

ANALYSIS OF INFRASTRUCTURE CONDITIONS FOLLOWING THE FLASH FLOOD (GALODO) DISASTER IN LIMA KAUM VILAGE, LIMA KAUM DISTRICT, TANAH DATAR REGENCY

Elga Mayu Hendral^{1*}, Erna Juita², Elvi Zuriyani³, Dasrizal⁴

¹Geography Education Study Program, Faculty of Social Sciences and Humanities, PGRI University of West Sumatra.

*Correspondent Email: egamayulhendra@gmail.com.

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Geography Study Program, Lambung Mangkurat University

Abstract: The high susceptibility of West Sumatra to hydrometeorological disasters, particularly galodo (flash floods), necessitates comprehensive assessments of post-disaster infrastructure conditions to support effective recovery and disaster risk reduction. This study aims to evaluate the extent of infrastructure damage caused by the galodo flash flood that struck Nagari Lima Kaum, Lima Kaum District, Tanah Datar Regency, in May 2024. A quantitative research approach was employed using a survey design. The study population comprised households located in the affected areas, with 200 respondents selected from 797 households through proportional random sampling across four villages (jorong): Dusun Tuo, Balai Labuah Atas, Balai Labuah Bawah, and Piliang. Primary data were collected through structured questionnaires and field observations, while secondary data were obtained from the Nagari Lima Kaum Office and the Regional Disaster Management Agency (BPBD) of Tanah Datar Regency. The level of infrastructure damage was analyzed using a Likert-scale-based assessment. The findings reveal that the overall infrastructure damage was classified as high, with a damage index of 80.56%. The most severe impacts were observed in residential buildings and public infrastructure, particularly bridges and places of worship, whereas educational and healthcare facilities experienced relatively lower levels of damage. These findings underscore the urgent need to strengthen resilient infrastructure, improve post-disaster recovery strategies, and integrate disaster risk reduction measures into regional development planning in flash-flood-prone areas.

Keywords: Galodo Flash Flood; Infrastructure Resilience; Damage Assessment; Tanah Datar Regency

INTRODUCTION

Indonesia is one of the countries with a high level of vulnerability to disasters. Indonesia is located on the equator and an active mountain range that brings together three large tectonic plates that can actively move and collide with each other, causing natural disasters. Of the many potential natural disasters, Indonesia is called a natural disaster supermarket (Muhammad, 2020). A disaster is an event or series of events that threaten and disrupt the lives and livelihoods of people caused by natural factors, non-natural factors, or human factors, resulting in loss of life, environmental damage, property loss, and psychological impacts (Law of the Republic of Indonesia Number 24 of 2007 concerning Disaster Management, 2007). Geologically, West Sumatra is largely composed

of the Bukit Barisan mountains and is covered in young volcanic material that is prone to flooding, making it vulnerable to landslide disasters. One of the disasters that frequently occurs in this area is flash floods. Flash floods are the sudden arrival of large amounts of water, accompanied by powerful currents carrying large objects such as trees or rocks, causing puddles, overflows, and heavy flows. Due to continuous rain, sudden floods occur in low-lying residential areas (Juita, 2017). Flash floods are one of the natural hazards that occur in watershed areas (DAS) and can cause damage due to their high flow speeds (Hermon, 2012) in (Juita E, Ulmi, 2022). Nagari Lima Kaum, Lima Kaum District, Tanah Datar Regency, is located in an area characterized by a wetland environment, namely an area with permanent or seasonal high water levels that plays an

important role in the hydrological cycle of the area (Adi, 2013). The wetland environment ecologically and geomorphologically influences water flow patterns and rainwater storage, greatly determining how water and material runoff from disasters such as flash floods (galodo) are processed in the natural environment.

The existence of these wetlands is crucial in the context of the flash floods (galodo) and cold lava flows that occurred in Nagari Lima Kaum in May 2024. Wetlands function as runoff absorption areas, which can mitigate flood risk. However, high rainfall intensity and volcanic activity from Mount Marapi rendered the wetlands unable to withstand the abundance of cold lava and the rapid flow of water (Juita E & Zuriyani, 2018).

The aftermath of the disaster was deeply felt by the people of Nagari Lima Kaum, Lima Kaum District, Tanah Datar Regency. The flash floods caused by Mount Marapi's cold lava flow left deep scars for the community, which destroyed dozens of homes. Residents not only lost their homes, but the devastating disaster also claimed lives and destroyed property, including the agricultural land they depended on for their livelihoods. Other impacts of the flash floods included the collapse of bridges, widening of rivers, damage to homes, and the loss of personal belongings caused by Mount Marapi's cold lava flow. The occurrence of flash floods seriously threatens people's settlements.

