

ORIGINAL RESEARCH ARTICLES

Effectiveness of Comics as a Medium for Disaster Preparedness for Earthquakes and Landslides

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ABSTRACT

This study examined the effectiveness of using comics as an educational medium for enhancing disaster preparedness among residents in a landslide-prone barangay in the Mati City, Davao Oriental, Philippines. Employing a pretest-posttest design without a control group, the study involved 195 randomly selected respondents who read a Cebuano-language comic about landslide and earthquake preparedness. Using a modified survey questionnaire, the study assessed the effectiveness of comics across five dimensions—attractiveness, comprehensibility, acceptability, self-involvement, and persuasion. Results showed significant increases in respondents' knowledge after exposure to the comics, with particularly high scores in persuasion ($m = 4.43$) and comprehensibility ($m = 4.03$). The comics proved to be visually appealing, culturally significant, and successful in raising awareness and promoting preparedness behavior. The findings highlight the potential of comics as an accessible, relatable, and impactful tool in disaster risk communication, particularly for communities with limited literacy and formal education. The study recommends the inclusion of pretesting in government information materials and further exploration of the emotional and behavioral effects of comic-based interventions.

Keywords: Comics, disaster preparedness, earthquakes, pretesting, landslides

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INTRODUCTION

Disasters, whether natural or man-made, threaten communities worldwide, often resulting in loss of life, property damage, and long-term socio-economic disruptions. Among these, landslides are particularly devastating, especially in regions with vulnerable topographies and unstable soil conditions (Kjekstad and Highland, 2009; Linkha, 2024; Rathnaweera et al., 2012). Several calamities have damaged rural areas due to landslides caused by human activities, such as mining and the massive cutting of trees (illegal logging), in pursuit of the desired development of the locals. This phenomenon is true in some municipalities and other parts of the world (Weng Chan, 1998; Alimohammadlou, Najafi, and Yalcin, 2013).

Global climate change is likely to impact the frequency of landslides worldwide and is expected to continue doing so in the future (Lagmay et al., 2023). An independent review of over 1.5 billion temperature records from 15 sources spanning more than a century clearly shows that the planet is warming. Del Socorro (2023) underscores “the pivotal role of technology, policy interventions, and sustainable practices, stressing the

importance of a diverse strategy (p. 108).” Climatic conditions predicted from worldwide global warming involve new precipitation and wind conditions (Giorgi, Raffaele and Coppola, 2019; Abbass et al., 2022). These factors will significantly impact the amount and type of vegetation, as well as groundwater and surface water levels (Glanville et al., 2023; Land and Peters, 2023). All these factors will affect the stability of certain natural slopes due to losses of soil suction, higher groundwater tables, increase in seepage velocities, frequent occurrences of rapid drawdown conditions, losses of soil reinforcement contributed by roots, and losses of stabilizing materials through erosion from flooding (Crozier, 2010; Haque et al., 2019).

The Philippines is an archipelago that frequently experiences landslide disasters, primarily triggered by extended rainfall and earthquakes. To mitigate these events, various engineering solutions and vegetation strategies have been implemented (Singh, 2010; Ghosh and Bhattacharya, 2018) to manage the risk of landslides caused by heavy rains which pose a significant threat to the safety and lives of Filipinos residing at the foot of the mountains (Pelone and Arellano, 2024). These landslides, often referred to as mudslides, have led to substantial

property damage and loss of life (Beroya et al., 2023; Cabrera and Lee, 2019).

Despite the effort of the local government, comics are not systematically used in local governance or disaster policies. There is a need for policies that recognize comics as an important communication tool, especially in marginalized areas. However, these approaches often fail to fully address the community's diverse needs, leaving certain groups underinformed or disengaged (Gumiran et al., 2019). Studies on the use of communication materials are posited in the study of Verzosa et al. (2024) to promote awareness and engagement in solid waste management, as well as mangrove conservation and regeneration (Inoco and Villegas, 2024). Effective communication of disaster preparedness information is essential, yet traditional methods often fail to engage communities adequately, particularly those with limited literacy levels or diverse cultural backgrounds (Shklovski, Palen and Sutton, 2008; Sou and Hall, 2021).

