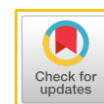


Village funds and poverty reduction in South Sumatra: A geographically weighted regression analysis



Sukanto ^{a,1}, Suwardi ^{b,2}, Muhammad Ferdy Oktavianto ^{b,3}

^a Department of Economic Development, Faculty of Economics, Universitas Sriwijaya, Indonesia

^b South Sumatra Regional Office of the Directorate, General of Treasury, Ministry of Finance, Indonesia

¹soekanto0813@fe.unisri.ac.id; ²suwardi3@gmail.com; ³ferdyoktavianto76@gmail.com

* corresponding author

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ABSTRACT

Poverty alleviation is the main agenda of development programs in Indonesia. Most of the implemented programs are non-spatial in nature and thus not yet optimal. This study looks into spatial patterns and area-based approaches to reducing poverty in South Sumatra Province. The geographically weighted regression (GWR) method using poverty data from 2022-2024 was employed in this study. The study finds an assembled spatial poverty pattern where areas (sub-districts) with high poverty levels are surrounded by regions with high poverty levels. Therefore, the poverty alleviation strategy of each region is aligned with each influencing factor.

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1. Introduction

Since 2015, the Indonesian government has implemented the Village Fund policy to promote equitable development and alleviate poverty in rural areas (Anam et al., 2023; Andina & Kim, 2023; Ilyasa et al., 2021). Through this policy, villages are provided with adequate financial resources to optimize their local potential for economic development and to improve the quality of life of rural communities (Oktaviya & Sutikno, 2024). The primary objectives of the policy are to enhance the quality of life of rural residents, strengthen local economies, and reduce regional development disparities (Karnoto, 2024; Mardalena et al., 2023). Village funds are allocated to improve public services, reduce poverty, stimulate the village economy, narrow development disparities among villages, and strengthen the role of village communities as agents of development (Rahayu, 2017). The allocation of village funds takes into account population size, poverty levels, land area, and geographic conditions. Furthermore, village funds play a crucial role in strengthening village institutions and contribute to poverty alleviation, improved well-being, and the empowerment of village communities (Lalira et al., 2018; Muslihah et al., 2019).

Rural poverty is a serious challenge in Indonesia (Arham & Payu, 2019), with significant disparities in poverty levels across provinces and regencies/cities (Pratiwi & Joshi, 2025). South Sumatra Province, characterized by diverse geographic and economic conditions, exhibits considerable disparities in poverty across its regions (Rahayuningtya & Afif, 2022). Some regencies endowed with abundant natural resources, such as agricultural land and plantations, do not necessarily have low poverty rates, whereas economically less-developed areas sometimes receive

substantial allocations of village funds (Setiawan, 2025). This suggests that the impact of village funds on poverty reduction is uneven across regions.

Based on data from Statistics Indonesia, poverty in South Sumatra Province was 14.25 percent in 2015 and declined to 10.97 percent in 2024. This overall poverty reduction is not always evenly distributed across districts/cities within the province. This decline indicates improvements in community welfare, likely influenced by village development programs or village funds. However, approximately 10 percent of the population remains poor, highlighting the need for more targeted policy interventions and more effective utilization of village funds, particularly in areas with high poverty rates but suboptimal allocation of village funds. Regional heterogeneity is associated with the poverty levels of neighboring regions, negative spillover effects that cannot be captured by non-spatial analysis (Ntodwa & Chirwa, 2025; Wang et al., 2023). Therefore, spatial analysis is important for understanding poverty distribution patterns and the effectiveness of village funds more comprehensively.

In addition, local economic growth supported by village funds also exhibits a cluster pattern, wherein villages located close to each other tend to experience simultaneous increases in economic activity (Sutresno et al., 2023). This spatial pattern suggests that the relationship between village funds and poverty may not be uniform across regions. Although previous studies, including Dewi et al (2025); Eliezer (2025); Wahyuni & Damayanti (2014), have examined the link between village funds and poverty, limited attention has been given to the spatial heterogeneity of this relationship across sub-districts. This aspect is crucial because the association between village funds and poverty can vary geographically due to differences in local socioeconomic conditions, economic structures, institutional capacities, and development characteristics. While several studies have applied spatial approaches such as Geographically Weighted Regression (GWR) to poverty-related issues, the spatially varying relationship between village funds and poverty remains insufficiently explored, particularly at the sub-district level in South Sumatra across multiple years.

To address this gap, this study integrates Moran's I and Local Indicators of Spatial Association (LISA) for spatial clustering identification with GWR to estimate geographically varying coefficients of village funds for both household and individual poverty across 208 sub-districts in South Sumatra from 2022 to 2024. The novelty of this study lies in combining spatial clustering analysis with geographically varying regression at the sub-district level over a multi-year period to examine whether the impact of village funds differs across locations and poverty measures. Accordingly, this research contributes to the literature by providing a geographically disaggregated and temporally comparative assessment of the spatial relationship between village funds and poverty. The objectives of this study are to: (1) identify the spatial distribution and clustering of poverty across sub-districts in South Sumatra, and (2) examine whether the relationship between village funds and poverty varies geographically and over time. The findings are expected to provide an empirical basis for geographically targeted poverty-reduction policies and more adaptive village-fund management.

