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Evaluation of Dengue Hemorrhagic Fever Reporting in the Hospital Early Warning System in Indonesia

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Abstract

Dengue Hemorrhagic Fever (DHF) remains a major public health concern in endemic countries and requires timely surveillance to support early outbreak detection and response, with hospitals playing a key role in identifying and reporting confirmed cases through early warning systems such as the Hospital Early Warning System (Kewaspadaan Dini Rumah Sakit, KDRS). This qualitative study at RSUD Panembahan Senopati, Bantul Regency, Indonesia, involved nine purposively selected informants (two physicians, three nurses, three ward administrative staff members, and one surveillance officer. Data were collected through in-depth interviews in June 2025 and analyzed using open, axial, and selective coding within the data reduction, data display, and conclusion drawing/verification framework described by Miles and Huberman to explore reporting timeliness, documentation completeness, coordination, and operational barriers. The findings indicate that physician-dependent diagnostic confirmation and authorization are central to reporting processes, as reporting is typically initiated only after a definitive diagnosis is established, despite earlier availability of laboratory results. High clinical workload, manual documentation, requirements for physical signatures, and coordination challenges were reported to contribute to delays relative to the 24-hour reporting target, while surveillance personnel used electronic medical records to verify incomplete reporting information. Overall, DHF reporting through KDRS is strongly influenced by physician authority and hospital workflow, which may hinder timely notification, highlighting the need for clearer procedures, improved integration between electronic medical records and KDRS, and streamlined workflows to reduce administrative barriers while maintaining data validity and strengthening early warning capacity.

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1. INTRODUCTION

Dengue fever, transmitted primarily by Aedes mosquitoes, is one of the most rapidly expanding vector-borne diseases worldwide and remains a major public health challenge in endemic countries. The World Health Organization estimates that approximately 100 million dengue cases occur annually, with severe manifestations, including Dengue Hemorrhagic Fever (DHF), contributing to approximately 22,000 deaths each year (Soni et al., 2023). Longitudinal analyses using Global Burden of Disease data show that global dengue incidence increased from approximately 26 million cases in 1990 to 58 million cases in 2021, accompanied by a parallel rise in disability-adjusted life years (DALYs) (Zhang et al., 2025). These trends underscore the importance of timely case notification and effective surveillance in endemic health systems.

Dengue disproportionately affects tropical and subtropical regions, with Southeast Asia bearing a substantial burden. In 2019, more than 658,301 cases were recorded in Southeast Asia, reflecting sustained transmission in countries such as Indonesia, Malaysia, and Thailand (Chong et al., 2023). Regional epidemiological trends further indicate the continuing need for reliable dengue surveillance (Weng et al., 2025). For hospitals managing suspected and confirmed cases, the ability to report cases promptly is an important component of the public health response.Given this burden, effective surveillance systems are essential for early outbreak detection and timely public health response. Hospitals play a central role in infectious disease surveillance because they serve as key sites for case identification, laboratory confirmation, clinical management, and case notification. Hospital-based dengue surveillance can generate information that supports disease monitoring and public health decision-making (Sulistyawati et al., 2020). However, the usefulness of hospital surveillance data depends on whether cases are documented, verified, and reported without avoidable delays.

International and national policy frameworks emphasize that healthcare facilities must report notifiable diseases, including dengue, in a timely and accurate manner. Evidence from dengue surveillance studies highlights the importance of integrating clinical case information, diagnostic assessment, and notification to public health authorities(Carabalí et al., 2021; Lessa et al., 2025). In Indonesia, the Hospital Early Warning System (KDRS) is a mechanism for reporting dengue fever cases admitted to hospitals within 24 hours of diagnosis(Ministry of Health of the Republic of Indonesia, 2017). At RSUD Panembahan Senopati, Bantul Regency, KDRS reporting is linked to the Sistem Informasi Surveilans Kejadian Luar Biasa (SISKLB), the local web-based reporting platform. Hospitals are therefore expected to ensure systematic case documentation, data validation, and submission to surveillance authorities(Carabalí et al., 2021).

Despite these requirements, hospital-based dengue reporting systems still face operational barriers. Previous studies have identified underreporting and delayed notification as recurring problems, particularly in low- and middle-income countries (Carabalí et al., 2021). High clinical workload, administrative complexity, and diagnostic uncertainty can impede timely reporting (Angelo et al., 2020). In addition, variation in physicians' perceptions of reporting obligations and reliance on hierarchical authorization structures may create bottlenecks in hospital reporting pathways (Lessa et al., 2025). These barriers can reduce the timeliness, completeness, and usefulness of surveillance data. In the KDRS context, understanding how clinical decisions and administrative responsibilities interact is therefore essential.

