

**Housing Development, Environmental Health Conditions, and Community
Economic Change in Pematang Gajah Village, Muaro Jambi Regency**

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Abstract

Introduction: Housing development in Pematang Gajah Village has grown rapidly due to its strategic position as a hinterland of Jambi City and proximity to Jambi University, affecting environmental conditions and local economic activities. **Objective:** This study aimed to describe housing development, environmental conditions, and community economic conditions and analyze their relationships. **Method:** A quantitative correlational approach was used with 60 respondents. Data were collected through questionnaires, structured interviews, and field observations and analyzed descriptively and using the Rank Spearman correlation test. **Results and Discussion:** Housing development, environmental conditions, and community economic conditions were generally categorized as good. Significant positive relationships were found between housing development and environmental conditions (strong), housing development and community economic conditions (very strong), and environmental conditions and community economic conditions (moderate). The strongest relationship was between housing development and community economic conditions. **Conclusion:** Housing development was associated with changes in environmental conditions and increased local economic activities. Therefore, housing development should be directed toward a balance between environmental sustainability and community economic conditions.

Introduction

Population growth and urban expansion have accelerated housing development in peri-urban areas, driven by land availability, competitive property prices, and improved accessibility to urban centers. This expansion contributes to the transformation of hinterland areas from agricultural landscapes into residential zones (Isra et al., 2025); (Adigeh & Abebe, 2023); (Varkey et al., 2026). Housing development supports community welfare, social interaction, and local economic activities, but requires adequate infrastructure, spatial planning, and environmental sustainability (Baihaqi et al., 2025); (Winston, 2022). Development that exceeds environmental carrying capacity may compromise long-term sustainability and residential environmental quality (Kementerian LHK, 2020).

Pematang Gajah Village, Jambi Luar Kota District, Muaro Jambi Regency, is a strategic hinterland of Jambi City located near Jambi University. Its accessibility has encouraged residential expansion and land-use conversion from green spaces, shrubs, and rubber plantations into built-up areas. At least 29 medium- and large-scale housing complexes have been established over the past decade, reflecting substantial spatial transformation. This development may generate economic opportunities through increased demand for goods and services, growth of Micro, Small, and Medium Enterprises (MSMEs), and local employment (Pedraza, 2021); (Audina et al., 2024); (Sahoo & Swain, 2020). Despite these economic opportunities, rapid housing development may increase environmental pressures through reduced green open spaces, increased surface runoff, drainage limitations, domestic waste generation, and potential groundwater contamination (Vinczeova & Toth, 2025)

These environmental changes are also relevant to public health because inadequate drainage and standing water may create mosquito breeding sites, while poor domestic waste management and contaminated water sources may increase exposure to environmental health hazards. Reduced green spaces may also contribute to higher local temperatures and diminished residential environmental comfort (Mustika et al., 2025). Accordingly, the potential public health implications can be conceptualized through the following pathway: housing development → environmental change → environmental exposure → potential health risk. This framework describes plausible pathways rather than confirmed health effects in the study area.

Although housing expansion may stimulate economic growth, its relationship with environmental quality and community economic conditions requires empirical evaluation. Pematang Gajah Village provides a relevant setting for examining these relationships because of its ongoing transition from agricultural to residential land use. Therefore, this study aims to describe housing development, environmental conditions, and community economic conditions and analyze the strength and direction of the relationships between housing development and environmental conditions, housing development and community economic conditions, and environmental conditions and community economic conditions in Pematang Gajah Village, Muaro Jambi Regency. The environmental health framework provides additional context for interpreting potential implications of residential environmental changes without assuming that health outcomes were directly measured.

Method

This study was conducted from January to August 2026 in Pematang Gajah Village, Jambi Luar Kota District, Muaro Jambi Regency. The research location was selected purposively because the area has experienced relatively intensive housing development and has the characteristics of a peri-urban area undergoing changes in land use and community economic activities. The study used a quantitative approach with a correlational explanatory level to analyze the relationships between housing development, environmental conditions, and community economic conditions. The study respondents consisted of 60 people comprising local communities and business actors/UMKM around the housing areas. Sampling was conducted using *stratified random sampling*. Primary data were obtained through questionnaires, structured interviews, and field observations, while secondary data were obtained from village profiles, relevant institutional documents, and supporting data on housing development. The questionnaire used a Likert scale of 1–5 to measure respondents' assessments of each research variable.

