6	94.3	2.1	0.0
8108 Maluku Barat Daya	8.0	84.1	8.0	7.3
8109 Buru Selatan	15.6	83.1	1.3	1.3
8171 Ambon	26.7	73.3	0.0	1.6
8172 Tual	0.0	96.3	3.7	7.2
MALUKU	**13.8**	**79.9**	**6.3**	**3.6**
8201 Halmahera Barat	28.7	61.7	9.6	3.7
8202 Halmahera Tengah	16.4	73.8	9.8	0.0
8203 Kepulauan Sula	19.2	76.9	3.8	4.0
8204 Halmahera Selatan	30.8	59.9	9.3	0.0
8205 Halmahera Utara	43.9	53.1	3.1	3.1
8206 Halmahera Timur	21.6	63.7	14.7	2.7
8207 Pulau Morotai	47.7	50.0	2.3	5.9
8208 Pulau Taliabu	19.7	67.7	12.7	0.0
8272 Tidore Kepulauan	16.3	73.5	10.2	0.0
MALUKU UTARA	**30.3**	**61.7**	**8.0**	**2.1**

Source: (1) Village Potential Statistics 2018; (2) Susenas 2018

Approximately one-third of the villages in Maluku Utara have the majority of their households accessing bottled/refilled and tap water; while in Maluku, it is less than one-fifth. Once well/spring sources are included, over 90 percent of villages in both provinces have access to relatively clean water for drinking. However, upon closer examination, it becomes evident that some districts in Maluku still have over ten percent of villages where the majority of households lack access to clean water. In addition, Table 14 illustrates that a higher number of impoverished individuals in Maluku need to spend some money to obtain drinking water compared to their counterparts in Maluku Utara. This situation hampers the chances of these poor people improving their economic status. Increased accessibility to clean water would enable them to allocate their income to other essential needs, ultimately facilitating their journey out of poverty.

To some extent, access to clean water has a similar impact on public health as sanitation. Therefore, understanding the accessibility of clean water can be connected to the proportion of the population reporting health complaints, as presented in Table 13. Considering the more favorable progress in achieving clean water access compared to sanitation in relation to public health in both regions in question, stakeholders must effectively allocate more resources towards establishing adequate sanitation facilities. This is especially crucial in districts where over one-fifth of the villages have a majority of households without proper sanitation. At the same time, stakeholders also need to keep improving the quality of clean water that the majority has access to.

3.4.4 Access to Middle School

Higher education attainment increases the likelihood of individuals getting jobs and decent earnings, ultimately contributing to their journey out of poverty (Jones, 2016). More than merely providing accessible education facilities, stakeholders must pay attention to the quality of education because

education inequalities exacerbate the divide among different social groups, ultimately leading to further impoverishment among the less privileged (Bonal, 2016). The poor quality of education in Indonesia can be attributed to four main factors: (1) government spending on education levels; (2) the quality of Indonesian teachers; (3) reward/incentive systems that discourage high-quality teaching; and (4) poor management of public educational institutions (Karim, 2021; Rosser, 2018). Unfortunately, not all those components are easily measured over time. At the village level, the most feasible approach is to measure the accessibility of schools and assess their impact on village performance.

Law No. 20/2003 concerning the Indonesian National Education System, further elaborated by Government Regulation No. 47/2008 concerning the implementation of Compulsory Education, is the basis for implementing the nine-year primary education framework. This framework mandates that children aged 7 to 15 must attend elementary and middle schools, underscoring the essential nature of ensuring accessibility to both institutions. In 2018, villages in Maluku with convenient access to middle school facilities had 2.195 times higher odds of becoming developed villages compared to villages where most families lacked such access. Villages in Maluku Utara had 3.048 times higher odds of becoming developed villages. Again, it is evident that access to middle school education in Maluku Utara has a more significant effect on the village's development status compared to Maluku.

Table 15. Percentage of Villages by Middle School Access and Population Graduated from Middle School, 2018

Districts	Villages with middle school [1]	Villages without middle schools have difficulty accessing the nearest middle school [1]	Aged > 24 y.o who graduated from at least Middle School [2]
8101 Kepulauan Tanimbar	68.4	12.7	30.8
8102 Maluku Tenggara	26.1	23.4	30.3
8103 Maluku Tengah	61.4	10.3	29.1
8104 Buru	62.2	7.3	24.7
8105 Kepulauan Aru	29.9	42.7	22.4
8106 Seram Bagian Barat	56.2	5.6	26.2
8107 Seram Bagian Timur	32.0	20.6	20.8
8108 Maluku Barat Daya	46.9	30.1	21.9
8109 Buru Selatan	63.6	9.1	19.0
8171 Ambon	60.0	0.0	40.7
8172 Tual	66.7	7.4	32.0
MALUKU	**46.9**	**18.4**	**30.2**
8201 Halmahera Barat	42.5	10.2	23.5
8202 Halmahera Tengah	57.4	3.3	25.5
8203 Kepulauan Sula	73.1	6.4	21.3
8204 Halmahera Selatan	56.5	18.6	18.6
8205 Halmahera Utara	42.3	9.7	24.0
8206 Halmahera Timur	48.0	6.9	21.6
8207 Pulau Morotai	53.4	8.0	18.1
8208 Pulau Taliabu	49.3	25.4	16.9
8272 Tidore Kepulauan	53.1	6.1	33.9
MALUKU UTARA	**51.2**	**11.6**	**25.1**