Digitalization and system integration have been proposed to strengthen hospital reporting systems. The use of electronic medical records (EMRs) and digital reporting tools may improve access to clinical information and standardize documentation(Cahyono et al., 2021). Web-based surveillance platforms and integrated disease notification

systems can also facilitate data transmission and reduce errors associated with manual reporting (Boenecke et al., 2022). However, digital systems may have limited benefits when notification still requires separate manual forms, verification steps, or signatures. Accordingly, evaluations should examine both technological support and the routine workflow through which reporting occurs.

Evaluation frameworks provide structured approaches for assessing surveillance system performance. Relevant surveillance attributes include timeliness, completeness, and data quality, while qualitative methods can help explain the organizational processes underlying these attributes In this study, timeliness and completeness are examined as qualitative evaluation domains rather than estimated as numerical performance rates. In-depth interviews can identify contextual and organizational barriers that shape reporting practices (Sulistyawati et al., 2020).

However, important gaps remain in the evaluation of hospital-based dengue reporting. Studies have examined dengue surveillance using digital information sources and methods for detecting reporting anomalies (Rotejanaprasert et al., 2024; Sylvestre, Cécilia-Joseph, et al., 2022). Although predictive modeling and anomaly detection have advanced dengue outbreak forecasting (Phillips et al., 2025; Rotejanaprasert et al., 2024), greater attention is needed to the internal processes that determine reporting performance, such as workflow efficiency, interprofessional coordination, diagnostic authorization, and reporting timelines. Previous qualitative research has addressed hospital-based dengue surveillance (Sulistyawati et al., 2020), but the interaction of these processes within the KDRS reporting pathway at RSUD Panembahan Senopati has not been characterized in the present manuscript's study context.This study evaluates DHF case reporting within a hospital early warning system by focusing on timeliness, completeness, workflow coordination, and operational barriers. The study addresses the following research question: how do diagnostic confirmation, professional roles, and hospital workflow influence the timeliness and completeness of DHF case reporting through the Hospital Early Warning System (Kewaspadaan Dini Rumah Sakit, KDRS) at RSUD Panembahan Senopati?.

The contribution of this study lies in its qualitative examination of hospital-based DHF reporting, linking surveillance reporting concerns with contextual analysis of workflow and institutional dynamics. By examining hospital-level reporting mechanisms in an endemic setting, this study aims to inform improvements in reporting procedures, interprofessional coordination, and integration between clinical records and surveillance systems.

2. METHODS

This study used a qualitative design to evaluate the reporting system for Dengue Hemorrhagic Fever (DHF) cases within the Hospital Early Warning System (Kewaspadaan Dini Rumah Sakit, KDRS) at RSUD Panembahan Senopati, Bantul Regency, Indonesia. The primary data consisted of in-depth interview transcripts obtained from key informants who were directly involved in the KDRS reporting process. Supporting materials included institutional KDRS reporting forms, electronic medical record (EMR) interfaces, and documentation related to the Sistem Informasi Surveilans Kejadian Luar Biasa (SISKLB), the Bantul Health Office web-based surveillance platform for notifiable disease reporting.

The study was conducted at RSUD Panembahan Senopati, a public referral hospital in Bantul Regency, an area with endemic dengue transmission. The hospital is required to report confirmed DHF cases to the District Health Office through the KDRS mechanism

integrated with SISKLB. The evaluation focused on internal reporting workflows, professional roles, data management processes, and compliance with reporting timelines.

Informants were purposively selected based on their direct involvement in the DHF reporting process through KDRS. The selection criteria emphasized professional roles and responsibilities within the reporting chain. The hospital surveillance officer was designated as the primary informant because of their responsibility for data management, validation, and submission to the SISKLB platform. Attending physicians (Dokter Penanggung Jawab Pasien, DPJP) were included because they have the authority to establish clinical diagnoses and validate KDRS reports through formal signatures. Nurses and ward administrative staff were recruited because of their operational roles in documenting patient identity, clinical conditions, laboratory results, and the completeness of reporting forms.