Before analysis, the research instrument was tested for validity using the Pearson Product Moment correlation and for reliability using Cronbach's Alpha. The data were then analyzed descriptively to describe the conditions of each variable based on minimum, maximum, mean, frequency, and percentage values. The assessment used five categories, namely very poor, poor, moderately good, good, and very good, with a score range of 1.00–5.00. The relationships among variables were analyzed using the Rank Spearman correlation because the research data were ordinal in scale. The correlation coefficient was calculated using the following formula:

$$r_s = 1 - n \frac{6 \sum d_i^2}{n(n^2 - 1)}$$

with r_s as the Spearman Rank correlation coefficient, d_i as the difference between paired ranks, and n as the number of respondents.

Result and Discussion

1. Result

Overview of Housing Development in Pematang Gajah Village

Pematang Gajah Village represents an ideal prototype of a *peri-urban* area, namely a transition zone experiencing a shift in landscape from an agricultural character toward an urban one. Its strategic position as a *hinterland* of Jambi City and its direct proximity to the Jambi University campus have triggered massive spatial transformation. Over the past 15 years, plantation land and green open spaces have been converted into residential areas in response to high *aggregate demand* (market demand). The recap of housing development expansion in Pematang Gajah Village can be seen in the following table.

Table 1
Housing in Pematang Gajah Village

No.	Housing Name	Year Established	Number of Units	Number of Residents
1	Sempurna Gajah City	2020	57	121
2	Citraraya City Cluster Bukit Hijau	2018	416	815
3	MetroJambi Residence	2019	67	168
4	Griya Halim Barokah 1	2019	127	336
5	Mendalo Park	2020	460	1043
6	Villa Gajah Mas II	2019	56	79
7	Sinergi Angsana	2019	170	440
8	Arza Griya Mandiri III	2021	57	40
9	Arza Villa Graha 2	2018	234	472
10	Puri Arza II	2015	153	365
11	Banama Regency	2021	57	137
12	Amanda 6	2022	57	28
13	Griya Halim Fanona 1	2020	208	464
14	Puri Kedaton	2022	65	92
15	CitraRaya City Cluster Terrace Hill	2020	8	12
16	CitraRaya City Cluster Terrace Avenue	2020	18	4
17	Perumahan Green Paradise	2022	9	20
18	Griya Halim Barokah 2	2019	104	335
19	Citraraya City Cluster Springhill	2020	3	9
20	Rizky Hadi Residence 2	2021	76	178
21	Citraraya City Cluster Royal Palm	2020	1	2
22	Citraraya City Cluster The Boulevard	2020	36	89
23	Javana City Light Part 4	2022	79	186
24	Banama Regency 2	2020	46	112
25	Permata Akbar Asri	2022	65	137
26	Sawarna Residence	2023	161	8
27	Puri Arza 5	2022	100	53
28	Pematang Land	2023	8	15
29	Perumahan Sawarna Residence	2022	55	59

Based on Table 1, the dynamics of housing expansion have been very substantial, particularly during the period from 2018 to its peak in 2020–2025. Large-scale housing developments such as Mendalo Park (460 units) and CitraRaya City *Cluster* Bukit Hijau (416 units) recorded very high population densities. This exponential growth is empirical evidence that the status of Pematang Gajah Village as a strategic *hinterland* and educational buffer zone (Jambi University) has triggered a surge in aggregate demand for housing facilities.

The high demographic concentration and land conversion have created a development paradox (*dual impact*) that is the main focus of this thesis. In accordance with the literature review (Chapter II), the arrival of thousands of new residents in these housing areas automatically creates a *multiplier effect* that acts as an engine for the local economy through the growth of the service sector and UMKM. However, at the same time, the high ratio of housing units and residents (such as in Sinergi Angsana and Griya Halim Barokah) creates significant spatial pressure on environmental carrying capacity (*carrying capacity*), in the form of reduced green land cover and increased hydrological burden.

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Housing Development

Housing development in the *peri-urban* area of Pematang Gajah Village is not only related to the provision of housing facilities but also to regional spatial development. In accordance with the theory of regional development dimensions (Mulyana, 2021), Housing Development is assessed based on basic infrastructure, social, and institutional aspects. The questionnaire results showed that the Housing Development variable obtained a total average score of 237 and was categorized as “Good”.

The condition of housing buildings, supporting infrastructure such as roads, access to clean water and sanitation, as well as environmental conditions that support safety and social interaction received good assessments. Community participation in social activities and environmental management was also rated as good. Respondents assessed that housing development had a positive impact on community income, encouraged local economic activities such as micro-enterprises, services, and trade, and considered environmental sustainability aspects such as green open spaces and air quality. Waste management and drainage systems, coordination between local governments and developers, as well as the role of the community in monitoring and managing the housing environment were also rated as good.