The Marapi flash flood, which occurred in the early hours of Saturday, May 11, 2024, caused widespread damage in Nagari Lima Kaum, Lima Kaum District, Tanah Datar Regency. The following is a breakdown of the losses and casualties: Table 1. Data on losses from flash floods (galodo) in Nagari Lima Kaum, Lima Kaum District, Tanah Datar Regency.

No.	CategoryLoss	Amount Loss
1.	Death toll	6 Person
2.	Injured Victims	14 Person
3.	Missing Victims	3 Person
4.	Damaged Rice Fields	67.92 Hectare
5.	Severely Damaged House	32 Unit
6.	Moderately Damaged House	24 Unit
7.	Lightly Damaged House	45 Unit
8.	Drifting House	9 Unit
9.	R4 Vehicles	8 Unit
10.	R2 Vehicle	14 Unit

No.	CategoryLoss	Amount Loss
11.	House of worship	1 Unit
12.	Broken Bridge	3 Unit
13.	Livestock	503 Tail
14.	Trading Facilities	23 Unit

Source: Head of Village of Lima Kaum, 2025

Based on the background information provided, the research problem is formulated as follows: What is the condition of the infrastructure after the flash flood (galodo) disaster in Nagari Lima Kaum, Lima Kaum District, Tanah Datar Regency? The purpose of this research is to quantitatively determine and analyze the condition of the infrastructure after the disaster. This research is expected to provide quantitative baseline data used by the Tanah Datar Regency Regional Disaster Management Agency (BPBD) for infrastructure-based disaster rehabilitation and mitigation planning, as well as adding to the literature. Geography of Disasters in Wetland Environments.

LITERATURE REVIEW

1. Understanding Flash Flood Disasters

a) Disaster

Natural disasters are disasters caused by events or a series of events caused by nature, including earthquakes, tsunamis, volcanic eruptions, floods, droughts, hurricanes, and landslides. Natural disasters in West Sumatra often occur because almost all of West Sumatra is vulnerable to climatological, geographical, social, cultural, economic, political, and technological disasters that exist in the region for a certain period of time, which can reduce the ability to respond to the adverse impacts of certain hazards (Hermon, 2012) in (Juita E, Ulmi, 2022).

A disaster is synonymous with a natural event that destroys settlements and the surrounding environment, whether caused by an earthquake, tsunami, volcanic eruption, or rainstorm resulting in massive flooding and landslides. On the other hand, a disaster also describes an event that disrupts a community's daily activities. This disruption is caused by human activity, occurs suddenly, is unforeseen, and its consequences cause unrest for the community. A disaster can also be defined as an event that has a serious impact on the functioning of a community or society, causing loss of life, property, and environmental damage. This event exceeds the capacity of the community and its available resources (Soekartawi, 2002) as noted by (Juita Erna, 2021).

b) Flash floods

Flash floods are a type of flooding that occurs rapidly due to high rainfall intensity and generally carries materials such as mud, rocks, and wood. Due to the speed of the floodwaters and the accompanying materials, flash floods are usually very destructive and cause loss of life in their path, as emergency evacuations are difficult and buildings are damaged by the strong currents carrying the materials (Adi, 2013). Flash floods can cause severe damage to infrastructure such

as roads, bridges, agricultural land, and public facilities. In addition to the loss of property, communities experience psychological trauma and the loss of livelihoods (Juita E & Zuriyani, 2018).

2. Infrastructure Conditions

Physical vulnerability describes the estimated level of damage and loss to infrastructure when certain dangerous factors occur (Rizal & Hizbaron, 2015).

Table 2. Level of Building Damage

Level of Damage			Information
Minor Damage	Moderate Damage	Seriously Damaged	
Unit price x 10-30% (percentage of damage)	Unit price x 40-50% (percentage damage)	Unit price x 60% (percentage damage)	Suggestion price asset value of each building.
10% = a small part damaged building structure light.	40% = part component support others are damaged.	60% = building collapsed/ partially large structure main building damaged.	
20% = cracks in plastered walls.	50% = part small structure main building damaged.		
30% = a small part supporting components			

(Simbolon et al., 2022).

Table 3. Bridge Damage Level.