Source: (1) Village Potential Statistics 2018; (2) Susenas 2018

Generally, the percentage of villages with middle school institutions in Maluku Utara is higher than in Maluku, even though the distribution varies across districts. The dispersion of villages with middle schools among districts in Maluku Utara appears to be more evenly spread than in Maluku. Table 15 indicates that the lowest percentage of villages with middle schools in Maluku is 26.1 percent, while in Maluku Utara, it is 42.3 percent. Connecting this information with the fact that Maluku Utara performs better in poverty reduction clearly underscores the significant influence of education on poverty. Furthermore, examining the data for individuals over 24 years old who have graduated from at least the middle school level presents a nuanced picture. Maluku's achievement surpasses that of Maluku Utara,

potentially complicating our understanding of the relationship between education and poverty. To some extent, that information offers a new understanding of education's role in poverty alleviation. While access to formal educational institutions is pivotal, the provision of high-quality education holds even greater importance. Explaining that phenomenon is beyond the coverage of this study and, at the same time, offers an opportunity for further research. However, the main focus of stakeholders in this matter should be on enhancing the quality of education services to mitigate disparities in human resources.

3.4.5 Public Transportation

Public transport is essential for facilitating access to healthcare and education, providing jobs, boosting the rural economies, and counteracting the urbanization process (Šťastná & Vaishar, 2017), which contribute to the improved prospects that disadvantaged individuals, especially the poor, can achieve over time. The development of transportation networks in rural areas brings added value to agricultural products, mitigates spoilage and wastage, motivates farmers, enhances productivity, alters migration patterns, and in due time elevates the quality of life (Olagunju, 2022; Šipuš & Abramović, 2017).

In Maluku, villages with regular public transport routes exhibit 2.080 times higher odds of becoming developed villages compared to villages without such access. The same situation happens in Maluku Utara, even with a larger magnitude. Villages in Maluku Utara that have public transport with regular routes show 3.632 times higher odds of becoming developed villages compared to villages without such connectivity. This fact implies that the presence of public transport has a more significant effect on village development in Maluku Utara than in Maluku.

Compared to Maluku, Maluku Utara has more villages accessible by land and fewer villages accessible via water. This distinction is understandable, considering that Maluku Province has more archipelagos than Maluku Utara (Badan Pusat Statistik, 2019). However, considering the relatively low percentage of villages in Maluku with access via water, despite more than 90 percent of its area being water, it underscores the imperative for robust development of water-related public infrastructure in Maluku. Regarding land roads between villages that cannot be passed by 4-wheeled or larger motorized vehicles throughout the year and villages lacking public transport, Maluku also has a higher percentage of such villages.

Table 16. Percentage of Villages by Type of Transport Traffic, 2018

Districts	Traffic from/to the village by land	Traffic from/to the village via water	Land roads between villages cannot be passed by 4-wheeled or more motorized vehicles throughout the year	No public transport
8101 Kepulauan Tanimbar	49.4	15.2	15.2	36.7
8102 Maluku Tenggara	60.9	9.8	19.6	17.4
8103 Maluku Tengah	82.1	1.6	7.1	15.2
8104 Buru	86.6	2.4	7.3	13.4
8105 Kepulauan Aru	1.7	72.6	21.4	17.1
8106 Seram Bagian Barat	86.5	2.2	12.4	16.9
8107 Seram Bagian Timur	33.0	3.1	32.0	29.9
8108 Maluku Barat Daya	34.5	15.9	25.7	52.2
8109 Buru Selatan	53.2	2.6	29.9	19.5
8171 Ambon	96.7	0.0	0.0	0.0
8172 Tual	29.6	22.2	3.7	44.4
MALUKU	**53.8**	**13.1**	**18.5**	**23.7**
8201 Halmahera Barat	77.2	5.4	12.0	14.4
8202 Halmahera Tengah	65.6	0.0	1.6	27.9
8203 Kepulauan Sula	57.7	10.3	9.0	5.1
8204 Halmahera Selatan	30.0	31.6	22.8	17.3
8205 Halmahera Utara	78.6	5.1	8.2	9.7
8206 Halmahera Timur	79.4	1.0	1.0	21.6
8207 Pulau Morotai	77.3	10.2	1.1	3.4
8208 Pulau Taliabu	39.4	19.7	16.9	59.2
8272 Tidore Kepulauan	79.6	4.1	22.4	12.2
MALUKU UTARA	**62.4**	**12.2**	**11.7**	**17.0**

