CICHT 2025
Cendekia International Conference on Health & Technology

Effects of Landslide Vigilance Education toward Community Knowledge in Wetan Kali Hamlet of Rahtawu Village, Gebog District, Kudus Regency

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ABSTRACT

Abstract. Background: According to the 2023 data from the Kudus District Disaster Management Agency, 36 landslide incidents occurred. Slopes greater than 45% are concentrated in Gebog District, with Rahtawu Village identified as the most landslide-prone and frequently affected area. In 2021, landslides struck Wetan Kali and Semliro hamlets, damaging the village's connecting roads. The area has steep terrain with regosol soil, and residents continue to excavate land for tourism infrastructure. This study aims to examine how landslide vigilance education influences public knowledge in Dukuh Wetan Kali, Rahtawu Village. Objective: This study aims to analyze the effect of landslide vigilance education on community knowledge in Wetan Kali hamlet, Rahtawu Village, Gebog District. Methods: This study used a quantitative quasi-experimental method with a one-group pretest-posttest design and a cross-sectional approach. The population consisted of 473 households, and the sample size of 47 was calculated using the Arikunto formula. The researcher applied random sampling to select participants. Data collection involved distributing a 10-item questionnaire on landslide vigilance knowledge and delivering educational content through a leaflet. The Wilcoxon test was used to analyze the results. Results: The Wilcoxon test yielded a p-value of $0.000 \leq 0.05$, indicating that the landslide vigilance education significantly affected community knowledge in Dukuh Wetan Kali, Rahtawu Village, Gebog District. Conclusion: Landslide vigilance education significantly increased community knowledge in Wetan Kali hamlet, Rahtawu Village, Gebog District.
Keywords: Education, Vigilance, Landslides, Knowledge, Community

INTRODUCTION

Indonesia has become increasingly vulnerable to natural disasters, especially during the rainy season. Many communities fail to adequately prepare for disasters, resulting in delayed responses once they occur. Both public and governmental vigilance levels remain low. Denny Hidayati, a human ecology researcher, asserts that limited disaster vigilance knowledge in various regions leads to low disaster awareness. Although public concern may rise temporarily after a disaster, it often fades quickly. Therefore, it is essential for both the government and the public to improve disaster education, early warning systems, basic needs fulfillment, clear legal disaster mitigation policies, and resource mobilization (CNN Indonesia, 2018).

Data from the National Disaster Management Agency (BNPB) indicates that Indonesia experienced 3,535 disasters in 2021. Of these, 99.5% were hydrometeorological events, including 1,196 floods, 1,038 landslides, 837 whirlwinds, 57 droughts, 271 forest and land fires, 62 earthquakes, and 3 volcanic eruptions (BNPB, 2021). Landslides caused the highest death toll, making them one of the most lethal disasters. These

typically occur during the rainy season and frequently strike mountainous regions (BNPB, 2017).

Indonesia recorded 1,160 landslides in 2020, 1,038 in 2021, 885 in 2022, and 410 in 2023. Among the 34 provinces, Java Island consistently experiences natural disasters each year. In 2023, Java recorded 183 landslides, the second highest after Sumatra. East Java experienced 54 incidents, Central Java 123, and West Java 6. Central Java thus had the highest landslide frequency in 2023 due to its hilly and highland topography (BNPB, 2023).

According to the Central Bureau of Statistics (2020), Central Java has a population of 36,516,035 and is located between 6° S and 8° S and 108°–111° E. The head of the Central Java Regional Disaster Management Agency (BPBD) reported that landslides affected 22 districts or cities, including Kudus. Since 2020, landslides in Central Java have resulted in 17 deaths or missing persons, 22 injuries, and 11,159 people displaced. BPBD Kudus recorded 402 disaster events in 2023 alone, including 122 floods, 36 landslides, 30 extreme weather events, 195 forest and land fires, and 19 droughts. These disasters caused damage to 149 houses—2 severely and 147 averagely—and 47 public facilities. Six people died, three were injured, and 1,752 were displaced (BPBD Kudus, 2024).