No	Damage Category	Damage Criteria	Description Explanation
1.	Seriously damaged	Bodyroad/building the bridge is mostly damaged	• Physically damaged condition >70% • Most of the main structure/road body is damaged • Most of the asphalt layer is broken/cracked • Dangerous/risky to traffic • Repair with reconstruction
2.	Moderate damage	Bodyroad/building the bridge still exists, a small part of the structural components are damaged	• In a way physical damage 30%-70 • The road structure is still there • A small part of the main structure is damaged (broken, cracked) • Relatively still functioning Repair with rehabilitation
3.	Minor damage	Bodyroad/building The bridge still exists, some components (hardening layer) are cracked (the structure can still be used)	• Physically damage <30% • The building still exists • A small part of the structure was slightly damaged • Cracks in the pavement layer • A small number of other supporting components were damaged (road drainage) • Still can be used • Minor repairs

(Simbolan et al., 2022)

RESEARCH METHODS

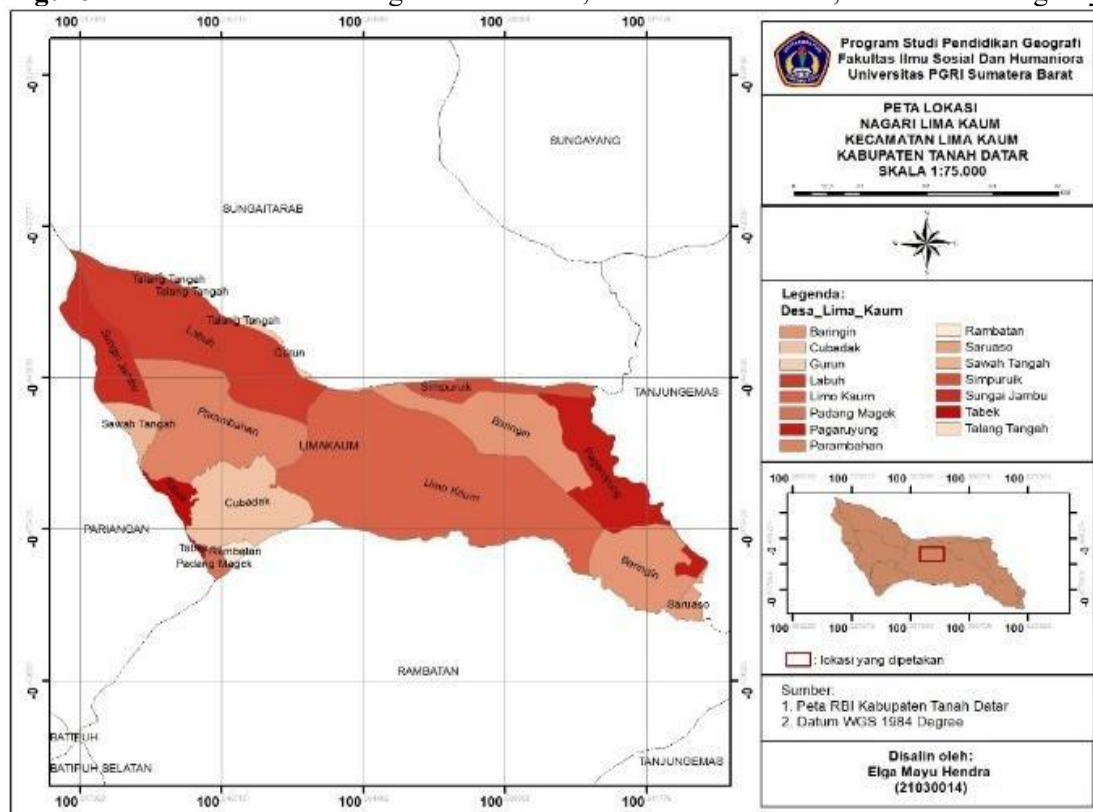
This study employed a quantitative research approach to assess the level of infrastructure damage caused by flash floods in Nagari Lima Kaum, Tanah Datar Regency, Indonesia. The study population comprised all areas affected by the flash flood event, while the research sample focused on the four most severely impacted Jorong (sub-villages), namely Dusun Tuo, Balai Labuah Atas, Balai Labuah Bawah, and Piliang. A total of 200 household heads were selected from 797 households using proportional random sampling to ensure representative coverage of the affected population. Primary data were collected through structured questionnaires and direct field observations to evaluate the condition of critical infrastructure, including

residential buildings, bridges, places of worship, educational facilities, and healthcare facilities. Secondary data were obtained from the Nagari Lima Kaum administrative office and the Regional Disaster Management Agency (BPBD) of Tanah Datar Regency to support data verification and contextual analysis. The collected data were analyzed using a five-point Likert scale to quantify the level of infrastructure damage, enabling a systematic assessment of the severity and spatial distribution of disaster impacts.

RESEARCH LOCATION

In this study, the location is in Nagari Lima Kaum, Lima Kaum District, Tanah Datar Regency

Figure 1. Research Location Nagari Lima Kaum, Lima Kaum District, Tanah Datar Regency



Source: Processed from research results

DATA COLLECTION TECHNIQUE

Data were collected through a systematic and rigorous research process using multiple complementary methods. This approach ensured the acquisition of comprehensive, valid, and reliable information necessary to address the research objectives. The specific data collection methods employed in this study are as follows:

1. Observation,

Observation was conducted through systematic and direct field observations to identify and record physical, environmental, and social phenomena relevant to the research objectives. This method enabled the researchers to obtain firsthand information on existing conditions, community activities, and contextual factors influencing the study area. Field observations were documented using standardized observation sheets to ensure consistency and reliability.