Comics combine illustrations with storytelling to explain complex ideas, engage audiences, and appeal to diverse age groups and literacy levels (Sou and Hall, 2021; Sarayeva, 2017; Tatalovic, 2009). Studies suggest that comics can indeed influence how people perceive and engage with these important issues (Sarayeva, 2017, p. 33). To address the gap, this study explored the use of comics as a medium for disaster preparedness, focusing on landslide-prone communities in Mati City. It aimed to evaluate the effectiveness of comics in terms of five components: attractiveness, comprehension, acceptability, self-involvement, and persuasion, and analyze the difference in respondents' knowledge levels before and after exposure to comics.

Theoretical framework

This study is based on the Entertainment-Education (E-E) Theory, as outlined by Singhal and Rogers (2002). E-E suggests that people are more receptive to educational messages when these are integrated into engaging and emotionally impactful stories, which help in better absorption and retention of information. The theory emphasizes that involvement with relatable characters and plots fosters message comprehension, identification with positive role models, and personal reflection on attitudes and behaviors (Sabido, 2003). It also introduces the concept of "narrative transportation," where immersive storytelling enhances learning and persuasion through psychological engagement. Additionally, E-E incorporates Bandura's (2009) Social Cognitive Theory, which highlights observational learning—people learn by watching others, especially those they identify with. Characters within E-E narratives typically serve as positive models, demonstrating desirable behaviors; negative models, exhibiting risky actions; or transitional models, who change over the course of the story (Sood, Menard and Witte, 2003; Singhal and Rogers, 2002; Wang and Singhal, 2021). This typology allows audiences to observe the consequences of different choices, fostering critical thinking. The theory further emphasizes the importance of audience-centered content design, taking into account cultural values, literacy levels, and emotional triggers, particularly in low-resource settings where emotional engagement can help bridge educational gaps, thereby increasing attention, recall, and motivation among underserved communities (Schmid, 2021).

Hypothesis

Grounded in the theoretical underpinnings of Entertainment-Education (E-E) theory and Social Cognitive Theory, this study examines how comic-based educational

interventions can enhance disaster preparedness knowledge, particularly in earthquake- and landslide-prone areas such as Mati City. This framework provides a predictive lens for evaluating the causal relationships between comics as a medium and knowledge levels in the context of disaster risk reduction. Comics have been proven effective in increasing HIV/AIDS awareness among youth (Obare et al., 2013; Willis et al., 2018) and in disaster mitigation (Fitria et al., 2022).

Building on this theoretical foundation, one assumption is that exposure to comic-based materials will lead to improved knowledge about disaster preparedness, including appropriate actions before, during, and after a seismic or landslide event. This is supported by empirical studies, such as Mailizar et al. (2023), which found that using comics in mathematics teaching can increase disaster preparedness.

Based on the established theoretical framework, this study hypothesizes that exposure to disaster preparedness comics will not significantly increase respondents' knowledge of landslides and earthquakes.

MATERIALS AND METHODS

Research design

This study utilized a quantitative research design. Quantitative research is particularly well-suited for studies that aim to measure variables, establish relationships, and generate generalizable results using statistical tools and methodologies (Creswell and Creswell, 2017). The study employed a pretest and posttest design with no control group to assess the knowledge level. This means that the respondents underwent a pretest before being exposed to comics. The respondents were given two weeks to read the comics before they were given post-test. Pretest-posttest design is a widely utilized quantitative research approach that measures changes in participants' knowledge, attitudes, and behaviors as a result of an intervention (Zientek, Nimon and Hammack-Brown, 2016). This approach is particularly useful in educational and behavioral studies, where understanding the impact of a specific intervention, such as comics, is critical (Ratnasari, 2013).

Description of the study area

Davao Oriental features a diverse topography dominated by extensive mountain ranges, interspersed with irregularly distributed plateaus, wetlands, and lowland areas. One of its prominent landmarks is the Mount Hamiguitan Range, a recently designated UNESCO World Heritage Site, situated at the junction of San Isidro, Governor Generoso, and Mati City. Covering about 516,446 ha, the province represents the largest land area within Region XI (Davao Region), accounting for roughly 26% of the region's total land area (Cabrera and Lee, 2019).