Understanding the spatial heterogeneity of village fund impacts is critical for policy formulation. Conventionally, poverty alleviation policies rely on a uniform, province-wide approach (a 'one-size-fits-all' strategy), assuming that fiscal transfers yield homogeneous effects across all sub-districts. However, such an assumption is often empirically flawed. By identifying specific sub-districts where village funds are less or more effective due to local constraints, this research provides actionable, location-sensitive insights. Consequently, this study aims to enable policymakers to move away from generalized resource allocation toward targeted, spatially adaptive interventions, thereby optimizing the efficiency of public spending for poverty reduction.

2. Literature Review

2.1. Public Expenditure Theory

Public Expenditure Theory was developed by Musgrave (1959) and is one of the fundamental theories in public economics. According to Keynes, in "The General Theory of Employment, Interest, and Money", the level of economic output (Y) depends on aggregate demand. In the short run, aggregate demand consists of household consumption (C), investment by firms (I), and government expenditure (G). Government expenditure is one of the main components of aggregate demand; therefore, an increase in government spending leads to an increase in aggregate demand and

national income (Mankiw, 2006). In simple terms, the Keynesian equilibrium model can be expressed as follows:

$$Y \approx AD = C + I + G + (X - M) \quad (1)$$

This theory emphasizes the government's crucial role in providing public goods and services, distributing resources, and stabilizing the economy. In the context of rural development, public expenditure theory emphasizes that government allocation of funds must take into account local community needs and regional economic potential, so that expenditures can provide tangible benefits to rural communities.

2.2. Fiscal Decentralization

Fiscal decentralization is a concept in public finance that describes the delegation of fiscal authority from the central government to regional governments, including authority to manage regional revenues, expenditures, and financing. This concept aims to increase the efficiency of public resource allocation (Alonso & Andrews, 2019; Chen & Suk, 2023), strengthening local government accountability (Bojanic, 2018), as well as encouraging regional fiscal independence by expanding the regional revenue base. Within the framework of public finance theory, fiscal decentralization is based on the premise that regional governments have better information about the needs and preferences of local communities than the central government. Therefore, the delegation of fiscal authority is expected to increase the effectiveness of public services and encourage regional economic development that is more responsive to regional characteristics. This concept aligns with Musgrave's view, which emphasizes the allocation and distribution functions of fiscal policy, and Oates' Decentralization Theorem, which states that the provision of public services will be more efficient if carried out by the government closest to the community (Alonso & Andrews, 2019; Bojanic, 2018).

Fiscal decentralization plays a role in strengthening the link between fiscal policy and improving community welfare at the local level. In the Indonesian context, one form of implementation is village funds, which are fiscal transfers from the central government allocated directly to village governments to finance infrastructure development, economic empowerment, and public services. Through village funds, villages are expected to stimulate local economic activity, expand employment opportunities, and strengthen village development capacity, thereby contributing to poverty reduction and interregional disparities.

2.3. Poverty

Poverty is a multidimensional and complex development problem. Generally, poverty can be understood as a condition where an individual or group is unable to meet basic needs for a decent life both food and non-food needs. Todaro & Smith (2015) explained poverty is not only related to low income, but also reflects limited access to education, health care, employment, and other public facilities. Furthermore, poverty is also seen as a condition of powerlessness in meeting the minimum living standards prevailing in a society. Thus, poverty is not solely an economic issue, but is also intricately linked to social and structural aspects.

2.4. Empirical Evidence

Motaghi et al (2023) explained that poverty is a multidimensional phenomenon in which geography represents an important dimension because poverty conditions are shaped by the characteristics of the places where people live. This spatial dimension implies that poverty alleviation policies cannot necessarily be designed uniformly across regions. Daulay & Simamora (2023) similarly emphasize the spatial character of poverty and argue that poverty reduction policies should consider regional and local conditions. Septemberini et al (2024) further demonstrate that the determinants of poverty can vary substantially across local governments, while Wahyuni & Damayanti (2014) argued that poverty alleviation interventions should be differentiated according to regional characteristics. More recently, Ntodwa & Chirwa (2025) shows that multidimensional poverty tends to form spatial clusters among geographically adjacent areas rather than being randomly distributed. These findings establish that poverty is not only an individual or household-level problem but also a spatial phenomenon. A growing body of empirical evidence suggests that Indonesia's Village Fund Program has contributed to rural poverty reduction, although the magnitude and mechanisms of this effect remain debated. Andina & Kim (2023) found that the program

contributes to poverty alleviation, although its effects vary according to the geographical characteristics of rural areas. [Rammohan & Tohari \(2023\)](#) similarly show that the program is associated with improvements in rural household welfare and labor-market outcomes. More recently, [Agusta & Khoirunurrofik \(2024\)](#) demonstrate that the effectiveness of village funds is contingent on their expenditure structure, with development-oriented spending associated with lower poverty rates than other spending categories.

Within this context, village funds represent an important fiscal instrument for poverty reduction at the local level. Based on Public Expenditure Theory, government expenditure can reduce poverty by providing public goods and services, improving infrastructure, and supporting productive economic activities. From the perspective of Fiscal Decentralization Theory, transferring fiscal resources to villages enables public spending to be directed closer to local needs and potentially improves the efficiency and responsiveness of service delivery. Village funds can therefore contribute to poverty reduction through several channels, including improved access to basic infrastructure and public services, increased local economic opportunities, and strengthened household income-generating activities.