2. Questionnaire

A structured questionnaire was administered to collect quantitative data from respondents regarding the variables investigated in this study. The questionnaire consisted primarily of closed-ended questions, allowing respondents to select predefined response options. This approach facilitated standardized data collection, minimized response bias, and enabled statistical analysis across the study population.

3. Documentation

Documentation was employed as a supporting data collection technique to complement the findings obtained through observation and questionnaires. Documentary evidence included photographs, audio recordings, video recordings, official reports, maps, and other relevant archival materials related to the research context. These materials were used to verify field observations, strengthen data triangulation, and enhance the credibility of the research findings.

DATA ANALYSIS TECHNIQUES

Quantitative questionnaire data were analyzed using a weighted Likert-type scoring method. Each response was converted into a numerical score (Yes = 3, No = 2, and Don't Know = 1), allowing the calculation of weighted scores and the Respondent Achievement Level (TCR). The resulting percentage scores were used to classify infrastructure damage into severe, moderate, and minor categories according to predefined assessment criteria. This approach enabled a standardized evaluation of respondents' perceptions and facilitated comparative analysis across different indicators of infrastructure damage.

Table 4. Answer Weighting Criteria

Answer Options	Score Weight	
	Positive	Negative
Yes	3	1
No	2	2
Don't know	1	3

(Fadli & Reza, 2022)

Descriptive statistical analysis was employed to summarize respondents' responses. The proportion of respondents selecting each response category was calculated as a percentage using the following equation:

$$P = \frac{f \times 100\%}{n}$$

where P is the percentage of respondents, f is the observed frequency for each response category, and n is the total sample size. This calculation facilitates comparison of the relative distribution of responses across categories. The comparison between the actual and ideal scores was performed to assess the level of achievement for each indicator. The resulting values are presented in Table 5 and serve as the basis for the subsequent analysis.

Table 5. Respondent response score percentage criteria

No	Interval Evaluation	Information
1	0-35%	Low
2	35-75%	Currently
3	75-100%	Tall

(Fadli & Reza, 2022)

To assess the degree of respondents' accomplishment, the Total Respondent Achievement (TCR) index was computed by juxtaposing the aggregate score derived from respondents' answers with the highest attainable score. The TCR value is articulated as a percentage, indicating the degree to which the recorded reactions near the maximum possible score. The computation is executed utilizing the subsequent formula:

$$TCR = \frac{\text{Acquisition Score}}{\text{Maximum Score}} \times 100\%$$

Information:

TCR = Respondent Achievement Level

RESULTS AND DISCUSSION

This section discusses the research findings based on the established objectives and research questions. The analysis examines the spatial and environmental characteristics of the galado (flash flood) disaster in Nagari Lima Kaum, Lima Kaum District, Tanah Datar Regency, highlighting the interactions among topographic, hydrological, and land-use factors that contributed to the event. The findings are supported by field investigations, spatial analyses, and relevant secondary datasets, enabling a comprehensive interpretation of the disaster mechanism and its implications for disaster risk reduction. The descriptive statistics and key characteristics of the collected data are summarized in the following table.

Tabel 6. Physical Vulnerability Score

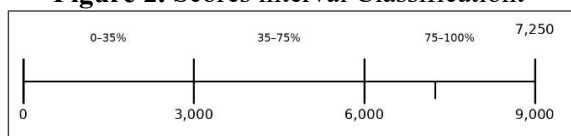
		F	%		
1. Condition building (house)	Seriously damaged	95	47.5%	488	82.22%
	Moderate damage	115	57.5%	509	
	Minor damage	90	45%	483	
2. Condition educational facilities (school)	Seriously damaged	47	23.5%	396	87.00%
	Moderate damage	79	39.5%	439	
	Minor damage	85	42.5%	470	
3. Condition public facilities (bridges)	Seriously damaged	94	47%	489	74.44%
	Moderate damage	115	57.5%	505	
	Minor damage	107	53.5%	572	
4. Condition public facilities (places worship)	Seriously damaged	90	45%	478	86.61%
	Moderate damage	109	54.5%	501	
	Minor damage	92	46%	580	
5. Condition public facilities (health)	Seriously damaged	87	43.5%	463	72.50%
	Moderate damage	70	35%	431	
	Minor damage	71	35.5%	446	
Total score				7,250	

Source: Processed Primary Data, 2025

Based on the tabulated questionnaire data, the respondents obtained a total score of 7,250. The maximum possible score was calculated by multiplying the highest score assigned to each questionnaire item (3), the total number of questionnaire items (15), and the number of respondents (200), resulting in a maximum score of 9,000, as shown below:

$$\text{Maximum Score} = 3 \times 15 \times 200 = 9,000$$

Where 3 represents the highest score assigned to each questionnaire item, 15 is the total number of questionnaire items, and 200 is the total number of respondents. Based on the calculated maximum score, score intervals were subsequently established to classify respondents' perceptions into predetermined categories. The interval classification is presented in the following figure.