Source: Village Potential Statistics 2018

Transportation development serves as an intermediary service that contributes to poverty reduction by enhancing the well-being of poor individuals. To some extent, the data pertaining to Maluku's land and water transportation development, which is outperformed by its neighbouring province, addresses the query regarding its elevated poverty levels. It also offers insights to its stakeholders about people's needs for improved public transport services.

3.4.6 Access to Credit

Microcredit helps reduce poverty by mitigating financial exclusion, helping poor people to resist economic shocks and making them out of poverty in the long term (Yu et al., 2020). The provision of credit to rural households has yielded an increase in their aggregate income, consequently leading to a rise in per capita income (Luan & Bauer, 2016). However, it is noteworthy that the impact may depend on people's specific socio-economic background in certain instances (Ganle et al., 2015). In a nutshell, ensuring that poor people have adequate access to financial services is vital because it can potentially offer them better prospects for economic development and poverty alleviation. Incorporating this variable into a village-level analysis would be a good starting point.

The difference between the odds of villages where most families have access to credit facilities is relatively minor when considering the village status in Maluku and Maluku Utara. In Maluku, villages with most families having access to credit facilities had 2.562 times higher odds of becoming developed villages compared to villages where most families lack such access. At the same time, in Maluku Utara, it takes 2.015 times. This observation suggests that the impact of households' credit access on village development is more pronounced in Maluku compared to Maluku Utara.

Table 17. Percentage of Villages by Bank Availability and Accessibility

Districts	Villages with Bank	Villages without Bank and have difficult access
8101 Kepulauan Tanimbar	6.3	58.2
8102 Maluku Tenggara	2.7	56.0
8103 Maluku Tengah	6.0	25.0
8104 Buru	2.4	50.0
8105 Kepulauan Aru	0.9	85.5
8106 Seram Bagian Barat	5.6	55.1
8107 Seram Bagian Timur	2.1	74.2
8108 Maluku Barat Daya	2.7	84.1
8109 Buru Selatan	2.6	80.5
8171 Ambon	16.7	0.0
8172 Tual	3.7	63.0
MALUKU	**3.7**	**59.8**
8201 Halmahera Barat	3.6	34.1
8202 Halmahera Tengah	8.2	49.2
8203 Kepulauan Sula	5.1	67.9
8204 Halmahera Selatan	3.0	66.2
8205 Halmahera Utara	2.0	35.2
8206 Halmahera Timur	3.9	49.0
8207 Pulau Morotai	4.5	56.8
8208 Pulau Taliabu	7.0	78.9
8272 Tidore Kepulauan	4.1	28.6
MALUKU UTARA	**3.9**	**51.1**

Source: Village Potential Statistics 2018

Table 17 presents a seemingly contradictory portrayal compared to the outcomes derived from the logistic regression analysis. Despite being only a slight difference, the percentage of villages in Maluku with banks is lower than that in Maluku Utara. Similarly, the proportion of villages lacking banks or facing challenges in accessing banking services is higher in Maluku compared to Maluku Utara. These statistics collectively underscore the more accessible nature of banking services in Maluku Utara. In contrast, the logistic regression results imply a distinct pattern where access to credit facilities significantly affects the village development status in Maluku more than in Maluku Utara. This discrepancy raises the question: could the limited access to banking services in Maluku contribute to this disparity? The answer lies beyond this study's objectives and opens a new topic for future research. Nevertheless, the lower presence of banks in Maluku could signify reduced funding accessibility. This could potentially explain why household credit access has a more pronounced influence on village development in Maluku. Regarding poverty reduction, restricted access to banking services might impede individuals' efforts to achieve economic autonomy, consequently affecting their overall quality of life. This finding could be a reference for the local government to broaden and enhance the accessibility of banking services. Such efforts could play a pivotal role in advancing household and micro-entrepreneurial economy.

3.4.7 Crime

Some economists place criminal activity in the formal labor market as a substitute for employment (Sharkey et al., 2016). This view sees illegal activity as an alternative, if not supplementary, source of income when individuals struggle to secure work or fair wages. Consequently, crime becomes one of the central roles in poverty (Gaitán-Rossi & Guadarrama, 2021). On one hand, poor people are vulnerable to engaging in criminal activities (Sugiharti et al., 2023). On the other hand, poor people are also at risk of being victims of crime (Webster & Kingston, 2014). To this point, the ambiguous relationship between crime and people's welfare status necessitates cautious analysis, given that it can exhibit variations across regions, communities, and time periods. However, understanding its importance in any specific context is essential. By knowing that, stakeholders may have influential information for effectively reducing poverty.