The study was conducted in Barangay Mamali, Mati City, Davao Oriental, which has a total population of 561 households (PhilAtlas, 2015). According to the Philippine Statistics Authority (2020), this rural area has a population of 2,295. It is highly susceptible to landslides, with active cracks affecting the community (Beroya-Eitner et al., 2023; DENR-Mines and Geosciences Bureau, 2024). Beroya-Eitner et al. (2023) found that global warming increases precipitation and hydro-meteorological hazards, such as landslides, in Davao Oriental. Sinogaya, Patiño, and Montaña (2024) emphasized that communities exposed to natural hazards, including flooding and landslides, will continue to exhibit vulnerability unless proactive measures are implemented.

Meanwhile, Mati City lies along an active fault line that traverses the Eastern Mindanao Ridge, covering an approximate distance of 15 kilometers before bordering the eastern margin of the Maragusan Valley—an inter-valley mountainous region. The fault follows a north-northwest (N10°–15°W) strike along the east edge of the valley and cuts through relatively young alluvial fans, indicating recent geological activity. South of the Maragusan Valley, a continuous upslope-facing scarp has been identified, extending for approximately 3 kilometers (Perez et al., 2015).

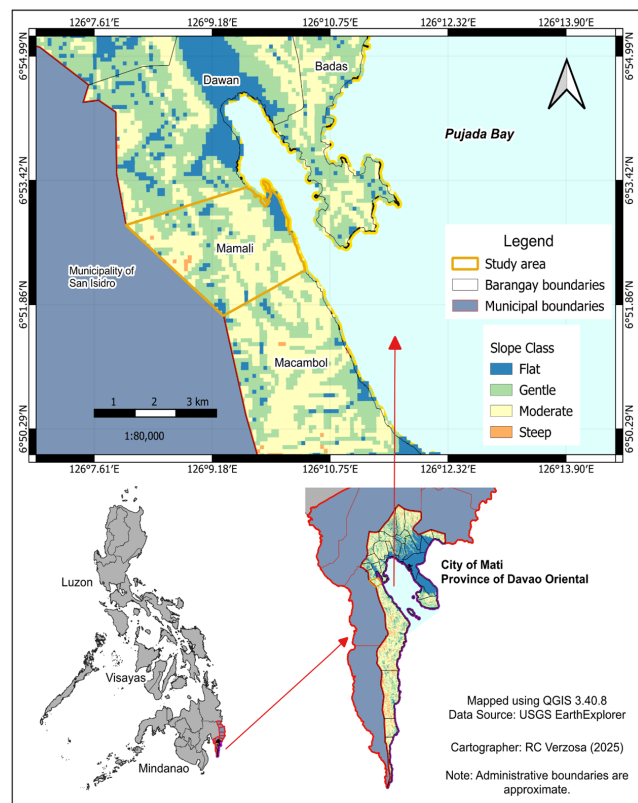


Figure 1. Map of the study area.

According to Perez et al. (2015), the fault line extends southward for approximately 55 km along the Eastern Mindanao Ridge. Field investigations have revealed geomorphic features associated with active faulting, such as offset creeks, sag ponds, pressure ridges, and natural springs, indicating ongoing tectonic movement and surface deformation (Buena et al., 2019; Perez et al., 2015). Near Mati City, the fault shows notable changes in geometry, including branching and variations in strike direction, indicating a complex fault structure. This configuration heightens Mati's vulnerability to seismic hazards due to its proximity to an active fault system. In 2021, the city experienced a magnitude-7.1 undersea earthquake at a depth of 69 kilometers (ABS-CBN News, 2021), and 113 earthquakes were recorded in just one year (Earthquake Track, 2025). These events highlight the city's significant seismic risk and the need for regular public education and preparedness initiatives.