A total of nine informants participated in the study: one hospital surveillance officer, two specialist physicians, three nurses, and three ward administrative staff members. . Data were collected in June 2025 through semi-structured, face-to-face interviews guided by an interview protocol covering diagnostic procedures, reporting timelines, workflow coordination, perceived barriers, and compliance with mandatory reporting standards. Each interview lasted approximately 30–60 minutes and was conducted in Indonesian. Interviews were audio-recorded with participants' consent and transcribed verbatim for analysis. Data collection was reported to have continued until thematic saturation was achieved.

The main domains explored in this qualitative evaluation concerned surveillance reporting practices. They included perceived reporting timeliness, completeness of documentation, workflow coordination, and barriers and facilitators affecting reporting. Timeliness was explored in relation to the interval between diagnostic confirmation and submission to the surveillance unit; this interval was not measured quantitatively. Data completeness concerned informants' accounts of whether required fields in KDRS forms were completed and verified. Workflow coordination covered coordination between physicians, nurses, administrative staff, and surveillance personnel.These domains guided thematic coding of interview data and were considered in relation to established surveillance attributes. The analysis examined how diagnostic decisions, professional responsibilities, documentation practices, and coordination shaped the reporting process.

Data analysis was organized around three stages data reduction, data display, and conclusion drawing/verification as described by Miles and Huberman (1994). During data reduction, interview transcripts were read and coded to identify meaningful units of information related to KDRS reporting; this initial stage was described as open coding. Codes were then grouped into categories and their relationships examined; a process described as axial coding. Finally, selective coding was used to integrate the categories into overarching themes for interpretation and data display..

Data were managed and analyzed manually through iterative reading and constant comparison. Emerging themes were compared across professional groups to enhance credibility and confirm the consistency of interpretations. Triangulation involved comparing perspectives from surveillance officers, physicians, nurses, and administrative staff. Analytical rigor was strengthened through peer debriefing and audit trail documentation. This approach was intended to provide an in-depth account of contextual, organizational, and professional factors affecting DHF reporting at RSUD Panembahan Senopati. Ethical approval was obtained from the Research Ethics Committee of Universitas Ahmad Dahlan before data collection (approval number: REC-UAD/01/01/06-2025/146). All participants received written and verbal explanations about the study purpose, voluntary participation, confidentiality, and their right to withdraw at any time without consequences.

3. RESULTS AND DISCUSSION

A total of nine informants participated in this study, representing key professional roles involved in hospital-based DHF case reporting. The informants consisted of two specialist physicians, namely one pediatrician and one internist, three nurses, three ward administrative staff members, and one hospital surveillance program officer. Most informants were female, with eight of the nine participants being women. Their ages ranged from 33 to 49 years. Educational backgrounds varied according to professional role, including medical specialist qualifications, bachelor-level nursing and public health degrees, diploma-level nursing education, and senior high school education for administrative staff. This diversity of professional backgrounds enabled a comprehensive exploration of the clinical, administrative, and organizational dimensions of the KDRS reporting system.

Table 1. Characteristics of study informants.

Informant Code	Sex	Age (Years)	Highest Educational Attainment	Professional Position
D1	Female	47	Pediatric Specialist (Sp.A)	Pediatrician
D2	Female	46	Internal Medicine Specialist (Sp.PD)	Internist
P1	Female	36	Diploma in Nursing (D3)	Nurse
P2	Female	49	Bachelor of Nursing (BSc Nursing)	Nurse
P3	Female	44	Bachelor of Nursing (BSc Nursing)	Nurse
A1	Female	37	Senior High School	Ward Administrative Staff
A2	Female	34	Senior High School	Ward Administrative Staff
A3	Male	38	Senior High School	Ward Administrative Staff
S1	Female	33	Bachelor of Public Health (BPH)	Surveillance Program Officer

This study examined Dengue Hemorrhagic Fever (DHF) case reporting through the Hospital Early Warning System (Kewaspadaan Dini Rumah Sakit, KDRS) at RSUD Panembahan Senopati. Informants described the reporting process in relation to diagnostic confirmation, workload, interprofessional coordination, timeliness, and documentation completeness. Across professional groups, diagnostic confirmation by the attending physician emerged as the primary trigger for KDRS reporting. Although laboratory indicators such as thrombocytopenia, elevated hematocrit, or positive NS1/IgG/IgM results were often available earlier, reporting was generally postponed until the physician formally established the diagnosis. As one pediatrician stated:

“If it has been diagnosed as DBD, whether the lab is positive or the clinical signs are strong, I will make the KDRS report” (D1).

Similarly, an internist emphasized the need for caution when serological results were inconclusive:

“If IgG/IgM is not clearly positive, we must be careful. I sign the report when the diagnosis is truly confirmed” (D2).

