

Implementation of a Web-based Geographic Information System for Mapping Rabies Cases in the Indonesia – Timor Leste Border Area

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Abstract.

The high spread of rabies in Malaka Regency has raised concerns among the people of Malaka, including communities in Timor Leste that directly border the regency. Information about the spread of this disease has not been openly disseminated to the public due to the absence of a system capable of accommodating such needs. To address this problem, it is necessary to develop a Geographic Information System (GIS) for mapping rabies cases in the Indonesia - Timor Leste border area. The system is developed as a web-based platform, enhancing accessibility by enabling residents to retrieve information from any location with internet access. The project was carried out in three primary phases: preparation, deployment, and testing and evaluation. The development and implementation of the system were completed successfully. The findings indicate that the developed system functions effectively as an information tool for the community. Evaluation results demonstrate that it successfully provides accessible and reliable data on rabies cases in Malaka and nearby areas, including bordering districts in Timor Leste. The system achieved an average acceptance score of 4.64, reflecting a generally positive response from users. Overall, the web-based GIS proves to be a practical and efficient solution for improving the delivery and impact of public health information services.

Keywords: GIS; Indonesia – Timor Leste border; Rabies and Malaka.

I. INTRODUCTION

Malaka Regency is a border area between Indonesia and Timor Leste, where one of the serious public health problems is rabies caused by dog bites. Recent data from the Malaka District Health Office show that in 2025 there were 118 rabies cases resulting from dog bites, distributed across 16 primary health centers (puskesmas) in Malaka Regency. The spread of rabies in Malaka Regency needs to be communicated transparently to the wider community so that residents can be more cautious of dogs infected with rabies. The close proximity of villages and the shared land border between Indonesia and Timor Leste create particular concern among communities in the border areas of Timor Leste. Currently, the Malaka Regency government does not yet have a platform that provides information on the spread of rabies caused by dog bites to the people of Malaka and surrounding areas.

This issue can be addressed through the development of a Geographic Information System (GIS) capable of mapping rabies cases resulting from dog bites in Malaka Regency based on their distribution across each primary health center (puskesmas). Several villages in Malaka Regency have implemented e-government systems [1], [2] for public service delivery, indicating their readiness in terms of technology adoption and acceptance. Geographic Information Systems (GIS) have been successfully implemented in many countries for disease mapping [3], [4], [5], [6], [7], [8], [9], [10], [11] including in Indonesia [12], [13]. The use of GIS can enhance transparency in disseminating information about the spread of rabies to the public [14], [15], [16], thereby increasing awareness among the people of Malaka and communities in surrounding border areas. To ensure ease of access, the GIS developed in this project is web-based.

II. METHODS

The implementation of this community project is carried out in three stages:

1. Preparation Stage

In this initial phase, the project team conducted meetings with officials responsible for rabies control at the Malaka Regency Health Office to identify current challenges. Rabies-related data were also gathered to support the development of the GIS.

2. Implementation Stage

This phase started with requirements analysis and system design, which were then followed by the development of the web-based GIS application.

3. Testing and Evaluation Stages

After the system was completed, it was tested with 10 community members to assess user acceptance. The evaluation was conducted using the User Acceptance Testing (UAT).