Respondents and sampling

The research focused on residents of a specific barangay in Mati City, Davao Oriental, to assess the effectiveness of comics as a tool for enhancing disaster readiness in response to landslides and earthquakes. Using Cochran's formula, a sample size of 195 was determined from 561 households. After determining the sample size of 195, the study employed simple random sampling, focusing on one individual aged 18 to 70 years old per household to ensure equal selection chances. This approach minimizes selection bias and enhances the validity

of the research results (Bryman and Bell, 2004, p. 55). According to the Philippine Statistics Authority (2024), Davao Oriental recorded a total population of 576,343 in 2020, with a population density of 101 persons per square kilometer, up from 79 persons per square kilometer in 2000. This relatively low to moderate population density suggests that, while some urban centers, such as Mati City, may be more densely populated, much of the province remains rural and dispersed. Moderate density can pose challenges in disseminating preparedness materials, especially in geographically isolated and rural areas (Kapucu, Hawkins and Rivera, 2013). The province boasts a high simple literacy rate of 96% as of 2020, with an upward trend from previous decades. Among the household population aged five and above, 190,273 completed high school, and 35,681 hold academic degrees, while only 14,430 have no grade completed (Philippine Statistics Authority, 2024). The high literacy level supports the use of comics as educational tools, as most residents can read and comprehend printed narratives (Tsene, 2022; Golding and Verrier, 2020). According to Kapucu, Hawkins, and Rivera (2013), the adaptive capacity of rural communities in disaster preparedness is anticipated to support recovery for individuals and the community as a whole.

Data collection

The study followed research protocols, including community approval and permission from the barangay captain. Although the university lacked an ethics review board at the time, ethical standards were upheld by obtaining informed consent, ensuring voluntary participation, maintaining confidentiality and anonymity, and explaining the study's purpose and procedures.

The study employed a modified survey questionnaire, adapted from Bertrand (1978) and Escalada (2007), to assess the effectiveness of comics based on attractiveness, comprehensibility, acceptability, self-involvement, and persuasion, each with three corresponding questions. The second part consisted of 15 items that tested knowledge of landslides and earthquakes. After revision, experts validated the questionnaire, with the City Disaster Risk Reduction and Management Office (CDRRMO) reviewing its content, especially given the area's proximity to a fault line. The comics feature local residents to educate the community on disaster preparedness.

This twelve-page Cebuano comic (Figure 2) depicts two rural families in a disaster-prone barangay. One actively participates in disaster readiness efforts, while the other remains uninvolved. The story emphasizes the significance of community involvement in enhancing disaster resilience and responding effectively to earthquakes and landslides.

The comic demonstrates risk awareness, evacuation planning, and emergency preparedness through the actions, dialogue, and visuals of its characters. It emphasizes sharing information about high-risk areas and preparing essential supplies. Framing, as per Entman (1993), involves highlighting specific aspects of reality to influence perception.

Conversely, a 5-point Likert scale was used to assess the effectiveness of the comic material, with response options ranging from 1 (strongly disagree) to 5 (strongly agree). This scale includes intermediate categories: 2 (disagree), 3 (unsure/undecided), and 4 (agree).

The study was conducted during the weekly barangay meeting. The respondents were instructed to complete the pretest survey questionnaire before they were exposed to the comics. Bertrand (1978, p. 17) outlined this approach as "arranged," a process where participants come to a prior agreement to evaluate the communicated messages.



Figure 2. The first and last pages of the comics for disaster preparedness on landslides and earthquakes.

Subsequently, the respondents were given two weeks to finalize their review of the comic materials. Upon completion, they were classified into ten groups based on the proximity of their households. This classification facilitated subsequent evaluations using a modified self-administered survey questionnaire to determine whether they had successfully acquired the intended knowledge.

Data analysis

This study employed mean values, percentages, and frequencies to evaluate the effectiveness of comics in terms of attractiveness, comprehensibility, acceptability, self-involvement, and persuasion. The study used a t-test to analyze the significant

difference in respondents' knowledge before and after their exposure to the comics.

RESULTS

Respondents' profile

Table 1 indicates that the majority of respondents (38%) fall within the 40-49 age bracket, while 31% are aged 30-39, 15% are in the 50-59 range, 12% belong to the 20-29 group, and 3% are aged 60-69. The findings also indicate that a significant majority of the respondents are male, comprising 54% of the overall sample, while females account for 46%. Additionally, a substantial number of respondents are married, totaling 86%, compared to 6% who identify as single and 8% as widowed.

Table 1. Demographic profile of the respondents.