Kudus Regency is prone to both landslides and floods. The northern highland areas, such as Rahtawu Village in Gebog District and Colo Village in Dawe District, report the highest landslide occurrences. Gebog District has slopes exceeding 45%, making it highly vulnerable. Rahtawu Village faces the most frequent and severe landslides every year (BPBD Kudus, 2023).

According to the Rahtawu Village Government (2024), a major landslide struck Wetan Kali Hamlet, RW 02, in 2016, affecting 460 households and damaging a 5-meter stretch of the connecting road to a depth of 4 meters. Despite the absence of fatalities, the landslide resulted in the displacement of 1,400 residents and numerous material losses. Another landslide occurred in 2018, prompting increased public outreach efforts. From 2020 to 2023, incidents included falling rocks (2020), landslides (2021), fallen trees (2022), and warehouse collapses that triggered landslides (2023).

The researcher conducted a preliminary study by interviewing 10 landslide-affected residents to assess their disaster knowledge and vigilance. The questions explored how well residents understood landslides, how they prepared before a disaster, and what actions they took before, during, and after the event. Most residents admitted they rarely cleaned drainage systems before the rainy season, continued cutting down trees, and excavated land for tourism development. These actions indicated a lack of vigilance. The study concluded that the disaster readiness level in Wetan Kali Hamlet, Rahtawu Village, was low, evidenced by poor drainage planning, ongoing deforestation, and uncontrolled excavation.

METHODS

This study used a cross-sectional design and took place in May 2024 in Wetan Kali Hamlet, Rahtawu Village, Gebog District. The researcher employed simple random sampling, selecting 47 households from a total population of 473. Data collection involved home visits using questionnaires and educational leaflets. The analysis included univariate and bivariate techniques, with the Wilcoxon test applied at a significance level of < 0.05.

RESULTS AND DISCUSSION

Results

The researchers provided landslide vigilance education from May 6 to May 12, 2024, for 47 respondents.

Table 1. Respondent Age Characteristics

Ages	Frequency	Percentage
26 – 35 Years Old	18	38,3%
36 – 45 Years Old	12	25,5%
46 – 55 Years Old	17	36,2%
Total	47	100%

Table 1 indicates 47 respondents based on age characteristics: 18 respondents (38.3%) are early adulthood (26-35 years old), 12 respondents (25.5%) are late adulthood (36-45 years old), and 17 respondents (36.2%) are early elderly stage (46-55 years old)

Table 2. Respondent Sex Type Characteristics

Sex types	Frequency	Percentage
Male	32	68,1%
Female	15	31,9%
Total	47	100%

Table 2 indicates 32 of 47 respondents, 68.1%, are females while 15 respondents (31.9%) are males.

Table 3. Respondent Education Characteristics

Latest Education	Frequency	Percentage
Primary/Junior High School	31	66%
Senior High School	11	23,4%
Bachelor	5	10,6%
Total	47	100%

Table 3 indicates 31 of 47 respondents, 66%, have primary/junior high school educational background, 11 respondents, 23.4%, with senior high school education, and 5 respondents, 10.6%, with bachelor degree.

Table 4. Respondent Occupation Characteristics

Occupations	Frequency	Percentage
Housewives	6	12,8%
Farmers	16	34%
Sellers	17	36,2%
Entrepreneurs	3	6,4%
Civil servants	5	10,6%
Total	47	100%

Table 4 indicates 6 respondents (16.8%) are housewives; 16 respondents (34%) are farmers; 17 respondents (36.2%) are sellers; 3 respondents (6.4%) are entrepreneurs; and 5 respondents (10.6%) are civil servants.

Table 5. Pre-Education

Knowledge (Pre)	Frequency	Percentage
Excellent	18	38,3%
Average	26	55,3%
Low	3	6,4%
Total	47	100%

Table 5 indicates 18 respondents (38.3%) with excellent knowledge, 26 respondents (55.3%) with average knowledge, and 3 respondents (6.4%) with low knowledge.

Table 6. Post Education

Knowledge (Pre)	Frequency	Percentage
Excellent	47	100,0%
Average	0	0%
Low	0	0%
Total	47	100%

Table 6 indicates excellent knowledge of 47, 100%, respondents.