These results indicate that housing development in Pematang Gajah Village not only generates physical development of the area but is also related to social, economic, environmental, and institutional aspects. The respondents’ assessment, which was categorized as good, indicates that the presence of housing has brought changes to infrastructure provision and community activities in the study area. The development of housing is also reflected in changes in the spatial conditions of Pematang Gajah Village. Based on a comparison of location maps before and after the entry of developers, prior to development, the village area was dominated by secondary forests, shrubs, and residents’ rubber plantations, with road infrastructure that was still very limited. After development, spatial changes occurred, marked by the establishment of 29 integrated residential clusters. These changes indicate a dual impact, namely the emergence of local economic stimulus occurring alongside ecological challenges.

Environmental Conditions

In the context of *peri-urban* regional development, environmental conditions are an important parameter for assessing changes and pressures on environmental carrying capacity. The development of housing areas not only brings changes to infrastructure but can also create ecological pressures. Environmental conditions in Pematang Gajah Village were analyzed based on observations of changes in environmental conditions before and after housing development.

Table 2
Impact of Housing Development on the Environmental Conditions of Pematang Gajah Village

No.	Parameter	Before Housing Development	After Housing Development	Impact	Description
1	Green Land Cover	65% of village area	45%	Negative	Reduced green land due to land conversion for housing development
2	Groundwater Quality	Good (TDS <500 mg/L)	Moderate (TDS $\pm$ 700 mg/L)	Negative	Development activities and domestic waste have begun to affect groundwater quality
3	Air Quality	Good (average ISPU 30)	Fair (average ISPU 60)	Negative	Increased vehicles and development activities cause increased dust and air pollutants
4	Drainage and Flooding	Infrequent inundation	Frequent inundation during the rainy season	Negative	The drainage system has not fully adapted to the increase in built-up areas
5	Waste Management	60% of households served	85%	Positive	Improved sanitation services and community awareness
6	Environmental Noise	Low	Moderate	Negative	Increased vehicle activity and community mobility
7	Public Open Spaces	3 locations	5 locations	Positive	Provision of parks and public spaces by developers

Based on Table 2, housing development in Pematang Gajah Village shows both positive and negative impacts on environmental conditions. Negative impacts are evident in the reduction of green land cover from 65% to 45%, changes in groundwater quality, increased air pollution, increased inundation during the rainy season, and increased environmental noise. These changes indicate that the expansion of built-up areas has placed pressure on the ecological conditions of the area.

On the other hand, there are several positive impacts, particularly in improved waste management services and the increase in public open spaces. Waste management services increased from 60% to 85% of households, while public open spaces increased from 3 to 5 locations. This indicates that housing development has also been accompanied by improvements in several environmental facilities and services.

Community Economic Conditions

Within the framework of *peri-urban* regional economic development, the housing sector can serve as a catalyst or an *engine of growth*. The presence of new residential areas not only changes the physical space but is also associated with changes in the economic structure of local communities. This condition can be seen from the development of business activities and economic opportunities for communities around the housing areas.

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Table 3
Impact of Housing Development on Economic Conditions in Pematang Gajah Village

No.	UMKM Economic Aspect	Condition Before Development (2020)	Condition After Development (2025)	Impact	Description
1	Number of Active UMKM	28 business units	57 business units	Positive	Increased almost twofold due to increased demand from housing residents
2	Types of Developing Businesses	Dominated by grocery stores and traditional culinary businesses	Increased with <i>laundry</i> , building material stores, and <i>online</i> services	Positive	Diversification of business types due to urban community needs
3	Average Monthly UMKM Turnover	Rp2,500,000	Rp3,500,000	Positive	Increased income due to increased purchasing power of residents
4	Labor Absorption	65 people	125 people	Positive	UMKM are able to absorb more local workers
5	Access to Capital	Limited to village cooperatives	Began to expand through banks and financing institutions	Positive	Business actors began to gain access to formal capital
6	Competitiveness of Local Products	Low (village scale)	Medium (sub-district scale)	Positive	Marketing expanded through social media and networks among housing areas
7	Business Operational Costs	Low (Rp1.5 million/month)	Increased (Rp2.3 million/month)	Negative	Rental and raw material costs increased due to urbanization
8	Income Inequality Among UMKM	Low	Moderate	Negative	Larger businesses such as building material stores and cafés developed faster than small traditional businesses
9	Partnerships with Private Sector	Almost none	6 active partnerships	Positive	Cooperation with developers and building material stores
10	UMKM Training and Assistance	1 training session/year	4 training sessions/year	Positive	Increased attention from the village government toward community economic empowerment

Based on Table 3, the development of housing areas shows relatively substantial changes in the economic conditions of the community in Pematang Gajah Village. The number of active UMKM increased from 28 units in 2020 to 57 units in 2025. This development was also accompanied by diversification of business types, from previously being dominated by grocery stores and traditional culinary businesses to becoming more diverse, such as *laundry*, building material stores, and *online* services.