Profile	Frequency	Percentage
Age		
20-29	23	12%
30-39	61	31%
40-49	74	38%
50-59	30	15%
60-69	6	3%
Total	195	100%
Sex		
Female	90	46%
Male	105	54%
Total	195	100%
Civil status		
Single	11	6%
Widow/er	16	8%
Married	168	86%
Total	195	100%
Ethnicity		
Cebuano	149	76%
Ilonggo	2	1%
Boholano	4	2%
Kalagan	33	17%
Mandaya	7	4%
Total	195	100%
Educational Attainment		
Elementary Level	26	13%
Elementary Graduate	38	19%
High School Level	63	32%
High School Graduate	49	25%
College Level	13	7%
College Graduate	6	3%
Total	195	100%

Meanwhile, 76% of the total respondents identify as Cebuano, indicating that the mode of the distribution in terms of ethnicity is Cebuano. In comparison, Kalagan constitutes 17% of the respondents, while the remaining participants include Ilonggo, Boholano, and Mandaya, each represented in lesser percentages. Regarding educational attainment, the distribution mode is at the High School level, with 32% of respondents falling into this category. Additionally, 25% of respondents are classified as High School Graduates, while 19% completed Elementary education. Furthermore, 13% reached the Elementary level, 7% achieved college attendance, and only 3% were identified as College Graduates. This indicates that, generally, respondents have completed elementary education and have

engaged in high school studies but have not completed secondary education.

Effectiveness of comics in terms of attractiveness

As Table 2 shows, the attractiveness component of comics is highly rated with an overall mean of 3.91. Respondents found that the visuals in the comics effectively captured their attention, with a mean score of 3.81. This highlights the engaging nature of the visual elements, which significantly drew and maintained interest. Additionally, the design and layout of the comics were perceived as visually appealing, scoring a mean of 3.76.

Table 2. Respondents' responses on the attractiveness component of comics.

Statements	Mean	Descriptive interpretation
1. The visuals in the comics captured my attention	3.81	High
2. The design and layout of the comic were visually appealing.	3.76	High
3. The colors and illustrations used in the comic enhanced the message.	4.16	High
Overall	3.91	High

Additionally, with a mean of 4.16, the use of colors and illustrations enhanced the understanding of the message.

Effectiveness of comics in terms of comprehensibility

The study, as revealed in Table 3, found that the language used in the comics was simple, with a mean score of

4.41. This suggests that the use of vernacular language has a very high impact on the audience when used. Moreover, the results reveal a mean of 4.07, indicating that the comics provided real-life guidance on disaster preparedness. However, differences emerged in the slightly lower mean (3.61) for clarity of information, yet it was still high in comprehensibility.

Table 3. Respondents' responses on the comprehensibility component of comics.

Statements	Mean	Descriptive interpretation
1. The information in the comics was clear and easy to understand.	3.61	High
2. The language used in the comics was simple and straightforward.	4.41	Very high
3. The comics provided a real-life guidance on disaster preparedness.	4.07	High
Overall	4.03	High

Effectiveness of comics in terms of acceptability

The results in Table 4 suggest that the scenarios depicted in the comics were realistic and relatable, without presenting

offensive messages (mean = 3.93). The mean score of 3.95 indicates that the comics are well-suited to the respondents' age and background, showcasing effective audience segmentation.

Table 4. Respondents' responses on the acceptability component of comics.

Statements	Mean	Descriptive interpretation
1. I found the comics appropriate for my age and background.	3.95	High
2. The scenarios depicted in the comics were realistic and relatable and did not provide offensive messages.	3.93	High
3. I believe the comics is suitable tool for disaster preparedness education.	4.08	High
Overall	3.99	High

Furthermore, the respondents believed that comics are an effective tool for disaster preparedness education, with a mean score of 4.08. The findings indicate a strong level of acceptability among respondents. The overall mean score for acceptability is 3.99, suggesting that participants found the comics acceptable and did not find any part of them offensive or bothersome.

Effectiveness of comics in terms of self-involvement

In the context of self-involvement, the data presented in Table 5 demonstrate that the item with the highest rating ($m = 4.32$) signifies a substantial degree of involvement among respondents. This finding encourages individuals to critically evaluate their readiness for disaster situations, including landslides and earthquakes.