While these studies confirm the general poverty-reducing role of village funds, other research points to substantial spatial variation in this relationship, although the magnitude and direction of the relationship may vary across regions. [Sutresno et al \(2023\)](#), for example, found that village funds were related to local economic activity and poverty conditions in Brebes Regency, with the relationship varying across locations. [Guswandi & Amelia \(2023\)](#) also identified spatial variation in the relationship between village funds and local development outcomes in West Sumatra. [Sebayang et al \(2025\)](#) further highlight the importance of spatial connectivity and local institutional conditions in shaping the relationship between village funds and poverty. These findings suggest that the allocation of village funds alone may not generate uniform poverty outcomes because the effectiveness of fiscal resources depends on the socioeconomic and institutional characteristics of each locality.

The heterogeneous effects of village funds can be explained by differences in economic structure, infrastructure, accessibility, public-service provision, institutional capacity, and the ability of local governments and communities to transform fiscal resources into productive activities. Consequently, two sub-districts receiving similar amounts of village funds may experience different poverty outcomes. This argument implies that a global regression coefficient may conceal substantial local variation in the relationship between village funds and poverty. A geographically varying approach is therefore necessary to identify where the relationship is stronger or weaker. Although previous studies have established the relevance of spatial analysis and GWR in understanding poverty and village-fund-related outcomes, limited attention has been given to the geographically varying relationship between village funds and poverty at the sub-district level over multiple years in South Sumatra. This study addresses this gap by examining 208 sub-districts in South Sumatra during 2022–2024 and comparing local GWR coefficients across years. The analysis therefore extends the existing literature by examining not only whether village funds are associated with poverty, but also whether the strength and direction of this association vary geographically and over time.

2.5. Conceptual Framework

The conceptual framework of this study links village funds to poverty reduction through the public expenditure and fiscal decentralization channels. Village funds provide fiscal resources that can be directed toward public services, basic infrastructure, community empowerment, and local economic activities. These mechanisms are expected to reduce household and individual poverty. However, the strength of the relationship is not assumed to be identical across locations because local socioeconomic conditions, accessibility, economic structure, and institutional capacity may differ. Accordingly, the study expects a negative relationship between village funds and poverty, while the magnitude of the relationship is expected to vary geographically. Moran's I and LISA are used to identify spatial dependence and clusters of poverty, whereas GWR is used to estimate the location-specific coefficient of village funds.

3. Method

This study employs a quantitative spatial research design using annual cross-sectional data to examine the spatial relationship between village funds and poverty across South Sumatra Province.

Sukanto et al (Village funds and poverty reduction in South Sumatra:)

The study covers 208 sub-districts located in 13 regencies and Prabumulih City. Secondary data were obtained from the National Team for the Acceleration of Poverty Reduction (TNP2K) and Statistics Indonesia (BPS), and were complemented by relevant literature. The analysis focuses on two primary variables: village fund allocations and poverty, observed at the sub-district level for 2022, 2023, and 2024. Because the objective is to examine spatial heterogeneity within each year, the GWR models were estimated separately for 2022, 2023, and 2024 rather than pooling the observations as panel data (Table 1). Only sub-districts with complete and consistent observations throughout the study period were included.

Table 1. Operational Variables

Variables	Conceptual Definition	Operational Variables	Unit
Poverty	A condition in which individuals or households are unable to meet basic needs and minimum living standards	Number of poor households and individuals	People
Village Funds	Fiscal transfers from the central government to villages for development and empowerment	Total village fund allocation per sub-district	Million Rupiah

Source: multiple source

Geographically Weighted Regression (GWR) was employed because the research question concerns whether the relationship between village funds and poverty varies geographically across South Sumatra. Unlike a global regression model, which assumes that a single coefficient applies uniformly to all locations, GWR estimates a location-specific coefficient by incorporating distance-based spatial weights. This allows the strength and direction of the relationship between village funds and poverty to vary across sub-districts according to their geographic location and local characteristics (Hasibuan et al., 2022; Sukanto et al., 2019).

The GWR estimation was conducted using ArcGIS, employing a Gaussian kernel function. The optimal bandwidth was selected using the corrected Akaike Information Criterion (AICc), which determines the spatial extent of observations contributing to the estimation of each local coefficient. The use of a fixed kernel ensures that spatial weights are determined based on a fixed geographic distance, with observations located closer to each focal sub-district receiving greater weights than more distant observations. The bandwidth was optimized based on the AICc criterion to achieve an appropriate balance between model fit and model complexity. These specifications are reported to ensure the transparency and reproducibility of the GWR estimation.

For each year (2022, 2023, and 2024), the GWR model was estimated separately using the geographic coordinates of the 208 sub-districts. To demonstrate the empirical added value of the local GWR specification over a global model, the corresponding Ordinary Least Squares (OLS) regression benchmark for each year is also reported, including the AICc values. The analysis was performed using GWR model with the following formula:

$$y_i = \beta_0(u_i, v_i) + \sum_{k=1}^p \beta_k(u_i, v_i)x_{ik} + \varepsilon_i \quad (2)$$