Figure 2. Scores interval Classification

Source: Adapted from Sugiyono (2023) and processed by the authors (2025).

Based on the classification intervals presented above, the condition of infrastructure following the galodo (flash flood) disaster in Nagari Lima Kaum, Lima Kaum District, Tanah

Datar Regency, was assessed using the percentage score method. The percentage was calculated by comparing the total score obtained with the maximum possible score using the following equation:

$$\text{TCR} = \frac{\text{Obtained Score}}{\text{Maximum Score}} \times 100\%$$

Substituting the observed values:

$$\text{TCR} = \frac{7,250}{9,000} \times 100\% = 80,56\%$$

The computed percentage of 80.56% signifies that the post-disaster infrastructure status is classified as good according to the established evaluation standards. This discovery indicates that, although the effects of the galodo catastrophe, most public infrastructure continued to operate or had been successfully reinstated through recovery and rehabilitation initiatives. Nevertheless, some infrastructure components still require significant modification to boost resilience against future hydrometeorological catastrophes. The analysis of the Total Criterion Referenced (TCR) values relied on a triadic damage categorization to guarantee a uniform evaluation of infrastructure status post the Galodo flash flood. Infrastructure exhibiting TCR values between 0% and 35% was categorized as experiencing minor damage, signifying slight physical degradation with negligible effects on operational capacity.

TCR values ranging from 35% to 75% were classified as moderate damage, indicating considerable dysfunction that necessitates restoration and rehabilitation for normal operation. Infrastructure exhibiting TCR values exceeding 75% was categorized as severely damaged, indicating significant devastation that undermines structural stability and necessitates

substantial rebuilding initiatives. This categorization underpins the assessment of infrastructure damage severity, as demonstrated in Figure 3. The level of infrastructure damage resulting from the Galodo flash flood in Nagari Lima Kaum was evaluated using the Total Conformity Ratio (TCR). The corresponding results are presented in Figure 4.

Figure 3. Classification of Infrastructure Damage Severity Based on Total Criterion Referenced (TCR)