Table 5. Respondents' responses on the self-involvement component of comics.

Statements	Mean	Description interpretation
1. The comics made me reflect on my own preparedness for disasters.	4.32	Very high
2. I feel motivated to take action based on the information in the comics.	3.59	High
3. The comics provided practical steps I can take to prepare for landslides and earthquakes.	3.64	High
Overall	3.85	High

Respondents also perceived the comics to offer practical preparatory steps ($m = 3.64$) and motivational cues for action ($m = 3.59$), both of which were rated as high. These results suggest that the comics effectively delivered relevant and applicable information. A discrepancy is evident between the respondents' level of reflective engagement and their corresponding motivation to take action.

Effectiveness of comics in terms of persuasion

The study revealed the value and impact of comics, as shown in Table 6, with an overall mean of 4.43, indicating a very high level of agreement among respondents. Respondents strongly agreed that the comics inspired them to prepare for disasters ($m = 4.91$) and convinced them of the importance of preparedness ($m = 4.36$).

Table 6. Respondents' responses on the persuasion component of comics.

Statements	Mean	Description interpretation
1. The comics convinced me of the importance of disaster preparedness.	4.36	Very high
2. The characters and stories in the comics inspired me to prepare for disasters.	4.91	Very high
3. I would recommend this comics to others in my community	4.01	High
Overall	4.43	Very high

The result also shows that the strong response to the comics' narratives implies that relatability and contextual relevance are key drivers of persuasive outcomes in disaster preparedness education. However, a significant difference becomes apparent when examining peer-to-peer persuasion. The slightly lower score for the statement "I would recommend this comic to others in my community" ($m = 4.01$) indicates that while individuals felt personally convinced and inspired, they were somewhat less willing to advocate for the comics to others.

Respondents' pretest and posttest

As shown in Table 7, the mean score of respondents significantly increased from 9.26 ($SD = 1.59$) in the pretest to 11.16 ($SD = 1.03$) in the posttest. This increase demonstrates a substantial improvement in the participants' knowledge level after exposure to the comics.

Table 7. Knowledge level of the respondents before and after the exposure to comics.

	N	Minimum	Maximum	Mean	SD
Pretest	195	5.00	12.00	9.26	1.59
Posttest	195	9.00	14.00	11.16	1.03

The results also show that a relatively broad range of scores was observed in the pretest (minimum = 5.00, maximum = 12.00), indicating a heterogeneous baseline knowledge among participants prior to exposure. Another unexpected pattern was the lack of perfect posttest scores (i.e., no respondent achieved the maximum possible score of 15), despite a high average of 11.16. This may suggest either a ceiling effect in knowledge acquisition or limitations in the comics' content coverage.

Difference in respondents' knowledge level before and after the exposure to comics

The data presented in Table 8 indicate a statistically significant enhancement in the knowledge levels of respondents following exposure to the comic. The p -value ($p < 0.001$) substantiates that the observed increase in knowledge is improbable to have arisen by mere chance, thereby reinforcing the educational efficacy of the comic-based intervention.

Table 8. Difference in respondents' knowledge level before and after the exposure to comics.

	Mean	N	SD	Mean difference	SD	t	df	Sig. (2-tailed)
Pretest	9.26	195	1.59	-1.90	1.60	-16.60	194	.000
Posttest	11.16	195	1.03					

The data reveal a significant reduction in the standard deviation from the pretest ($SD = 1.59$) to the posttest ($SD = 1.03$). This decrease implies that participants with initially low levels of knowledge exhibited the greatest improvements as a result of the intervention. Furthermore, the posttest results indicate that the use of comics effectively mitigated knowledge disparities

among respondents with diverse baseline knowledge levels. This trend suggests that comics can function as an equitable educational resource, facilitating the progression of learners with limited prior exposure to align more closely with their peers' knowledge levels.