The increase in economic activity is also reflected in the increase in average UMKM turnover from Rp2,500,000 to Rp3,500,000 per month and the increase in labor absorption from 65 people to 125 people. In addition, access to capital began to develop through banks and financing institutions, the competitiveness of local products increased,

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partnerships with the private sector began to develop, and UMKM training and assistance increased.

Nevertheless, these economic developments also created several challenges. Business operational costs increased from Rp1.5 million to Rp2.3 million per month, while income inequality among UMKM changed from a low to a moderate level. This condition indicates that the benefits of housing area development have not been fully experienced equally by all business actors.

The development of housing areas in Pematang Gajah Village shows predominantly positive economic impacts, particularly through increases in the number of UMKM, turnover, labor absorption, access to capital, product competitiveness, partnerships, and training and assistance. However, increased operational costs and inequality among UMKM indicate challenges that need to be considered in community economic development amid the growth of housing areas.

Results of the Spearman Rank Correlation Test Among Variables

Based on data from 60 respondents, a Spearman *Rank* correlation test (*rs*) was conducted to determine the direction and degree of relationship between Housing Development (PER), Environmental Conditions (LK), and Community Economic Conditions/Business Units (UU). The test used a significance level of 5% ($\alpha = 0.05$), with the relationship considered significant when the significance value (*p-value*) < 0.05. The results of the Spearman *Rank* correlation test among variables are presented in Table 4.

Table 4
 Matrix of Spearman *Rank* Correlation Test Results (*rs*)

Variable	Statistic	Housing Development (PER)	Environmental Conditions (LK)	Community Economic Conditions / Business Units (UU)
Housing Development (PER)	Correlation Coefficient (<i>rs</i>)	1.000	0.642**	0.715**
	Sig. (2-tailed)	—	0.000	0.000
	N	60	60	60
Environmental Conditions (LK)	Correlation Coefficient (<i>rs</i>)	0.642**	1.000	0.528**
	Sig. (2-tailed)	0.000	—	0.000
	N	60	60	60
Community Economic Conditions / Business Units (UU)	Correlation Coefficient (<i>rs</i>)	0.715**	0.528**	1.000
	Sig. (2-tailed)	0.000	0.000	—
	N	60	60	60

*Note: Correlation is significant at the 0.01 level (2-tailed). Source: SPSS Data Processing Results, 2026.

Based on Table 4, the relationship between Housing Development (PER) and Environmental Conditions (LK) has a correlation coefficient of $rs = 0.642$ with a significance value of $0.000 < 0.05$. These results indicate a positive, strong, and significant relationship. Thus, H1 is accepted. The relationship between Housing Development (PER) and Community Economic Conditions/Business Units (UU) has a

correlation coefficient of $r_s = 0.715$ with a significance value of $0.000 < 0.05$. These results indicate a positive, very strong, and significant relationship. Thus, H2 is accepted.

The relationship between Environmental Conditions (LK) and Community Economic Conditions/Business Units (UU) has a correlation coefficient of $r_s = 0.528$ with a significance value of $0.000 < 0.05$. These results indicate a positive, moderate, and significant relationship. Thus, H3 is accepted. Overall, the three relationships among the variables show positive and significant directions. The highest correlation coefficient is found in the relationship between Housing Development and Community Economic Conditions/Business Units ($r_s = 0.715$), followed by the relationship between Housing Development and Environmental Conditions ($r_s = 0.642$) and Environmental Conditions and Community Economic Conditions/Business Units ($r_s = 0.528$).

2. Discussion

The results of the study show positive and statistically significant correlations between Housing Development, Environmental Conditions, and Community Economic Conditions in Pematang Gajah Village. The strongest relationship was found between Housing Development and Community Economic Conditions ($r_s = 0.715$), indicating a strong positive correlation rather than a direct causal effect. Housing development may contribute to local economic growth by increasing demand for goods and services, supporting the expansion of Micro, Small, and Medium Enterprises (MSMEs), and creating employment opportunities. This condition is reflected in the increase in active MSMEs from 28 to 57 units, alongside reported improvements in business turnover and employment absorption. These findings are consistent with Siregar (2025), who reported that residential expansion in peri-urban areas can generate economic multiplier effects through employment and MSME development. Setiawan & Rahmawati (2024) also demonstrated that housing development is associated with shifts in local economic activities toward trade and services. However, increasing operational costs, land rental prices, and limited access to capital may restrict the equitable distribution of these economic benefits among local communities.