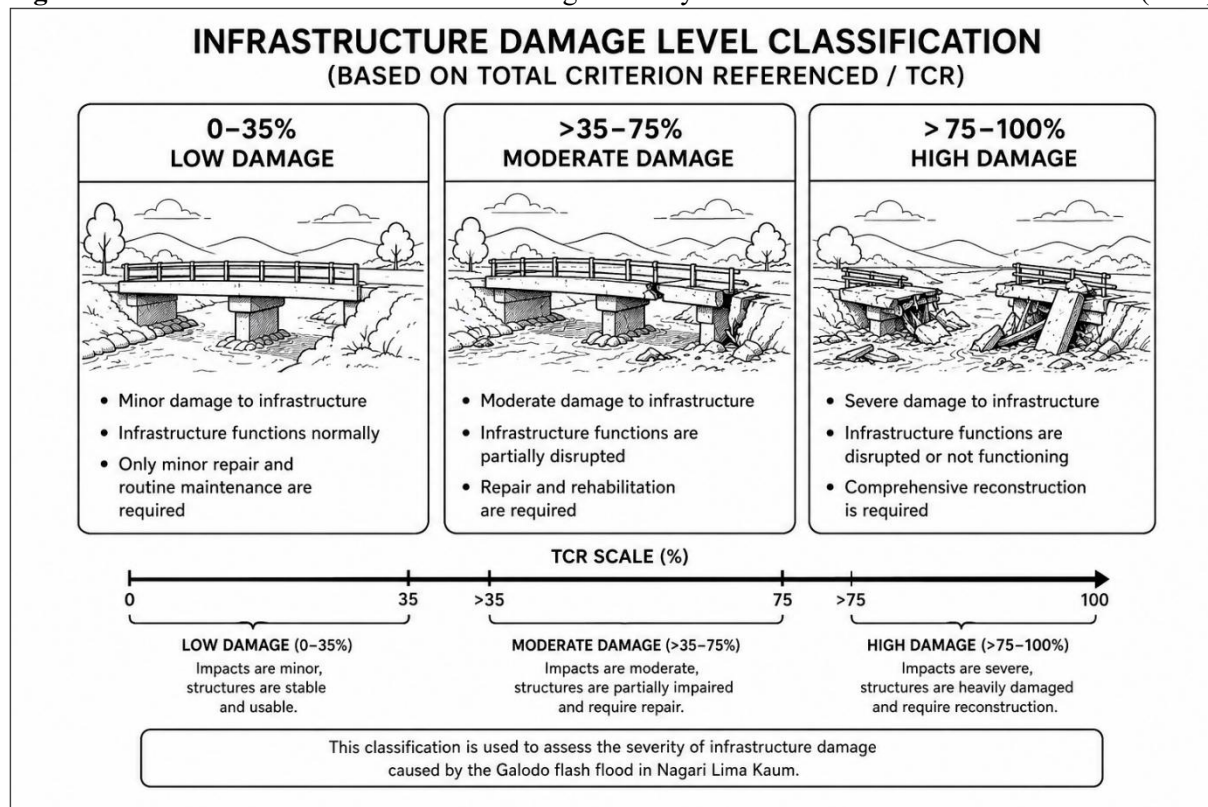
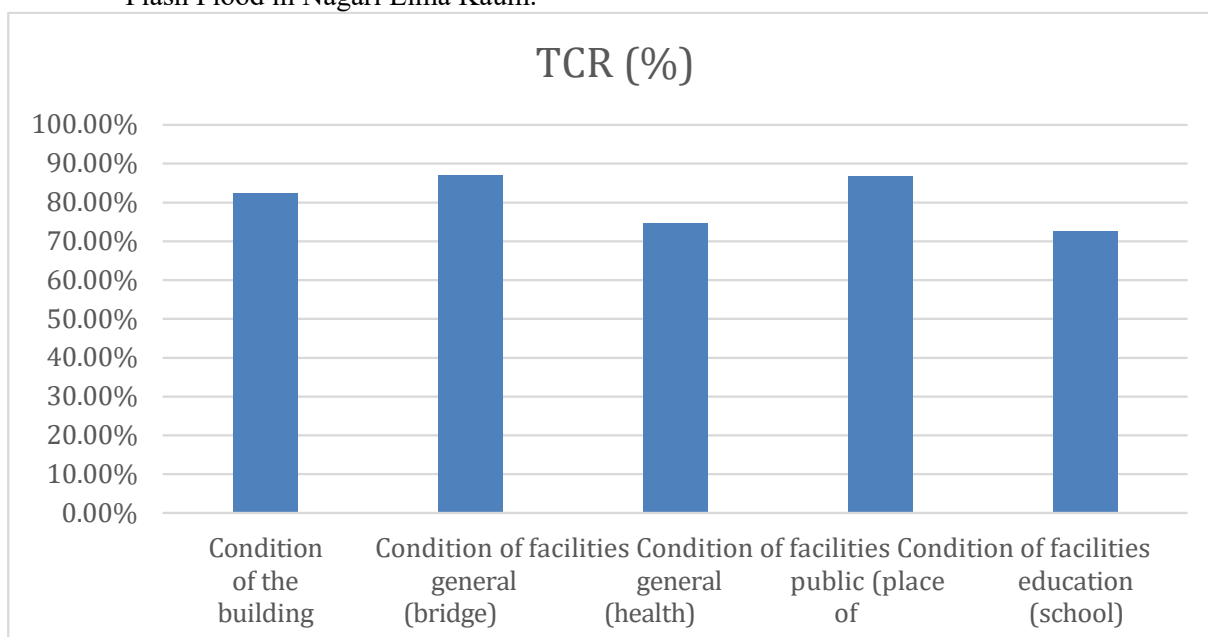


Figure 4. Total Conformity Ratio (TCR) of Infrastructure Damage Indicators Following the Galodo Flash Flood in Nagari Lima Kaum.



It can be concluded that the condition of infrastructure following the flash flood (Galodo) disaster is classified as high or severely damaged, with a damage percentage of 80.56%, indicating a high level of infrastructure damage. This can be seen from the score obtained of 7,250 out of a maximum score of 9,000, with the percentage obtained being 80.56%. The majority of respondents stated that the main infrastructure in Nagari Lima Kaum, including buildings (houses) and public facilities (bridges and places of worship), suffered quite severe damage, including heavy, moderate, and light damage.

Concurrently, academic buildings (schools) and medical institutions (community health centers or clinics) sustained little harm as the degree of destruction was very minor. The outcomes reveal that, in spite of the devastation wrought by the disaster, the efforts to restore infrastructure have been highly effective and are nearing ideal status. These upgrades to infrastructure are essential for promoting mobility, social interactions, and economic resurgence, hastening the recovery process and enhancing the quality of life for individuals in afflicted locales.

DISCUSSION

The research results indicate that flash floods (galodo) have caused damage to various infrastructure, especially houses and public facilities (bridges and places of worship). Based on the TCR results, post-disaster infrastructure damage reached an average of 80.56%, indicating a high level of damage. However, educational facilities (schools) and healthcare facilities (community health centers, clinics) did not experience severe damage, with relatively low levels of damage.