This reliance on physician judgment indicates that reporting decisions were not solely laboratory-driven, but were embedded within clinical reasoning and diagnostic authority. The surveillance officer also confirmed that reporting depended on the documented diagnosis:

"If the doctor does not diagnose it as DF or DHF, we cannot report it, even if the laboratory values suggest it" (S1).

The reporting process operated in a clinical context characterized by high patient volume and competing service priorities. Nurses explained that patient stabilization, particularly fluid management and monitoring of vital signs and platelet levels, took precedence over administrative reporting tasks. One nurse stated:

"Our main focus is monitoring the patient's condition, especially fluids and platelet levels. The KDRS form is prepared after that" (P1).

Ward administrative staff also highlighted the complexity of the reporting process, particularly the continued reliance on manual documentation. Although electronic medical records (EMRs) were available, KDRS forms still required physical preparation and physician signatures. One administrator explained:

"We can check everything in the EMR, but the form still needs to be printed and signed before being submitted" (A2).

The coexistence of EMR-based clinical documentation and manual KDRS reporting added an administrative step that informants associated with delayed case notification.The KDRS reporting workflow involved several professional roles. Nurses prepared KDRS forms, physicians validated diagnoses and provided signatures, ward administrative staff collected and forwarded documents, and the surveillance unit entered data into SISKLB. Although this workflow was clearly structured, its implementation depended on timely coordination across professional groups. A nurse described the routine process as follows:

"We prepare the form when the lab result is positive, and during the morning round we ask the doctor to sign it" (P2).

However, delays occurred when physicians were occupied with outpatient clinics, ward rounds, or other clinical responsibilities. One administrator noted:

"Sometimes the doctor is in the clinic, and we have to wait until the next day for the signature" (A3).

The surveillance officer played an important role as a verification layer by cross-checking KDRS reports with EMR data. This verification helped reduce the impact of incomplete reporting forms:

"Even if some fields are incomplete, as long as we have the medical record number, we can verify it in the system" (S1).

Several barriers influenced the timeliness of DHF case reporting. Forgetfulness was mentioned across professional groups, especially when staff were managing multiple clinical and administrative tasks. One nurse admitted:

"Sometimes we forget to ask for the signature, especially when the ward is busy" (P3).

Holidays and shift transitions also contributed to reporting delays. An administrator explained:

"If it happens before a holiday, it might be reported the next working day" (A1).

Differences in professional perceptions also affected reporting consistency. The surveillance officer observed that some physicians were reluctant to report cases when serological results were negative, even when clinical suspicion remained:

"There are doctors who say it does not need to be reported if the IgG/IgM is negative" (S1).

This account suggests variation in how suspected cases were considered for reporting; the frequency of such variation was not measured.

According to the hospital surveillance officer, the expected reporting time was within 24 hours, but this target was not always met:

"Ideally it should be reported within 24 hours, but sometimes it is reported when the patient is about to be discharged" (S1).

Informants also described delays extending beyond two days, particularly when forms were not prepared promptly or physician signatures were unavailable; these intervals were not independently quantified.

Data completeness also varied. Essential identifiers, such as the medical record number and patient identity, were generally recorded. However, laboratory details or clinical information were sometimes incomplete. The surveillance unit compensated for incomplete entries by verifying missing information through EMR cross-checking. As noted by the surveillance officer:

"If something is missing, we verify it in the electronic medical record" (S1).