Table 7. the Pre and Post-Education Differences toward the Knowledge of Community in Wetan Kali Hamlet, Rahtawu Village, Gebog District

Knowledge Level				
Categories	**Pre**	**Post**	**P *Value***	**Z**
Excellent	18	47		
Average	26	0	0,000	-5,692
Low	3	0		

Table 7 indicates 18 respondents had excellent knowledge, 26 had average knowledge, and 3 had poor knowledge in pre-education. In the post-education, all 47 respondents reached the high knowledge category. The Wilcoxon test yielded a significance value of 0.000 < 0.05, indicating that disaster vigilance education significantly improved community knowledge in Rahtawu Village, Wetan Kali hamlet, Gebog district. Therefore, the alternative hypothesis is accepted, and the null hypothesis is rejected.

Discussion

Knowledge Level of the Community in Rahtawu village, Wetan Kali hamlet, before receiving landslide disaster vigilance education

Before the intervention, 26 respondents (55.3%) had average knowledge, 18 (38.3%) had excellent knowledge, and 3 (6.4%) had poor knowledge. Most residents had average or excellent knowledge because they experienced a landslide in 2016, which increased their understanding of predicting future events and taking preventive measures—such as avoiding building houses on slopes, not digging infiltration wells on steep land, avoiding illegal logging, and refraining from constructing permanent structures in high-risk zones.

According to Notoatmodjo (2016), experience enhances knowledge through repetition, problem-solving, and practical engagement. Muis and Anwar (2018) also found that individuals with previous landslide experience tend to respond more actively to risks, both individually and collectively, by modifying their environment and participating in risk reduction efforts.

Following the 2016 incident, the Regional Disaster Management Agency (BPBD) conducted landslide awareness sessions for the 26 respondents with average knowledge. They also accessed information through television, the internet, radio, newspapers, flyers, and magazines, enabling them to share insights with others and promote disaster prevention awareness.

According to Holilah (2016), information centers—accessible anytime by anyone—can influence public understanding positively or negatively depending on the conveyed messages. Fitriadi, Rosalina, and Arisanty (2017) emphasized that distributing educational materials such as brochures and conducting disaster prevention training increases public awareness of landslide risks and vigilance.

Only 3 respondents (6.4%) indicated low knowledge, likely due to limited access to information and low motivation to participate in vigilance activities. Winardi (2016) stated that motivation stems from internal or external stimuli that drive individuals to act. Ristia Pratiwi et al. (2021) also noted that limited information lowers motivation to engage in vigilance activities.

Knowledge Level of the Community in Rahtawu village, Wetan Kali hamlet, after receiving landslide disaster vigilance education

After the education session, all 47 respondents (100%) demonstrated excellent knowledge, indicating that the intervention effectively improved community understanding of landslide vigilance in Rahtawu Village.

According to Notoatmodjo (2018), factors such as education, age, access to information, and experience shape disaster vigilance knowledge. Educational backgrounds among respondents included 5 (10.6%) with a bachelor's degree, 11 (23.4%) with a high school, 7 (14.9%) with a junior high school education, and 24 (51.1%) with only primary school education.

Khasanah and Sari (2016) concluded that formal education directly correlates with knowledge depth; individuals with higher education levels possess broader access to information. Similar findings by Tiara et al. (2019) in Silaberanti Lorong Dahlia, Palembang, reaffirm that education is key to the development of community knowledge.

Cui et al. (2018) found that individuals who received disaster education had greater experiential knowledge than those without such education. Moreover, older individuals tend to accumulate more knowledge due to greater life experience.

Respondents' ages ranged from 22–37 years (18 respondents or 38.3%), 38–52 years (12 respondents or 25.5%), and 53–67 years (17 respondents or 36.2%), classifying them within the productive age group.

Pangesti (2015) emphasized the importance of productive age groups due to their active roles and cognitive abilities. Aprilyanti (2017) also found that individuals in this age range tend to be more active and cognitively capable than older adults.

Suwaryo (2017) similarly observed that most people aged 26–35 engage actively in community life and develop their knowledge further over time. Between the ages of 20 and 35, individuals contribute significantly to society while preparing for later life stages.