This is in line with the theory according to (Sarapang et al., 2019), in their study on tsunami disaster vulnerability in Palu City, which emphasizes that physical vulnerability refers to the extent to which infrastructure and physical buildings in an area can be affected or damaged by disasters. This is in line with the results of Murdiana (2015), who studied flash floods in Sabang City, which determined that the dominant damage was to residential areas and public facilities. Murdiana also emphasized that mitigation needs to be focused on strengthening strategic infrastructure because physical damage triggers a decline in economic and social activities in the community.

In the context of disaster geography literature, this 80.56% figure serves as an

important benchmark for the level of infrastructure damage caused by cold lava disasters, which have different characteristics from hydrometeorological disasters such as ordinary floods or tornadoes. Cold lava carries materials such as mud, rocks, and wood at high speeds, resulting in more destructive physical damage, as explained in studies (Sarapang et al., 2019) and (Murdiana et al., 2015) regarding infrastructure vulnerability to disasters.

In addition to enhancing scientific understanding, these quantitative results can serve as a reference for the Tanah Datar Regency Regional Disaster Management Agency (BPBD) in determining post-disaster rehabilitation priorities, particularly in the Jorong-Jorong areas that were the focus of the research sample, such as Dusun Tuo, Balai Labuah Atas, Balai Labuah Bawah, and Piliang. This data is also very useful for risk-adaptive spatial planning, given the significant damage to physical infrastructure in the region due to the Marapi cold lava flood. By using these measurable and representative damage level indicators, BPBD can direct mitigation efforts, infrastructure repairs, and community capacity building in a more focused and evidence-based manner so that future disaster risks can be minimized.

CONCLUSION

Based on the results of the research analysis regarding the impact of flash flood disasters (galodo) in Nagari Lima Kaum in May 2024, it can be concluded that overall, the condition of infrastructure damage is categorized as high with a Respondent Achievement Level (TCR) index reaching 80.56%. This finding confirms that the impact of flash flood materials carrying mud, rocks, and wood has a very destructive power on the physical stability of buildings in the affected areas. That figure serves as a crucial indicator that the recovery of infrastructure in this area still requires serious attention due to the level of damage exceeding the normal functional limits.

The damage distribution reveals an irregular pattern among sectors, with the housing sector and public infrastructures like bridges and religious sites seeing the most substantial effects. Harm to these sectors impedes inhabitants' movement and interrupts the community's social and economic functions. Conversely, educational and health institutions experienced minimal damage, suggesting that these infrastructures possess superior operational resilience or are situated in regions not directly affected by the primary flow of cool lava.

Subsequently, the findings of this study furnish a quantitative repository for the Regional Disaster Management Agency (BPBD) of Tanah Datar Regency to prioritize rehabilitation and reconstruction initiatives in the hamlets experiencing the most extensive damage, including Dusun Tuo, Balai Labuah Atas, Balai Labuah Bawah, and Piliang. Moreover, the incorporation of disaster risk mitigation measures into adaptive spatial planning policies is essential for enhancing infrastructure resilience to forthcoming hydrometeorological hazards. Focused and data-driven interventions are crucial to reduce physical susceptibility and safeguard communities in disaster-affected regions.