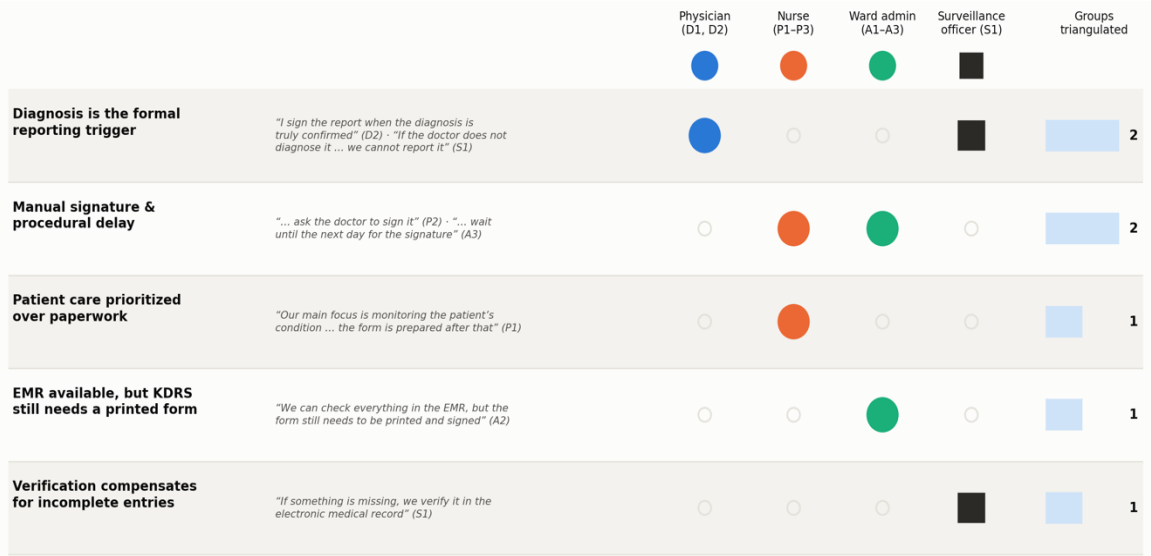


Figure 1. Triangulation of reporting-related themes across informant groups (direct-quote evidence).

Figure 1 maps each recurring theme in the Results to the professional group(s) whose direct quotes support it, reflecting the triangulation process described in the Methods. Only two of the five themes, physician-dependent diagnostic confirmation and the manual-signature/procedural delay, were corroborated by more than one informant group (physicians and the surveillance officer; nurses and ward administrative staff, respectively), indicating convergent accounts of the reporting bottleneck across roles. The remaining themes, clinical workload competing with documentation, the EMR-KDRS documentation gap, and the surveillance officer's compensatory verification role, were each voiced by a single professional group, representing role-specific rather than cross-validated observations.

In accordance with Indonesian national guidelines for Dengue Hemorrhagic Fever (DHF) prevention and control, all hospitalized DHF cases must be reported to the District Health Office using the Hospital Early Warning System (KDRS) form. This notification triggers a subsequent epidemiological investigation conducted by the local primary healthcare center (Puskesmas) (Ministry of Health of the Republic of Indonesia, 2017).

Taken together, the interviews indicate that physician confirmation, signature requirements, workload, and cross-unit coordination influenced the reporting pathway. The study did not measure the proportion of all eligible DHF cases captured by the system. These findings highlight how physician diagnostic confirmation and administrative authorization shaped reporting practices at RSUD Panembahan Senopati. The following discussion considers these accounts in relation to previous surveillance research.

Diagnostic confirmation by the attending physician (*Dokter Penanggung Jawab Pasien*, DPJP) functioned as the primary trigger for KDRS reporting. Although laboratory indicators, such as thrombocytopenia, elevated hematocrit, NS1 antigen, and IgG/IgM serology, were often available earlier, formal notification was usually postponed until the physician established a definitive diagnosis. This finding is consistent with previous studies showing that physician-dependent reporting structures can create bottlenecks in notifiable disease surveillance systems (Faridah et al., 2020; Lessa et al., 2025). In systems that require hierarchical authorization before notification, reporting performance becomes closely linked to clinical judgment and professional discretion. This process may support diagnostic accuracy, but it can also delay timely reporting, which is a core attribute of effective surveillance (Beatty et al., 2010; Hong et al., 2020; Khan, 2022).

The reliance on physician confirmation also reflects the diagnostic uncertainty of dengue infection. Early serological tests may be inconclusive or negative, and clinicians often combine laboratory results with clinical presentation before confirming a diagnosis. This cautious approach aligns with the World Health Organization recommendation to integrate clinical and laboratory criteria in dengue classification (Carabalí et al., 2021). However, when surveillance reporting depends only on final diagnosis rather than early suspicion or laboratory triggers, opportunities for rapid public health response may be reduced. Previous research has shown that delayed dengue reporting can weaken the effectiveness of vector control and outbreak containment measures (Bannister-Tyrrell et al., 2023). Therefore, the physician-centered reporting mechanism observed in this study illustrates an important tension between diagnostic certainty and epidemiological timeliness.

Organizational context also played an important role in reporting performance. The study setting was characterized by high clinical workload, competing patient care priorities, and continued reliance on manual documentation. Nurses reported that patient stabilization, particularly fluid management and monitoring for shock, took priority over administrative reporting tasks. This finding is consistent with evidence that high workload and competing clinical demands can delay notifiable disease reporting in hospital settings

(Angelo et al., 2020; Sulistyawati et al., 2020). In this context, reporting may be perceived as secondary to immediate clinical responsibilities, even though it is essential for public health action.