Agustini et al. (2020) confirmed that age influences knowledge levels through experience and increased information acquisition. Firmansyah (2014) found that respondents aged 20–45 in disaster-prone areas had the highest knowledge about disaster mitigation.

Correlation between Landslide Disaser Vigilance Education and Knowledge Level of the Community in Rahtawu village, Wetan Kali hamlet, after receiving landslide disaster vigilance education

The results indicated that before the education intervention, 38.3% of respondents had excellent knowledge, 55.3% had average knowledge, and 6.4% had low knowledge. After the intervention, the percentage of respondents with excellent knowledge rose sharply to 100%. This indicates that the educational program effectively improved the respondents' knowledge.

Respondents received the education enthusiastically. They concentrated well, actively participated, and shared their experiences during the 2016 landslide. Before the intervention, 3 respondents had low knowledge, and 18 had average knowledge. Afterward, all respondents indicated improved understanding, demonstrated by their correct responses on the post-test. They also received a leaflet to reinforce the material and encourage practical application.

The Wilcoxon Signed Rank Test produced a p-value of 0.000, which is less than 0.05. This result confirms a statistically significant difference in knowledge levels before and after the educational intervention, leading to the acceptance of the alternative hypothesis (Ha).

Prior to the intervention, 26 respondents scored 6–7 (average), 18 scored 8–10 (excellent), and 3 scored below 5 (low). After the intervention, the average score increased to 10, falling into the excellent category. These findings align with Putra and Barkah (2020), who reported a cognitive shift in respondents' thinking after educational interventions, with average scores rising from 40 to 85—demonstrating the effectiveness of education in enhancing knowledge.

Educators delivered the intervention through direct home visits using a 10-minute leaflet-based presentation. A post-test followed 5 minutes after the session. Sessions took place in the evening when residents had completed their work and could focus more effectively. Delivering education during rest periods helped optimize concentration and information retention.

Akbar et al. (2019) define concentration as the ability to focus attention and thought on a specific subject without distraction. Effective concentration improves comprehension, memory retention, and task efficiency. Yusuf (2016) found that the general public shows satisfactory concentration levels. However, environmental factors, such as noise, can influence concentration. Similarly, Putrianti (2014) stated that both internal and external factors affect how well individuals focus during educational sessions.

Respondents' knowledge improved because they were receptive and concentrated during the session. The topic was highly relevant and engaging, especially since they had experienced the 2016 landslide. This direct experience made the subject matter more meaningful and increased retention.

Notoatmodjo (2015) emphasized that repeated learning and direct encounters with a subject enhance knowledge retention and help resolve past learning difficulties. He also noted that experiential learning fosters skill development and long-term understanding.

Muis and Anwar (2018) found that individuals who had experienced landslides were capable of initiating changes in their environment to mitigate future risks. These individuals were also more likely to take independent and collective actions to prepare for disasters. They could educate others, deliver training, and engage in vigilance drills—helping build a culture of disaster resilience.

The educational material was delivered using a leaflet that included illustrations of landslide types and vigilance strategies. Respondents actively engaged with the material and focused on the presentation. Using leaflets proved highly effective in promoting disaster literacy. Respondents could reread the material after the session to reinforce learning.

Kholid (2018) defined a leaflet as a promotional tool printed on paper, usually folded two or three times. Ningsih (2022) noted that leaflets are effective for earthquake education, helping improve public knowledge of vigilance before and after receiving information. Similarly, Rahmawati et al. (2022) demonstrated that leaflets serve as effective tools for tsunami risk education, enabling coastal communities to better understand evacuation procedures and reduce disaster impact.

Respondents' interest in the topic enhanced their engagement and knowledge both before and after the session. The increase in post-intervention knowledge, supported by SPSS analysis and the Wilcoxon test (p-value = 0.000), confirms the effectiveness of the education.

Pratama et al. (2021) also reported a p-value of 0.000, showing that disaster mitigation education significantly affected landslide vigilance among youth groups in Binakal Village, Bondowoso. Ariyani and Endiyono (2020) found similar results, with a p-value of 0.0001, indicating a significant effect of disaster mitigation education on vigilance in Melun Village, Kedungbanten Sub-district, Banyumas. These results align with Yanti (2021), who emphasized that knowledge level significantly influences behavior: the more information individuals have, the better they act in response to hazards.