DISCUSSIONS

The study reveals that age constitutes a pivotal determinant in media consumption behaviors, with younger demographics increasingly favoring digital platforms for engaging with various media forms, including comics. In contrast, older age groups tend to prefer traditional media formats, such as newspapers and television (Singh, 2023). Moreover, Muzumdar and Pantaleo (2017) assert that the comics medium possesses a universally comprehensible language, rendering it effective across diverse age cohorts. Meanwhile, Singh (2023) emphasized that gender plays a significant role, as males are generally more engaged with print media, whereas females tend to prefer specific types of content. The results also demonstrate a fairly balanced sex distribution. Additionally, using the Cebuano dialect in comics is appropriate since it aligns with the language preferences of most respondents. Translating comics involves navigating linguistic, cultural, and technical challenges, as comics are a global art form that extends beyond their original regions (Evans, 2016). However, this task goes beyond simply translating text; it requires adapting cultural references, humor, and visual elements to resonate with the target audience (Zanettin, 2014).

Attractiveness

In terms of attractiveness, the research indicated that the structure and organization of the content were positively evaluated, thereby enhancing the overall aesthetic appeal. Mataram (2022) posits that through the incorporation of visual and aesthetic elements, comics serve as a potent medium for disseminating significant messages while minimizing the potential to induce fear or anxiety. Imaizumi et al. (2021) have demonstrated that the sequences in which characters appear, which are relatively easy to collect, can effectively capture the essence of a brief storyline, highlighting the featured characters within a narrative. Umaroh et al. (2023) elucidated that the effective use of infographics requires the incorporation of striking colors and visuals. In the context of disaster preparedness communication, it is essential to use images that are both visually appealing and effective (Friedman, Tanwar and Richter, 2008). However, some differences also emerge. While previous research in disaster preparedness communication has found that visuals alone may not always lead to behavioral change (Lundgren and McMakin, 2018), these results indicate that, although attention and aesthetic appeal are high, the overall motivation to act based on these visuals is somewhat lower. This implies that visuals alone may need to be supplemented by other forms of interactive or contextually relevant learning materials to drive preparedness behavior (Singhal and Rogers, 2001).

Comprehensibility

Knowledge gain occurs when audiences are emotionally engaged, cognitively involved, and capable of identifying with individuals who exemplify appropriate behaviors (Bandura, 2009; Singhal and Roger, 2002). In addition to simplified text, linking a familiar reference, such as a real-life scenario, can enhance understanding and literacy regarding disaster and risk preparedness (Brown, Haun and Peterson, 2014). Uekusa and Matthewman (2023, p. 36) assert that translating information into local languages and utilizing a variety of platforms and methodologies is crucial for enhancing risk reduction and resilience efforts. Furthermore, it is essential to consider the differences in literacy levels and the presence of disabilities during this translation process (Friedman et al., 2008; Cohn, 2020). However, while the comics' language was simple, some respondents felt that the information lacked adequate context or

detail to be completely clear. This discrepancy aligns with critiques in the risk communication literature, which warn of potential oversimplification when relying solely on visual and narrative tools (Oxman et al., 2022).

Acceptability

Asfaw et al. (2019) state that low trust in a source often leads individuals to overlook the content in the message. This suggests the comic's message resonates with the target audience. If the content is deemed offensive, implausible, or likely to stir dissent among viewers, it is likely to be discarded (Bertrand, 1978; Acunzo et al., 2014). Singhal and Rogers (2002) stated that Entertainment-Education should align with the audience's culture and development to strengthen their connection. Prior studies have mainly focused on visual clarity and simplicity (Muzumdar and Pantaleo, 2017), but effective comics must resonate with the audience's cultural background and contextual experiences. Visual aids alone may not be sufficient to prompt action if the content is not perceived as directly applicable (Golding and Verrier, 2020). Friedman, Tanwar, and Richter (2012) state that effective disaster information sharing depends on public literacy. This implies that the comics are acceptable to the respondents due to the content, messaging, and overall design.

Self-involvement

The idea that visual and narrative media can effectively enhance self-awareness during disasters (Mataram, 2022) further illuminates the study's findings. People need to cultivate self-efficacy, which is the belief in their ability to execute the suggested actions. As Bandura (2009) notes, merely knowing does not motivate behavior. It indicates that, while the comics stimulated reflection, they did not adequately empower readers to trust in their ability to take action. Setiawan et al. (2023) discovered that disaster comics featuring relatable characters and familiar settings increased reader engagement by helping them envision themselves in comparable situations. Similarly, Lc et al. (2022) highlighted that when readers connect with protagonists confronting realistic disaster scenarios, they are more inclined to absorb the message and evaluate their own readiness.