Housing Development also showed a positive and significant correlation with Environmental Conditions ($r_s = 0.642$). This relationship should be interpreted according to the environmental indicators measured in the study. If Environmental Conditions were assessed using questionnaire-based respondent perception scores, the correlation represents an association between housing development and perceived environmental conditions, rather than direct evidence of objectively measured environmental improvement or degradation. Housing development may improve the built environment through better roads, drainage systems, clean water infrastructure, and sanitation facilities. Nevertheless, physical expansion may simultaneously contribute to land-use conversion, reduced green open spaces, decreased water infiltration capacity, and increased pressure on drainage systems and groundwater resources. These represent potential objective environmental changes that require verification through field measurements, spatial analysis, or environmental monitoring. This dual relationship between infrastructure improvement and ecological pressure is consistent with Wijaya (2025) and Pratama et al. (2024), who highlighted the importance of balancing residential infrastructure development with the preservation of environmental functions in peri-urban areas.

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From an environmental health perspective, changes in residential environmental conditions may influence community exposure to environmental hazards. Reduced infiltration areas and inadequate drainage capacity can increase the potential for standing water, which may facilitate mosquito breeding and increase the risk of vector-borne diseases. Inadequate domestic wastewater management and declining groundwater quality may increase exposure to microbiological contaminants, potentially contributing to waterborne diseases. Furthermore, reduced vegetation and green open spaces may intensify local heat exposure and reduce residential environmental comfort. These relationships can be conceptualized through the pathway: housing development → environmental change → environmental exposure → potential health risk. However, these health implications remain theoretical because the reported correlation analysis does not directly measure environmental contaminants, individual exposure, or disease outcomes. Therefore, the findings should not be interpreted as evidence that housing development has caused specific health problems in Pematang Gajah Village.

Furthermore, Environmental Conditions showed a positive, moderate, and significant correlation with Community Economic Conditions ($r_s = 0.528$). This finding suggests that more favorable environmental conditions, as represented by the study's environmental indicators, are associated with better community economic conditions. Adequate infrastructure, environmental cleanliness, and comfortable residential surroundings may facilitate mobility, access to markets, and daily business activities. Conversely, inundation, deteriorating road conditions, and inadequate environmental maintenance may disrupt transportation, increase operational costs, and limit economic productivity. Nevertheless, the correlation does not establish whether improved environmental conditions support economic development or whether economically advantaged communities have greater capacity to maintain their residential environment.

Overall, the findings indicate that housing development in Pematang Gajah Village is associated with community economic conditions and environmental conditions, but the correlational design does not establish causal relationships. The distinction between respondent perceptions and objectively measured environmental changes is essential when interpreting these findings and their potential implications for public health. Therefore, housing development policies should integrate economic empowerment with environmental management, particularly through adequate drainage, preservation of green open spaces, protection of water resources, sanitation improvements, and support for local MSMEs. Future environmental monitoring and health assessments are needed to determine whether residential environmental changes translate into measurable environmental exposures and community health risks

Study Limitations

This study has several limitations that should be considered when interpreting the findings. First, the correlational research design does not establish causal relationships between housing development, environmental conditions, and community economic conditions. Second, environmental conditions assessed through respondent perception scores may not fully represent objective environmental changes, including land-use conversion, drainage performance, groundwater quality, and green open space availability. Third, the study did not directly measure environmental exposure or public health outcomes; therefore, potential health risks related to residential development remain conceptual rather than empirically demonstrated. Furthermore, the study was conducted in a single village, limiting the generalizability of the findings to other peri-

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urban areas. Future research should integrate objective environmental measurements, spatial analysis, and environmental health indicators to provide a more comprehensive assessment of residential development impacts

Conclusion

Based on the results of the study, it can be concluded that housing development, environmental conditions, and community economic conditions in Pematang Gajah Village are generally in relatively good condition. Housing development has a positive and strong relationship with environmental conditions and a positive and very strong relationship with community economic conditions. Meanwhile, environmental conditions have a positive and moderate relationship with community economic conditions. The results also show that the relationships among the variables do not indicate a *trade-off* between housing development and environmental conditions or between housing development and community economic conditions.

Declaration of AI Assistance

AI Tools including Chat GPT, Gemini, Claude AI were used during the preparation of this manuscript. The AI Tools were used for grammar checking, paraphrasing and translating. The Authors have checked the output of the tools

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