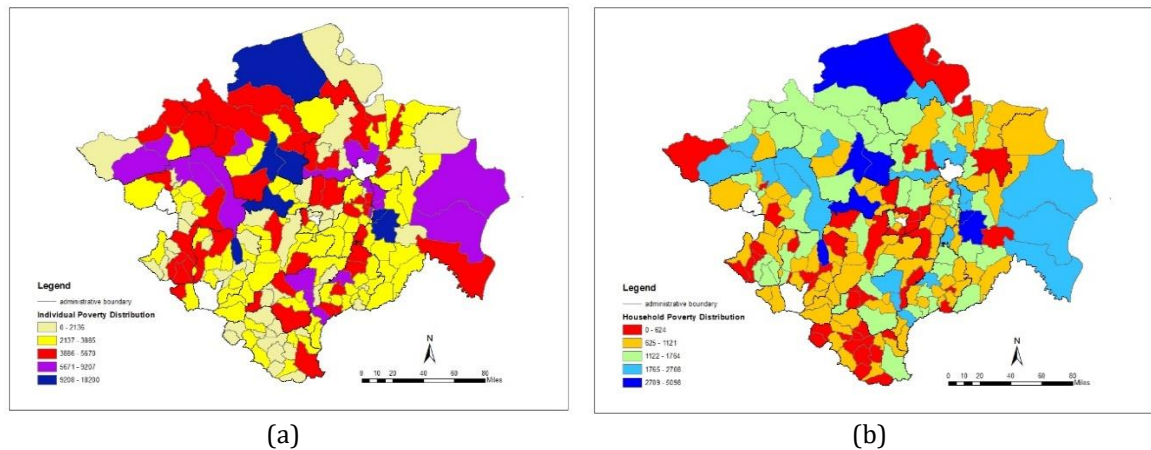
Where y_i is the response variable at the i -th subdistrict ($i = 1, 2, \dots, n$); x_{ik} is the predictor variable at the i -th subdistrict ($i = 1, 2, \dots, n$); (u_i, v_i) is the spatial coordinates point (longitude latitude) in an i -th subdistrict; $\beta_k(u_i, v_i)$ is the regression parameters for each i -th subdistrict; and ε_i is the error assumed IID (identically, independently, and normally distributed) with mean zero and constant variance σ^2 . Before estimating the local GWR models, a global Ordinary Least Squares (OLS) regression was estimated separately for each year as a benchmark. While the OLS model assumes a uniform coefficient for village funds across all sub-districts, the GWR model allows this relationship to vary geographically. Both models were compared using goodness-of-fit indicators including AICc to assess whether incorporating spatial heterogeneity provides superior explanatory power. The comparative results between the global and local models are detailed in the Results section. The identification of the GWR model for poverty uses the following formula:

$$\text{Pov}_i = \beta_0(u_i, v_i) + \beta_1(u_i, v_i)Vfund_i + \varepsilon_i \quad (2)$$

Where Pov_i is the amount of family/individual in the i -th subdistrict ($i = 1, 2, \dots, 208$); and $Vfund_i$ is the village fund (million rupiah) in the i -th subdistrict.

4. Results and Discussion

The distribution map of the number of poor individuals at the sub-district level in South Sumatra Province is presented in Figure 1(a), revealing an uneven spatial distribution of poverty across regions. The sub-districts are classified into five categories: beige (0–2,136 people), yellow (2,137–3,885 people), red (3,886–5,670 people), purple (5,671–9,207 people), and dark blue (9,208–18,200 people). Most sub-districts in South Sumatra fall into the low poverty category (beige; 0–2,136 people). However, several sub-districts fall into the medium to very high categories (yellow, red, purple, and dark blue; 2,137–18,200 people). Spatially, this pattern indicates a concentration of poverty within specific sub-district clusters, reflecting significant interregional inequality and highlighting the need for more targeted poverty alleviation interventions in high-poverty areas.



Source: data processed

Figure 1. (a) Individual Poverty Distribution, (b) Household Poverty Distribution

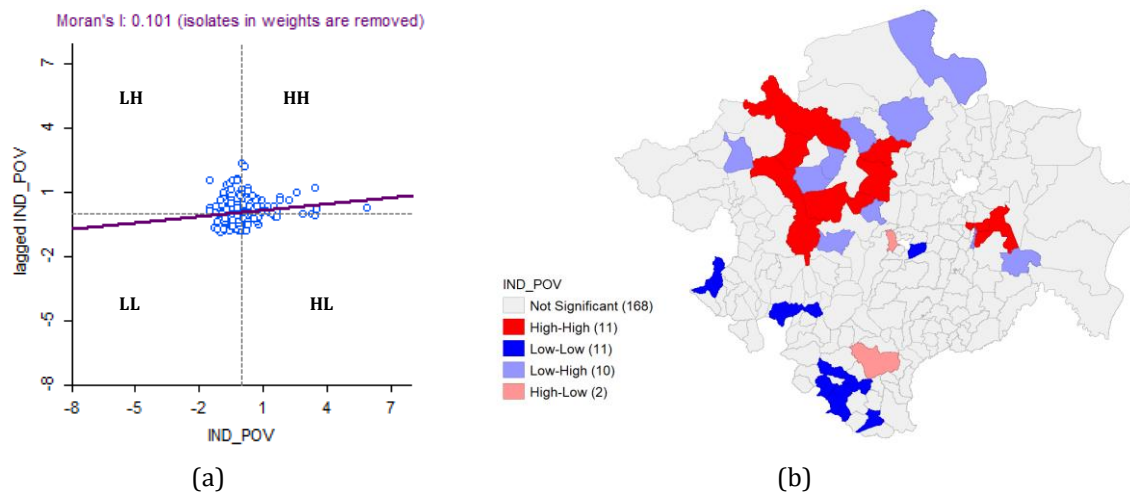
Figure 1(b) presents the spatial distribution of poor families across sub-districts in South Sumatra Province, revealing an uneven geographic pattern. The sub-districts are classified into five categories ranging from the lowest (0–624 families) to the highest tier (2,709–5,098 families). The majority of areas fall into the low-to-moderate categories (625–1,764 families), indicating that most sub-districts maintain a relatively moderate number of impoverished households. In contrast, only a few sub-districts fall into the highest tier, indicating a severe concentration of poverty in localized areas. Spatially, this clustering pattern reflects significant regional disparities in welfare across the province. Spatial autocorrelation analysis of individual poverty in South Sumatra Province yielded a Moran's I coefficient of 0.101 with a p-value of 0.001. This statistically significant p-value rejects the null hypothesis of spatial randomness, thereby confirming the presence of spatial dependence. This finding indicates that poverty levels in a given sub-district are significantly associated with those in neighboring areas. Furthermore, the positive Moran's I value confirms a positive spatial autocorrelation, implying that sub-districts with similar poverty levels tend to be geographically clustered (Jati et al., 2024).