Among the independent variables employed in this study, crime stands out due to the unique direction of its influence on the dependent variable. In the context of this study, the variable "crime" signifies that villages in Maluku with no reported crimes during the past year had 0.594 times higher odds of becoming developed villages compared to villages with reported crimes. Similarly, in Maluku Utara, villages without any crimes during the past year had 0.675 times higher odds of becoming developed villages than those with reported crimes. In the context of logistic regression analysis, coefficients that are exponentiated and fall below 1.0 represent negative relationships. Therefore, the absence of crimes in villages in Maluku and Maluku Utara contributes to reduced odds of achieving developed village status.

By referring to the data in this study alone, one might align with the perspective that crime and village development progress share a linear relationship, a viewpoint supported by several previous studies. A developing village is an attractive and promising market, attracting individuals from diverse backgrounds, albeit accompanied by an increase in criminal activities. However, this finding needs more elaboration and data for a conclusive assessment, considering that the crime-related variable employed in this study is limited to the presence of crime. This study also conducts the Fisher's Exact Test to examine the correlation between people who experienced crimes and their monetary poverty status, using data from the National Socio-economic Survey. The outcome of this analysis demonstrates a statistically significant association between these variables, with a p-value of less than 0.05.

3.4.8 Access to Police Station

To some extent, crimes are intertwined with police accessibility. For effective community-level management, proper security is essential. Considering that police services access is scarce in welfare-related research, even at the village level, this study put that into the analysis. It is essential to understand that the presence of police stations may not accurately correlate with their impact on poverty. For example, there are police stations that do not operate 24 hours and seven days a week, due to various

reasons. Also, access to the police station depends on the willingness and ability of villagers to travel to that location (Stassen & Ceccato, 2021).

Villages in Maluku with convenient access to a police station— whether located within or outside the villages, as long as they are easily reachable—had 2.217 times higher odds of achieving developed status compared to villages without such access. In Maluku Utara, villages with easy access to a police station demonstrate 1.570 times higher odds of becoming developed compared to villages without easy access. This data implies that the impact of accessible police stations on village development status is more pronounced in Maluku compared to Maluku Utara.

Easy access to police stations indicates a high level of progress in village development. On the other hand, data concerning the efficacy of police services, including the responsiveness of officers, was limited, rendering the use this variable in this study preliminary. Nevertheless, to this point, it is evident that for a developing village to mitigate the repercussions of crimes, robust security is imperative to safeguard the social and economic well-being of its residents.

Conclusions

The variables used in this study exerted a notable influence on the probability of a village being categorized as developed in Maluku and Maluku Utara. They supported the existing idea that infrastructure plays a significant role in developing villages and enhancing people's welfare, aligning with the government's integral effort to alleviate poverty. The possession of defecation facilities (toilets) by households in both provinces has the most considerable likelihood and a significant correlation with a village being categorized as developed. However, the effects of the remaining variables exhibited variability.

Regarding electrification, housing defecation facilities, drinking water, access to middle school, public transportation, and crime rates, Maluku Utara's performance is better than Maluku, as evidenced by its more pronounced and significant impact on village development. On the other hand, regarding access to credit and police stations, the likelihood of a village being classified as developed in Maluku is more significant than in Maluku Utara.

The result of this study cannot be separated from the fact that Maluku Utara ranks among the top-performing provinces in Indonesia with regard to its low poverty rate. Therefore, knowing that developed villages in Maluku Utara are strongly influenced by toilet ownership, improved accessibility of public transport, higher electrification rates, and convenient access to middle schools serves as a valuable lesson for its neighboring province, Maluku. Enhanced electrification leads to an improved quality of life, better educational outcomes, and effective public service delivery. In addition, the more significant influence of housing defecation facilities and access to clean drinking water, closely related to healthcare, alongside well-functioning village-level public transportation, correlates with more substantial reductions in poverty and advancements in development, mirroring the achievements seen in Maluku Utara.

An interesting topic for further investigation lies in understanding the substantial influence of crime on village development in both regions, despite its relatively lesser impact compared to other variables. Exploring this avenue of research necessitates more refined and comprehensive crime-related data than what is provided by this study. Nevertheless, it remains evident that criminal activities contribute to the advancement of village development.

As it provides the situations of infrastructure at the village level, the result of this study could also be a valuable reference for the assessment and evaluation of the effectiveness of *Dana Desa* program. This utilization aims to ensure that the program brings its optimal benefit in improving people's welfare.

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