The coexistence of electronic medical records (EMRs) and manual KDRS forms further indicates structural inefficiency in the reporting workflow. Although SISKLB supports centralized data transmission, the requirement for printed forms and physical physician signatures introduced additional procedural steps. First, technical interoperability between hospital EMRs and the KDRS reporting module should be established to allow automated alert generation upon the entry of confirmed laboratory parameters (e.g., severe thrombocytopenia or positive NS1/IgM assays) or standardized ICD-10 diagnostic coding (Faridah et al., 2020). Second, administrative protocols should be updated to permit provisional surveillance notification by trained nursing or surveillance personnel based on established laboratory criteria, thereby decoupling initial public health reporting from formal physician discharge signatures (Tsukada et al., 2025). Similar challenges have been reported in transitional surveillance systems where digital infrastructure has not been fully integrated into routine clinical workflows (Boenecke et al., 2022; Sylvestre, Cécilia-Joseph, et al., 2022). Digital transformation can improve completeness and standardization (Syed et al., 2020), but its effectiveness depends on seamless integration and the removal of redundant manual procedures (Wong et al., 2024). In this study, EMR verification by the surveillance officer helped compensate for incomplete documentation. This finding suggests adaptive system resilience, but it also shows that inefficiencies remain at the primary reporting stage.

Interprofessional coordination emerged as another determinant of reporting performance. The reporting chain involved nurses preparing KDRS forms, physicians validating diagnoses and signing reports, ward administrative staff collecting and forwarding documents, and surveillance officers entering data into SISKLB. Although this structure distributed responsibility across several professional groups, its effectiveness depended on timely communication and clear role allocation. Delays occurred during shift transitions, holidays, and periods when physicians were occupied with outpatient clinics or ward rounds. These findings reinforce the need for clear reporting protocols and accountability mechanisms to maintain surveillance continuity across professional roles and working schedules.

Professional perceptions of reporting obligations also influenced compliance. Surveillance personnel emphasized the need to meet the 24-hour reporting requirement, whereas some physicians were reluctant to report cases with negative serology despite clinical suspicion. This variation is consistent with previous research showing that healthcare workers' attitudes toward mandatory reporting affect reporting compliance (Wiley et al., 2020). Reporting is also influenced by education, awareness, and information (Mollabagher et al., 2026). When reporting is viewed primarily as an administrative task, adherence may decline. In contrast, stronger awareness of the public health purpose of early notification may improve acceptability, which is an important attribute in surveillance system evaluation (Hong et al., 2020).

The interviews suggest that confirmed DHF cases could be processed through the hospital reporting workflow, but this study did not quantitatively assess surveillance sensitivity, case ascertainment, or representativeness. Therefore, the findings should not be interpreted as evidence that all confirmed cases were captured. Delays described by informants could nevertheless limit the usefulness of notification for dengue control, where timely investigation and vector-control activities are important (Bannister-Tyrrell et al., 2023). Strengthening timeliness without compromising appropriate clinical assessment

remains a challenge for hospital-based dengue surveillance. This study contributes methodologically by using qualitative analysis to examine internal workflow dynamics behind routine case reporting. While predictive modeling and anomaly detection have advanced dengue outbreak forecasting (Phillips et al., 2025; Rotejanaprasert et al., 2024), fewer studies have explored the organizational processes that shape routine case notification. By integrating open, axial, and selective coding with surveillance evaluation principles, this study provides a contextual understanding of reporting performance and addresses a gap in evaluations of hospital-based surveillance systems in resource-constrained settings (Lessa et al., 2025; Sylvestre, Joachim, et al., 2022).

This study has several limitations. First, it was conducted in a single referral hospital, so the findings may not fully represent reporting practices in other hospitals with different resources, workflows, or digital infrastructure. Second, the study relied on interviews with health workers and administrative staff, which may be influenced by recall bias or social desirability bias. Third, this study did not quantitatively measure reporting timeliness, completeness, sensitivity, or representativeness using surveillance datasets. Fourth, respondent validation or member-checking of the coded themes was not performed due to operational constraints, although analytical rigor was maintained through investigator triangulation and peer debriefing. Fifth, data collection took place within a single month (June 2025), which reflects reporting dynamics during that specific timeframe and may not fully account for seasonal fluctuations in dengue transmission or peak hospital workload. Future studies should combine qualitative workflow analysis with quantitative assessment of reporting indicators to provide a more comprehensive evaluation of hospital-based dengue surveillance.