This spatial association is further illustrated by the Moran scatterplot in Figure 2, which categorizes the region into four quadrants. Quadrant I (High–High) identifies sub-districts with severe poverty surrounded by similarly high-poverty neighbors, while Quadrant II (Low–High) comprises low-poverty areas enveloped by high-poverty clusters. Conversely, Quadrant III (Low–Low) represents pockets of low poverty adjacent to other low-poverty sub-districts, whereas Quadrant IV (High–Low) consists of high-poverty areas isolated within low-poverty surroundings. The distribution of sub-districts across these four quadrants demonstrates that poverty in South Sumatra Province exhibits distinct spatial clustering driven by neighboring regional dynamics. These findings underscore the importance of incorporating spatial dimensions into regional development frameworks. Accordingly, policy interventions should be tailored to the spatial characteristics of each area to promote more effective, resource-efficient, and integrated poverty reduction.

Sub-districts identified within the High–High (HH) quadrant include Kayu Agung, Sirah Pulau Padang, and Pampangan (Ogan Komering Ilir Regency); Rantau Panjang (Ogan Ilir Regency); North Penulak (PALI Regency); Sungai Keruh, Lais, Babat Supat, Sanga Desa, and Batang Hari Leko (Musi Banyuasin Regency); and Muara Lakitan (Musi Rawas Regency). These areas exhibit structural characteristics that reinforce poverty across neighboring borders. They are generally

remote, rural areas characterized by extensive swamp, peatland, and forest ecosystems, rendering local economic activities highly dependent on subsistence agriculture (Aprilia et al., 2026).

According to Statistics Indonesia (BPS), poverty rates in these regencies remain disproportionately high. In 2024, the recorded poverty rates were 12.08% in Ogan Komering Ilir, 12.30% in Ogan Ilir, 9.82% in PALI, 12.88% in Musi Banyuasin, and 13.44% in Musi Rawas. This socio-economic vulnerability is further exacerbated by deficient basic infrastructure—such as inadequate roads, poor sanitation facilities, and limited access to electricity and clean water—which restricts population mobility and suppresses local economic dynamics (Andrianus & Alfatih, 2023). Additionally, human development is constrained by restricted access to quality education and healthcare, thereby perpetuating an intergenerational cycle of poverty. Consequently, this spatial concentration generates spillover effects, where contiguous high-poverty sub-districts share identical structural vulnerabilities, including homogenous livelihood patterns and deficient public service access (Jati et al., 2024), including limited infrastructure, similar livelihood patterns, and limited access to public services.



Source: data processed

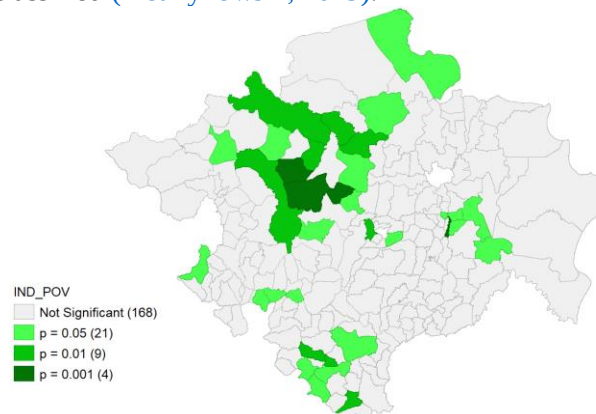
Figure 2. (a) Moran Scatterplot, (b) Spatial autocorrelation of poverty

Sub-districts categorized within the Low–High (LH) quadrant include Plakat Tinggi, Lawang Wetan, and Keluang (Musi Banyuasin Regency), alongside Benakat (Muara Enim Regency). These areas typically benefit from more robust localized economic activities such as commercial plantations, trading, and superior infrastructure capacity relative to their immediate neighbors (Eliezer, 2025). However, this spatial anomaly is often linked to the resource curse phenomenon under regional autonomy, where resource-abundant jurisdictions with high revenues fail to extend broad-based prosperity beyond their immediate borders. Situated as spatial outliers within high-poverty clusters, these sub-districts remain highly vulnerable to negative socioeconomic spillover effects from adjacent areas. Consequently, policy interventions in LH areas must prioritize strengthening domestic economic resilience and fostering cross-border developmental linkages to sustain achieved welfare and prevent regression (Novaldi & Pusponegoro, 2024).