REFERENCE

- Arikunto, S. (2022). Arikunto, Suharsimi, 2002, Prosedur Penelitian Suatu Pendekatan Praktek, Rineka Cipta, Jakarta. *Jurnal EMBA*, 1(3).
- Davison, E., Sabila, B., Juita, E., & Zuriyani, E. (2024). Upaya Penanggulangan Sisa Material Pasca Bencana Banjir Bandang di Nagari Andaleh Baruh Bukik Kecamatan Sungayang. *Jurnal Spasial*, 4(11), 152-158.
- Djauhari, W., Koto, A. G., Jaya, R., Ayuba, S. R., Rijal, A. S., & Tisen, T. (2023). Analysis of Infiltration in Various Land Use in The Alo River Sub-Region. *Jurnal Geografika (Geografi Lingkungan Lahan Basah)*, 4(1), 9-22.
- Efendi, M., Nasruddin, N., & Karani, S. (2022). Partisipasi sekolah terhadap masyarakat pembelajar tangguh bencana di lingkungan lahan basah. *JPIG (Jurnal Pendidikan Dan Ilmu Geografi)*, 7(2), 97-109.
- Efendi, M., Nugroho, A. R., Nayan, N., Rusdiansyah, R., & Normelani, E. (2022). Development of Adiwiyata-Based Integrated IPS Teaching Materials (Study of Environmental Wetlands and Sustainable Development at SMPN 11 Kota Banjarbaru). *J-PIPS (Jurnal Pendidikan Ilmu Pengetahuan Sosial)*, 9(1), 53-62.
- Gersanandi, G., Subardjo, P., & DS, A. A. (2013). Analisa Spasial Kerentanan Bencana Tsunami di Kabupaten dan Kota Pesisir Provinsi Sumatera Barat. *Journal of Oceanography*, 2(3), 232-237.
- Harvia, R., Juita, E., & Despica, R. (2024). Analisis Spasial Bencana Banjir Di Kota Padang Periode Tahun 2020-2024. *JPIG (Jurnal Pendidikan dan Ilmu Geografi)*, 9(2), 139-147.
- Juita, E., & Rezki, A. (2021, August). Dampak Gempa Dan Tsunami Terhadap Masyarakat Desa Bosua Kecamatan Sipora Selatan Kabupaten Kepulauan Mentawai. In *Mitigasi Bencana di Era New Normal Covid-19*.
- Muzdalifah, S., Kumalawati, R., Purboningsih, D., Kelpin, M., & Fatimah, S. (2026). Penguatan Kapasitas Kelembagaan Program Kampung Siaga Bencana (KSB) Trisakti di Kecamatan Cempaka Kota Banjarbaru. *Jurnal Pengabdian ILUNG (Inovasi Lahan Basah Unggul)*, 5(2), 93-103.
- Nugroho, A. R., Sari, Y. P., & Pangaribuan, A. N. (2021). Analisis Faktor Masyarakat Tetap Bertempat Tinggal Di Kawasan Rawan Bencana Banjir Kabupaten Banjar. *Jurnal Geografika (Geografi Lingkungan Lahan Basah)*, 1(2), 28-39.
- Putra, I. S. W., Hermawan, F., & Hatmoko, J. U. D. (2020). Penilaian kerusakan dan kerugian infrastruktur publik akibat dampak bencana banjir di Kota Semarang. *Wahana Teknik Sipil: Jurnal Pengembangan Teknik Sipil*, 25(2), 86-97.
- Rahmadi, M. T., Sari, F. A., Ulfami, T., & Wardani, A. (2023). Analisis Konsep Tipologi Permukiman Penduduk di Bantaran Sungai Deli Kelurahan Sukaraja Kecamatan Medan Maimun. *JPG (Jurnal Pendidikan Geografi)*, 10(1).
- Rizal, M. A., & Hizbaron, D. R. (2015). Analisis kerentanan fisik bahaya banjir lahar di desa sekitar kali putih kabupaten magelang. *Jurnal Bumi Indonesia*, 4(1), 222859.
- Sa'dianoor, S. D., Hutagamissufardal, H., Oktafiandi, A., & Maarif, S. (2023). Analisis Geospatial Intelligence untuk Penentuan Lokasi Relokasi Pasca Banjir Bandang. *Buletin Profesi Insinyur*, 6(2).
- Safitri, L., Juita, E., Zuriyani, E., & zeella Ulmi, A. (2025). Analisis Dampak Bencana Banjir Bandang terhadap Masyarakat di Nagari Unggan Kecamatan Sumpur Kudus Kabupaten Sijunjung. *Pendas: Jurnal Ilmiah Pendidikan Dasar*, 10(03), 271-280.
- Safitri, L., Juita, E., Zuriyani, E., & zeella Ulmi, A. (2025). Analisis Dampak Bencana Banjir Bandang terhadap Masyarakat di Nagari Unggan Kecamatan Sumpur Kudus Kabupaten Sijunjung. *Pendas: Jurnal Ilmiah Pendidikan Dasar*, 10(03), 271-280.

- Sarifah, F., Arashi, F. B., Iskandar, A. L., Ramadhan, M. A. R., Daniswara, M. P., & Rahmadhani, F. (2024). Analisis Dampak Bencana Banjir terhadap Kondisi Sosial dan Ekonomi pada Masyarakat. BANDAR: Journal Of Civil Engineering, 6(2), 56-64.
- Shofwan, M., Nugroho, A. R., Prasakti, Y., Fitria, N. N., & Azmi, L. (2021). Mitigasi Bencana Pada Masyarakat Tradisional Kampung Air Kelurahan Mantuil Kota Banjarmasin. *Jurnal Geografika (Geografi Lingkungan Lahan Basah)*, 2(2), 79-90.
- Unmehopa, Y. F. (2025). Faktor-faktor yang berhubungan dengan kesiapsiagaan masyarakat dalam menghadapi bencana tsunami. *Journal of Health Research Science*, 5(01), 110-118.
- Yulandari, D. F., & Juita, E. (2022). Analisis kerentanan bencana banjir bandang di Solok Selatan. *Jurnal Multidisiplin Indonesia*, 1(3), 938-943.