Persuasion

The findings underscore the persuasive capacity of narrative-based media, specifically comics, in augmenting disaster awareness and motivation. The facilitation of learning and behavioral change is significantly enhanced when audiences cultivate parasocial relationships with characters and witness modeled behaviors that are both relatable and achievable, as well as socially reinforced (Bandura, 2009; Singhal and Rogers, 2002). Sellnow et al. (2019) argued that narrative-centered risk messages are more persuasive than purely informational ones, especially when they appeal to emotion, self-efficacy, and social responsibility. Prawoto and Octavia (2021) found that comics depicting familiar scenarios and culturally resonant experiences helped audiences visualize risk, leading to greater changes in their beliefs. However, this contrasts with the study by Rawsthorne et al. (2023), which found that participatory comics co-designed with community members achieved higher levels of interpersonal diffusion due to a greater sense of local ownership and authenticity. These findings support the theoretical proposition that persuasion extends beyond mere attitude modification, encompassing a broader cognitive and social learning process (Slater and Rouner, 2002).

Difference in respondents' knowledge before and after exposure to comics

The study revealed significant improvements in respondents' knowledge after exposure to comics, aligning with research by Talatovic (2009) and McNicol (2017), which highlights the role of visual storytelling in enhancing understanding. Comics make complex topics, such as disaster risk, more accessible and emotionally engaging, particularly when considering factors like educational background, past disaster exposure, and access to information (Lillywhite and Wolbring, 2022; Hou, 2023). Higher education levels are linked to better disaster preparedness and literacy, with income and education influencing community readiness (Castañeda et al., 2020; Sayuti et al., 2021). While comics increased general awareness, they may lack detailed technical information, potentially hindering effective communication (Cvetković, 2024). Contrasting studies, such as Martinez-Villegas et al. (2015), suggest that adults may find disaster comics oversimplified or juvenile, indicating challenges in using comics for serious risk communication. To improve effectiveness, systematic testing and evaluation of media are essential, especially for vulnerable populations, as recommended by Evans (2016). Although comics can bridge knowledge gaps in underserved groups, their perception depends on cultural norms, visual literacy, and credibility (Yani, 2021). Engaging, accessible narratives are vital for motivating diverse audiences and enhancing knowledge retention (McNicol, 2017; Sarris, 2025; Sharpe and Izadkhah, 2014).

CONCLUSION

A majority of the respondents identified as male, and despite possessing limited formal education, comics have significantly enhanced the community's understanding of disaster preparedness, particularly about landslides and earthquakes. The statistically significant increase in posttest scores further corroborates the transformative potential of comics in enhancing disaster preparedness. Comics that use a family-focused story can raise awareness in vulnerable communities by highlighting two key aspects: persuasion and clarity, which align with the Entertainment-Education (E-E) theory. Future research should explore the emotional and psychological responses elicited by comics in greater depth, utilizing methodologies such as narrative transportation scales or affective engagement measures. A comprehensive understanding of these responses can clarify how comics facilitate not only knowledge acquisition but also the development of empathy and subsequent actionable behavior. While the pretest-posttest design offers benefits in evaluating immediate learning outcomes, it falls short in assessing long-term knowledge retention and the practical application of that knowledge. It is further recommended that government agencies incorporate pretesting into their Information, Education, and Communication (IEC) materials prior to broad dissemination, along with reinforcement with other strategies, to promote lasting behavioral change.

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AUTHOR CONTRIBUTIONS

Mark Aljen D. Binocal, the lead author, conceptualizes, analyzes, conducts, interprets, and writes most of the manuscript. Carmela N. Hadia, the co-author, interprets and contributes to some part of the manuscript.

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DECLARATION

Informed consent statement

The study adhere to ethical guidelines by securing community approval and permission from the barangay captain. Although there was no university ethics review board at that time the study was conducted, ethical standards were maintained through informed consent, voluntary communication of the study's objectives and procedures.

Conflict of interest

There is no conflict of interest in the conduct of the study.

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