Meanwhile, sub-districts classified in Quadrant III (Low–Low, LL) include Buay Pematang Ribu Ranau Tengah, Mekakau Ilir, Buay Sandang Aji, Pulau Beringin, Buay Runjung, and Muara Dua (South Ogan Komering Ulu Regency); Pajar Bulan, Pagar Gunung, and Gumay Ulu (Lahat Regency); Ulu Musi (Empat Lawang Regency); and Belida Barat (Muara Enim Regency). According to Lillah & Wijyaningrum (2025) areas with low poverty levels tend to cluster geographically because they share similar economic and social characteristics that support community welfare. Likewise, Setyani (2021) explained that human development, access to economic opportunities, and regional characteristics play important roles in shaping spatial poverty patterns across regions. In contrast, Quadrant IV (High–Low, HL) consists of Lengkiti (Ogan Komering Ulu Regency) and West Prabumulih (Prabumulih City), where sub-districts with high poverty levels are surrounded by neighboring sub-districts with relatively low poverty levels.

The Local Indicators of Spatial Association (LISA) analysis identified statistically significant local spatial autocorrelation in 34 of the 208 sub-districts included in the spatial dataset. These 34 sub-districts were classified into four cluster types: 11 High–High (HH), 11 Low–Low (LL), 10

Low–High (LH), and 2 High–Low (HL), with 21 sub-districts significant at the 5% level, 9 at the 1% level, and 4 at the 0.1% level. In contrast, 168 sub-districts showed no statistically significant local spatial association. The remaining six sub-districts were identified as neighborless observations, meaning they had no spatial neighbors under the first-order Queen contiguity spatial weights matrix and therefore could not be assigned to the conventional LISA cluster categories. In total, these three groups (34 significant, 168 non-significant, and 6 neighborless sub-districts) account for all 208 sub-districts in the dataset. The spatial distribution of the LISA significance levels and cluster types is presented in Figure 3. These findings indicate substantial spatial heterogeneity among sub-districts in South Sumatra Province, suggesting that poverty alleviation policies should be spatially differentiated and tailored to the socioeconomic characteristics of individual sub-districts to improve policy effectiveness. This pattern is consistent with the findings of Hasibuan et al (2019) in a study of 165 villages in West Bandung Regency, which identified 17 villages in the High–High (HH) category, 31 in the Low–Low (LL) category, 5 in the Low–High (LH) category, and 1 in the High–Low (HL) category, while 111 villages showed no statistically significant local spatial autocorrelation. A comparable pattern was also found in a LISA analysis of 276 European Union regions using Queen contiguity in GeoDa, where 175 regions were not significant, 45 were classified as High–High, 34 as Low–Low, 1 as Low–High, and 21 were identified as neighborless observations and thus could not be classified (Pietrzykowski, 2019).



Source: data processed

Figure 3. Local GWR coefficients for individual poverty

A comparison between the global OLS and local GWR models highlights the empirical advantage of incorporating spatial heterogeneity: while OLS assumes a uniform relationship across all sub-districts, GWR allows the coefficients to vary spatially. The GWR models show improved goodness-of-fit relative to OLS, with higher explanatory power (R^2 and adjusted R^2) and consistently lower AICc values across all study years, for both individual and household poverty. Table 2 shows the AICc consistently decreases from OLS to GWR across all study years, for both individual and household poverty, indicating that allowing the impact of village funds to vary geographically produces a more accurate and robust model than the global OLS specification.

Table 2. Comparison of Global OLS and Local GWR Model Fit

Poverty Measure	Year	OLS AICc	GWR AICc
Individual Poverty	2022	3796.70	3790.25
	2023	3798.15	3781.00
	2024	3793.33	3774.03
Household Poverty	2022	3276.68	3252.80
	2023	3279.66	3255.02
	2024	3273.82	3246.42

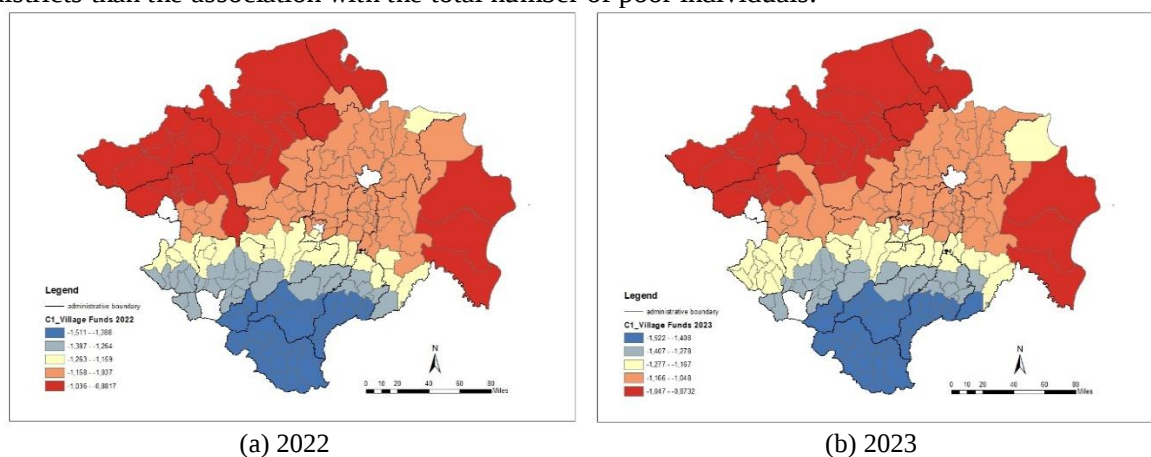
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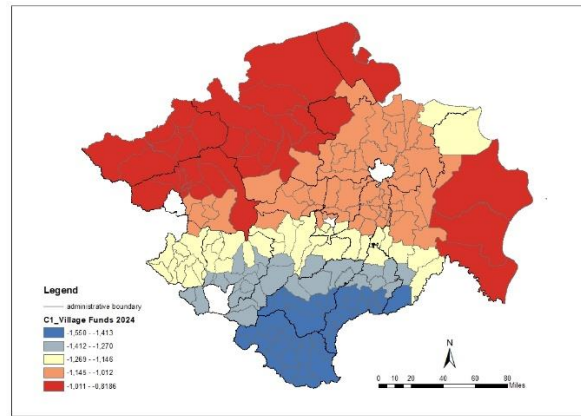
The results of the Geographically Weighted Regression (GWR) analysis indicate that the relationship between village funds and the number of poor families is spatially heterogeneous across sub-districts in South Sumatra. The local coefficient values ranged from -1.511 to -0.882 in 2022, -1.522 to -0.873 in 2023, and -1.550 to -0.819 in 2024. All sub-districts display negative local coefficients, indicating that higher village fund allocations are associated with lower numbers of poor