The findings have several implications for policy and health system strengthening. First, hospitals could assess the feasibility of provisional notification based on suspected cases or laboratory information, followed by physician confirmation, subject to applicable reporting regulations. Second, KDRS reporting forms should be integrated into the EMR system to reduce duplicate documentation, eliminate unnecessary printing, and minimize dependence on physical signatures. Third, periodic training and feedback sessions should emphasize the public health importance of timely dengue reporting and clarify the reporting responsibilities of physicians, nurses, administrative staff, and surveillance officers. Finally, routine evaluation using standardized surveillance performance indicators should be institutionalized to support continuous quality improvement. Overall, this study indicates that DHF reporting through KDRS is shaped by clinical authority, professional roles, workload, and institutional workflow. Addressing these organizational and procedural barriers may improve timeliness and coordination in hospital-based dengue surveillance.

4. CONCLUSION

This study demonstrates that DHF case reporting through the hospital-based KDRS system at RSUD Panembahan Senopati is strongly dependent on physician diagnostic confirmation and formal authorization. This dependence may delay reporting, particularly in a context of high clinical workload, manual documentation, physical signature requirements, and partially integrated administrative systems. Although informants described the routine reporting of confirmed DHF cases, adherence to the recommended 24-hour reporting standard was reported to be inconsistent. Surveillance officers also verified incomplete reporting information through electronic medical records. These findings highlight the need for clearer reporting procedures, better integration between KDRS and electronic medical records, and more effective coordination across professional roles. Future studies should combine qualitative workflow analysis with

quantitative assessment of reporting timeliness, completeness, sensitivity, and representativeness to provide a more comprehensive evaluation of hospital-based dengue surveillance systems.

CONFLICT OF INTEREST

The authors declare that the study was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

ETHICAL CONSIDERATIONS

This study was approved by the Research Ethics Committee of Universitas Ahmad Dahlan before data collection (approval number: REC-UAD/01/01/06-2025/146). All participants received written and verbal explanations about the study purpose, voluntary participation, confidentiality, and their right to withdraw at any time without consequences.

AUTHOR CONTRIBUTIONS

Fardhiasih Dwi Astuti and Fatimah Azahra Rumoroi contributed to conceptualization, methodology, data collection, analysis, and writing. Rokhmayanti contributed to supervision, validation, and critical revision. All authors reviewed and approved the final manuscript and agreed to be accountable for all aspects of the work.

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DECLARATION OF ARTIFICIAL INTELLIGENCE USE

During the preparation of this work, the authors used ChatGPT to enhance the clarity of the writing. After using ChatGPT, the authors reviewed and edited the content as needed and take full responsibility for the publication's content.

REFERENCES

Angelo, M., Ramalho, W. M., Gurgel, H., Belle, N., & Pilot, E. (2020). Dengue Surveillance system in Brazil: a qualitative study in the Federal District. *International Journal of Environmental Research and Public Health*, 17(6), 2062. https://doi.org/10.3390/ijerph17062062

Bannister-Tyrrell, M., Hillman, A., Indriani, C., Ahmad, R. A., Utarini, A., Simmons, C. P., Anders, K. L., & Sergeant, E. (2023). Utility of surveillance data for planning for dengue elimination in Yogyakarta, Indonesia: a scenario-tree modelling approach. *BMJ Global Health*, 8(11), e013313. https://doi.org/10.1136/bmjgh-2023-013313

Beatty, M. E., Stone, A., Fitzsimons, D. W., Hanna, J. N., Lam, S. K., Vong, S., Guzman, M. G., Mendez-Galvan, J. F., Halstead, S. B., Letson, G. W., Kuritsky, J., Mahoney, R., Margolis, H. S., & for The Asia-Pacific and Americas Dengue Prevention Boards Surveillance Working Group. (2010). Best practices in dengue surveillance: a report

from the Asia-Pacific and Americas Dengue Prevention Boards. *PLoS Neglected Tropical Diseases*, 4(11), e890. https://doi.org/10.1371/journal.pntd.0000890

Boenecke, J., Brinkel, J., Belau, M. H., Himmel, M., & Ströbele, J. (2022). Harnessing the potential of digital data for infectious disease surveillance in Sub-Saharan Africa. *European Journal of Public Health*, 32(Supplement_3), 640. https://doi.org/10.1093/eurpub/ckac131.569