Conclusion

Before the landslide vigilance education, 18 respondents (38.3%) had excellent knowledge, 26 (55.3%) had average knowledge, and 3 (6.4%) had low knowledge. After the education, all 47 respondents (100.0%)

achieved an excellent level of knowledge. This significant improvement indicates that the landslide vigilance education positively influenced community knowledge in Wetan Kali Hamlet, Rahtawu Village, Gebog District, as confirmed by the p-value of 0.000 ($p < 0.05$).

Suggestions

Given the study's limitations, future researchers are advised to conduct educational interventions in group settings (at the same time and place) to enhance effectiveness and participant engagement.

REFERENCES

Agustini, S. Y., Prawesti, A., & Pebrianti, S. (2020). Gambaran Pengetahuan Masyarakat Terhadap Kesiapsiagaan Bencana (Disaster Vigilance). *Jurnal Ilmu Keperawatan Indonesia*, 1(2). https://doi.org/10.57084/jikpi.v1i2.494

Akbar, M.F., Priambodo, A., & Jannah. M. (2019). Pengaruh Latihan Imagery Dan Tingkat Konsentrasi Terhadap Peningkatan Ketrampilan Lay Up Shoot Bola Basket SMAN 1 Menganti Gresik. *Jurnal Pendidikan. Jasmani, Olahraga dan Kesehatan*, 2(2), 1-13. http://ejurnal.budiutomomalang.ac.id/index.php/jpjok

Aprilyanti, S. (2017). Pengaruh Usia dan Masa Kerja Terhadap Produktivitas Kerja (Studi Kasus: PT. OASIS Water International Cabang Palembang). *Jurnal Sistem Dan Manajemen Industri*, 1(2), 68. https://doi.org/10.30656/jsmi.v1i2.413

Ariyani, Rachmi., and Endiyono. (2020). Pengaruh Pendidikan Mitigasi Bencana Tanah Longsor Terhadap Kesiapsiagaan Masyarakat Di Desa Melung Kecamatan Kedungbanteng Kabupaten Banyumas. *Jurnal Keperawatan Muhammadiyah*, 5(2), 109 - 116. http://journal.um-surabaya.ac.id/index.php/JKM.

BNPB. (2017). Definisi Bencana. Diakses dari : https://www.bnpb.go.id/definisi-bencana

BNPB. (2023). Data Bencana Alam. Diakses dari : https://dibi.bnpb.go.id/

BPBD Kudus. (2023). Data Kebencanaan BPBD Kabupaten Kudus 2023. Diakses dari : https://www.instagram.com/p/C2v1icOPoPX/?igsh=cWN0aDdtZzd2OGFo

Cui,K., Han, Z., & Wang, D. (2018). *Resilience of an Earthquake-Stricken Rural Community in Southwest China: Correlation with Disaster Risk Reduction Efforts. nt. J. Environ. Res. Public Health, 15(3), 407.* https://doi.org/10.3390/ijerph15030407

Firmansyah, Irman. 2014. "*Determinant of Non Performing Loan: The Case of Islamic Bank in* Indonesia". Buletin Ekonomi Moneter dan Perbankan Vol. 17 No. 2

Fitriadi, m. w., Kumalawati, r., & Arisanty, d. (2017). Tingkat kesiapsiagaan masyarakat terhadap bencana tanah longsor di desa jaro kecamatan jaro kabupaten tabalong . jpg (*jurnal pendidikan geografi*) , 32-41.

Holilah, I. (2016). Dampak Media Terhadap Perilaku Masyarakat. *Jurnal Studi Gender dan Anak*. 3(31): 103-114

Khasanah, U., and Sari, G.K. (2016). *The Correlation Between Mother's Knowledge On Diarrhea Prevention Behaviors Of Diarrhea In Chindren. Jurnal Kesehatan "Samodra Ilmu",* 7(2),149-160.