families, although the magnitude of the association differs across locations. However, not all local coefficients were statistically significant. Based on the pseudo t-value criterion ($|t| \geq 1.96$), of the 208 sub-districts analyzed, 193 (92.8%) showed statistically significant coefficients in 2022, 197 (94.7%) in 2023, and 196 (94.2%) in 2024, while the remaining sub-districts (15, 11, and 12, respectively) did not reach statistical significance (Figure 4). These results indicate that although the negative direction of the relationship between village funds and poverty is consistent across nearly all sub-districts, its statistical reliability is not universal; the interpretation that higher village fund allocations are associated with lower numbers of poor families should therefore be generalized primarily to the statistically significant sub-districts, rather than applied uniformly across the entire study area. This result is consistent with Abdullah (2022); Afriansyah (2020); Arham & Payu (2019); Sigit & Kosasih (2020) reported negative relationships between village funds and poverty in other Indonesian settings. The contribution of the present study is to show that the negative relationship is not spatially uniform in South Sumatra. This supports Public Expenditure Theory because fiscal spending can improve welfare through local public goods and economic activities, while the spatial variation is consistent with Fiscal Decentralization Theory because the effectiveness of transferred resources depends on local conditions and the capacity to translate fiscal resources into services and development outcomes.

Spatially, sub-districts in the southern part of South Sumatra, characterized by more pronounced negative local coefficients, exhibit a stronger negative association between village fund allocation and poverty. In contrast, sub-districts in the northern and eastern parts, where the coefficients are less negative, display a comparatively weaker association. These spatial differences should not be interpreted as evidence that village funds are intrinsically more effective in one region of the province; rather, they indicate that the observed relationship is conditioned by local characteristics. Variations in infrastructure access, local economic structures, geographic accessibility, human capital, and institutional capacity may affect how effectively village funds are converted into public services and income-generating opportunities. These mechanisms align with the fiscal decentralization perspective, wherein decentralized resources are expected to be more effective when local governments can align expenditures with local needs. Furthermore, the relatively stable coefficient pattern across 2022–2024 suggests that spatial heterogeneity is not purely transitory during the observation period. Nevertheless, because the current model includes only village funds as an explanatory variable, these contextual factors should be treated as plausible mechanisms rather than directly estimated determinants.

Similar findings emerged when poverty was measured using the total number of poor individuals. The local coefficients for village funds ranged from -1.088 to -0.360 in 2022, -1.063 to -0.376 in 2023, and -1.131 to -0.343 in 2024. As in the poor-families model, not all local coefficients were statistically significant. Applying the same pseudo t-value criterion ($|t| \geq 1.96$), 178 sub-districts (85.6%) were statistically significant in 2022, 187 (89.9%) in 2023, and 180 (86.5%) in 2024, with the remaining sub-districts not statistically significant (Figure 5). The proportion of non-significant sub-districts was consistently higher in this model than in the poor-families model (10.1–14.4% versus 5.3–7.2% across the three years), indicating that the association between village fund allocations and the number of poor families was statistically significant in a larger proportion of sub-districts than the association with the total number of poor individuals.