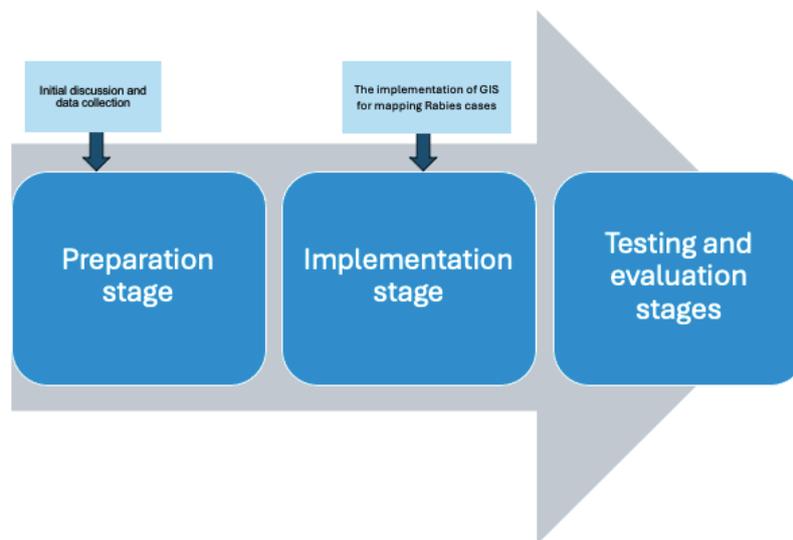


Fig 1. Community project stage

III. RESULT AND DISCUSSION

Development of the web-based GIS

The team developed the web-based GIS for mapping Rabies cases in Malaka Regencies spread across 16 primary health centers. Several pages of the developed system can be seen in Figs 2-4 including the dashboard, the rabies cases and the rabies cases mapping.



Fig 2. GIS dashboard

Web GIS GHPR Beranda Peta Kasus Tentang Kami

Rekap Kasus Per Puskesmas

No	Puskesmas	Kasus	Bulan	Tahun	Kontribusi
1	Puskesmas Fahiluka	7	Jan	2025	5.83%
2	puskesmas Babulu	1	Jan	2025	0.85%
3	Puskesmas Seon	1	Jan	2025	0.85%
4	Puskesmas Nurobo	8	Jan	2025	6.78%
5	Puskesmas Bani Bani	1	Jan	2025	0.85%
6	Puskesmas Kaputu	1	Jan	2025	0.85%
7	Puskesmas Sarina	1	Jan	2025	0.85%
8	Puskesmas Oekmurak	1	Jan	2025	0.85%
9	Puskesmas Alkani	3	Jan	2025	2.54%
10	Puskesmas Weoe	9	Jan	2025	7.63%
11	Puskesmas Wekmidar	7	Jan	2025	5.93%
12	Puskesmas Alas	4	Jan	2025	3.39%
13	Puskesmas Namfalus	5	Jan	2025	4.24%
14	Puskesmas Weliman	15	Jan	2025	12.71%
15	Puskesmas Besikama	30	Jan	2025	25.42%
16	Puskesmas Betun	24	Jan	2025	20.34%

Fig 3. Rabies cases by primary health centers



Fig 4. Mapping of rabies cases

The testing and evaluation of the system

The User Acceptance Testing (UAT) was conducted with system users (community members) to determine the level of user acceptance of the developed web-based GIS for mapping rabies cases. This testing aimed to evaluate whether the system is easy to use, informative and helpful in enabling users to obtain information about the distribution of rabies cases in Malaka Regency. The test involved 10 participants from the Malaka community. The evaluation indicators included clarity of information, ease of use and the level of user satisfaction with the developed system. The testing procedure was carried out by giving each participant the opportunity to explore and use all features of the web-based GIS. Respondents were asked to assess various aspects using a Likert scale (1–5), where 1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly agree. The results of this evaluation are summarized in Table 1.

Table 1. UAT results

Participant	Ease of use	Clarity of information	User satisfaction	Average score
Participant 1	5	5	5	5.00
Participant 2	5	5	4	4.67
Participant 3	5	4	5	4.67
Participant 4	5	5	5	5.00
Participant 5	5	5	5	5.00
Participant 6	5	4	5	4.67
Participant 7	4	5	5	4.67
Participant 8	4	4	4	4.00
Participant 9	4	4	4	4.00
Participant 10	5	4	5	4.67
Overall average score				4.64

Based on the results of the User Acceptance Testing (UAT), an overall average score of 4.64 was obtained, indicating that respondents were generally satisfied with the ease of use and clarity of the developed system. Therefore, the system is considered suitable for use as an information platform for the dissemination of rabies case data in Malaka Regency and surrounding areas, including Timor Leste.

IV. CONCLUSION

The development and evaluation of the web-based Geographic Information System (GIS) for mapping rabies cases in the Indonesia - Timor Leste border region have been successfully completed. The system has been effectively implemented and evaluated to ensure its functionality and usability. This platform plays a crucial role in providing accessible and transparent information about the spread of rabies. It serves the communities of Malaka as well as neighboring areas, including regions of Timor Leste, by increasing public awareness of rabies cases and their distribution. Through this web-based GIS, residents can obtain timely and accurate information, which supports preventive measures and promotes greater vigilance in border communities.

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