Muis, I., & Anwar, K. (2018). Model Kesiapsiagaan Masyarakat dalam Pengurangan Risiko Bencana Tanah Longsor di Desa Tugumukti , Kecamatan Cisarua Kabupaten Bandung Barat Abstrak *Community Vigilance Model in Landslide Disaster Risk Reduction in Tugumukti Village , Cisarua Subdistric. Asian Social Work Journal*, 3(4), 19–30

Ningsih. (2022). Penyuluhan tentang Gempa Bumi dengan Media Leaflet pada Masyarakat di Kelurahan Malabero Kota Bengkulu. J*urnal Pengabdian Kepada Masyarakat Wahana Usada*, 4(2), 96–104. https://doi.org/10.47859/wuj.v4i2.232

Notoatmodjo, D. S. (2018). Metodologi Penelitian Kesehatan. In Rineka Cipta : Jakarta.

Notoatmodjo, S (2018). Ilmu Perilaku Kesehatan. Rineka Cipta. Jakarta , diakses pada tanggal 27 Desember 2023.

Notoatmodjo, Soekidjo., 2015. Promosi Kesehatan dan Ilmu Perilaku Kesehatan. Jakarta: Rineka Cipta.

Nurfaiz Fathurrahman Yasien, Felia Yustika, Intan Permatasari, & Muthiah Sari. (2021). Aplikasi Geospasial Untuk Analisis Potensi Bahaya Longsor Menggunakan Metode Weighted Overlay (Studi Kasus Kabupaten Kudus, Jawa Tengah). *Jurnal Geosains Dan Remote Sensing*, *2*(1), 33–40. https://doi.org/10.23960/jgrs.2021.v2i1.47

Pratama, Rachmad., dkk. (2021). Pengaruh Edukasi Mitigasi Bencana Terhadap Kesiapsiagaan Menghadapi Bencana Tanah Longsor Pada Karang Taruna Kecamatan Binakal Bondowoso. 1 - 8. http://repository.unmuhjember.ac.id.

Rahmawati, I., Wulan, Afrianti, E., Fitriani, D., Oktarina, M., & Violita Siska Mutiara. (2022). Pengurangan Resiko Bencana Tsunami Pada Masyarakat Pesisir Pantai Melalui Media Leaflet. Braz Dent J., 33(1), 1–12.

Rofifah, R. (2019). Hubungan antara pengetahuan dengan kesiapsiagaan bencana pada mahasiswa keperawatan universitas diponegoro skripsi. *Departemen Ilmu Keperawatan Fakultas Kedokteran Universitas Diponegoro Semarang*, *2019*, 1–124.

Sari,Kartika Indah. (2017). Studi Tentang Kesiapsiagaan Masyarakat Dalam Menghadapi Bencana Tanah Longsor Berdasarkan Tingkat Kerawanan Tanah Longsor Di Kecamatan Sukoharjo Wonosobo. Disertasi diterbitkan pada 11 April 2022. Jakarta : Program Studi Pendidikan Geografi Fakultas Ilmu Sosial Universitas Negeri Jakarta.

Sukmaningrum, A., & Imron, A. (2017). Memanfaatkan Usia Produktif Dengan Usaha Kreatif Industri Pembuatan Kaos Pada Remaja Di Gresik. Paradigma, 5(3), 1-6. https://ejournal.unesa.ac.id/index.php/paradigma/article/view/21647/19841

Suwaryo, W.A.P., and Yuwono, P. (2017). Faktor-Faktor Yang Mempengaruhi Tingkat Pengetahuan Masyarakat dalam Mitigasi Bencana Alam Tanah Longsor. SSN 2407-9189 . 305 - 314. Article Text-3595-1-10-20171108-1.pdf.

Tiara, M.T., Romadoni, S., &Imardiani. (2019). Pengaruh Penggunaan Video Animasi Terhadap Pengetahuan Masyarakat Tentang Kesiapsiagaan Banjir Di Kelurahan Silaberanti Lorong Dahlia Palembang, 3(2). http://journal.umpo.ac.d/indeks.php/IJHS

Winardi, 2016. Motivasi dan Pemotivasian Dalam Manajemen. Jakarta. Raja Grafindo Perkasa

Yusuf,A.M. (2016). Metode Penelitian Kuantitatif, Penelitian Kualitatif dan Penelitian Gabungan. Kencana