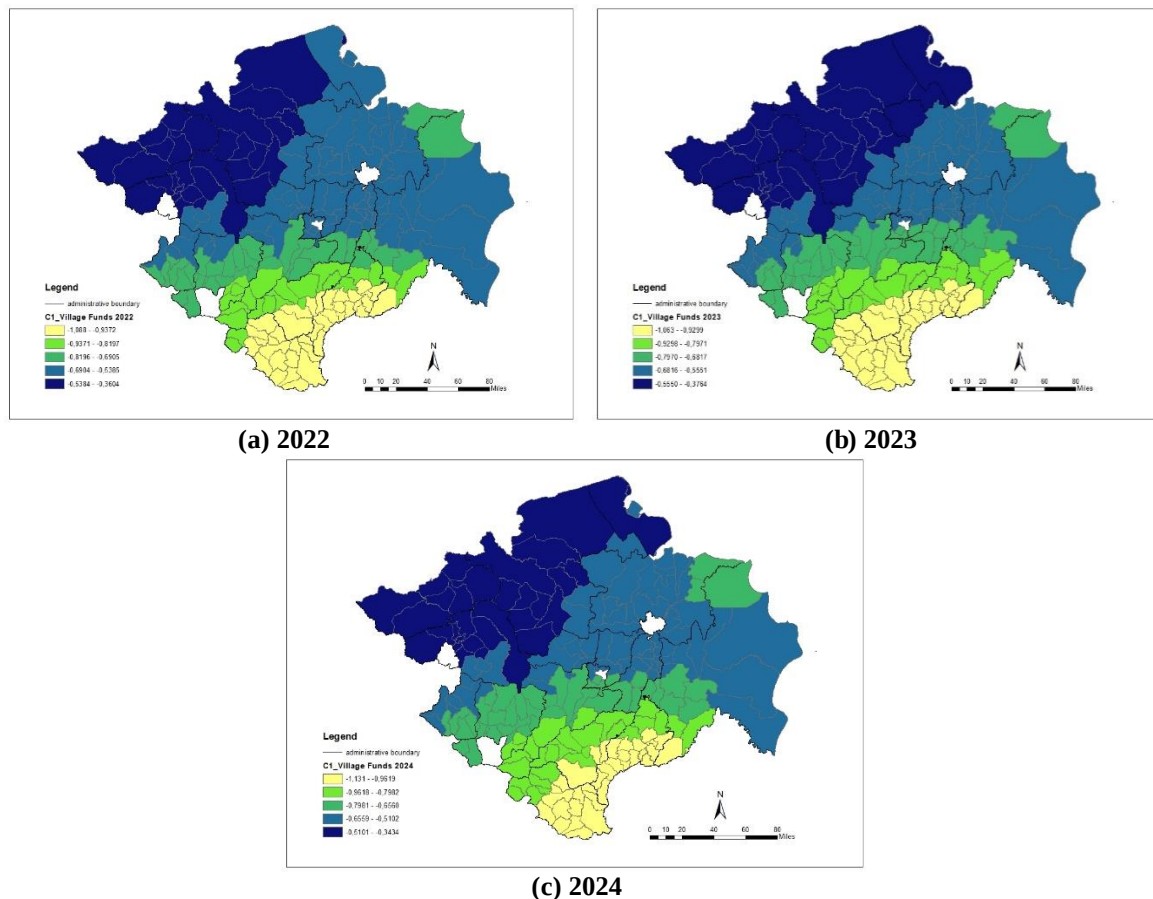


(c) 2024

Source: data processed

Figure 4. Local GWR coefficients $\beta_{1i}(u_i, v_i)$ Village funds to household poverty

Nevertheless, the consistent negative coefficients across both poverty measures indicate an overall negative association between village funds and poverty, although the magnitude and statistical significance of this association varied across sub-districts and years. This spatial variation suggests that the relationship between village funds and poverty is not uniform across South Sumatra Province, and that a single province-wide coefficient may mask important local differences. These findings are consistent with the spatial heterogeneity reported by [Sutresno et al \(2023\)](#) and [Guswandi & Amelia \(2023\)](#).



(c) 2024

Source: data processed

Figure 5. Local GWR coefficients $\beta_{1i}(u_i, v_i)$ Village funds to poor individual poverty

The variation in these local coefficients suggests that village fund allocation policies should be tailored to the specific conditions of each territory, as the application of uniform frameworks that disregard geographic differences may reduce the effectiveness of poverty alleviation efforts ([Artino et al., 2019](#)). Similarly, [Sukanto et al \(2019\)](#) found that village funds contributed to poverty reduction in more than 80% of sub-districts, although the magnitude of the effect varied across regions,

indicating that development programs should be designed according to regional socioeconomic characteristics. Furthermore, the observed spatial pattern of the village fund effect remained relatively stable over time, suggesting that the structural characteristics influencing poverty reduction were relatively persistent during the study period (Guswandi & Amelia, 2023). This interpretation is further supported by Anam et al (2023), who reported that regional disparities in the effectiveness of village funds are strongly shaped by institutional capacity and the quality of local governance.

5. Conclusion

This study finds that poverty in South Sumatra has a significant positive spatial autocorrelation, indicating that sub-districts with similar poverty conditions tend to cluster geographically. The LISA results further identify local clusters and spatial outliers, confirming that poverty is not randomly distributed across the province. The GWR estimates show negative local associations between village funds and both household and individual poverty in 2022–2024, while the magnitude of these associations varies across sub-districts. The main contribution of the study is to extend the existing literature on village funds and poverty by demonstrating, at the sub-district level, that the relationship is spatially heterogeneous and relatively stable in sign across multiple years. These findings strengthen the case for spatially differentiated poverty-reduction policies rather than relying solely on uniform province-wide approaches.

The policy implication is that village-fund management should become more adaptive to local poverty conditions and spatial linkages. Areas within High–High poverty clusters require coordinated interventions that address shared structural constraints, while Low–Low areas can be prioritized for sustaining local economic and welfare gains. However, this study has two important limitations. First, the empirical model includes only village funds as the primary explanatory variable, meaning the estimated local coefficients should be interpreted as geographically varying associations rather than complete causal effects. Second, the study focuses exclusively on South Sumatra, which limits the generalization of the findings to other provinces with different institutional and socioeconomic settings. Future research should incorporate additional socioeconomic variables such as infrastructure, employment, education, health access, local economic structures, and institutional capacity and extend the analysis by employing spatial panel or other longitudinal methods to provide a more comprehensive explanation of poverty dynamics.

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