Cahyono, A. D., Satoto, T. B. T., & Lazuardi, L. (2021). Pelaporan surveilans demam berdarah berbasis SMS di Kota Yogyakarta. *Jurnal Manajemen Pelayanan Kesehatan (The Indonesian Journal of Health Service Management)*, 19(2), 1-5. https://doi.org/10.22146/jmpk.v19i2.1923

Carabalí, M., Jaramillo, G. I., Rivera, V. A., Possu, N.-J. M., Restrepo, B. N., & Zinszer, K. (2021). Assessing the reporting of dengue, chikungunya and zika to the national surveillance system in Colombia From 2014–2017: A Capture-Recapture Analysis Accounting for Misclassification of Arboviral Diagnostics. *PLoS Neglected Tropical Diseases*, 15(2), e0009014. https://doi.org/10.1371/journal.pntd.0009014

Chong, V., Tan, J. Z. L., & Arasoo, V. J. T. (2023). Dengue in pregnancy: A Southeast Asian perspective. *Tropical Medicine and Infectious Disease*, 8(2), 86. https://doi.org/10.3390/tropicalmed8020086

Faridah, L., Rinawan, F. R., Fauziah, N., Mayasari, W., Dwiartama, A., & Watanabe, K. (2020). Evaluation of health information system (HIS) in the surveillance of dengue in Indonesia: Lessons from case in Bandung, West Java. *International Journal of Environmental Research and Public Health*, 17(5), 1795. https://doi.org/10.3390/ijerph17051795

Hong, R., Walker, R., Hovan, G., Henry, L., & Pescatore, R. (2020). The power of public health surveillance. *Delaware Journal of Public Health*, 6(2), 60–63. https://doi.org/10.32481/djph.2020.07.016

Khan, O. S. (2022). Evaluation of the Dengue Surveillance System in Khyber Pakhtunkhwa Province, Pakistan, in 2020. *Iproceedings*, *8*(1), e36584. https://doi.org/10.2196/36584

Lessa, C. L. S., Fiuza, B. S. D., Hodel, K. V. S., Cíntia Silva Minafra e Rezende, Gonçalves, M. D. S., & Machado, B. A. S. (2025). Understanding dengue underreporting: an analysis of the impacts for the world, Latin America and Brazil. *The Scientific World Journal*, 2025(1), 9993911. https://doi.org/10.1155/tswj/9993911

Ministry of Health of the Republic of Indonesia. (2017). *Guidelines for Prevention and Control of Dengue Fever in Indonesia*. Directorate General of Disease Control and Environmental Health.

Mollabagher, M., Hassanzadeh, A., Sepehri, M. M., Habibelahi, A., & Sarabadani, A. (2026). Towards an integrated framework for health surveillance systems: a systematic literature review of design components and implementation challenges. *Health Science Reports*, 9(1), e71652. https://doi.org/10.1002/hsr2.71652

Phillips, M. T., Marzán-Rodríguez, M., Aponte, J. T., Rivera, A., Rodríguez, D. M., Madewell, Z. J., Rysava, K., Paz–Bailey, G., Adams, L. E., & Johansson, M. A. (2025). Dengue epidemic alert thresholds for surveillance and decision-making in puerto rico: development and prospective application of an early warning system using routine surveillance data. *BMJ Open*, 15(9), e106182. https://doi.org/10.1136/bmjopen-2025-106182

Rotejanaprasert, C., Areechokchai, D., & Maude, R. J. (2024). Two-step spatiotemporal anomaly detection corrected for lag reporting time with application to real-time dengue surveillance in Thailand. *BMC Medical Research Methodology*, 24, 10. https://doi.org/10.1186/s12874-024-02141-5

Soni, S., Gill, V. J. S., Anusheel, Singh, J., Chhabra, J., Gill, G. J. S., & Bakshi, R. (2023). Dengue, chikungunya, and zika: the causes and threats of emerging and re-emerging arboviral diseases. *Cureus*, 15(7), e41717. https://doi.org/10.7759/cureus.41717

Sulistyawati, S., Nilsson, M., Ekasari, M. P., Mulasari, S. A., Sukesi, T. W., Padmawati, R. S., & Holmner, Å. (2020). Untapped potential: a qualitative study of a hospital-based dengue surveillance system. *American Journal of Tropical Medicine and Hygiene*, 103(1), 120–131. https://doi.org/10.4269/ajtmh.19-0719

Syed, M. A., Mujalli, H. A., Kiely, C. M., Qotba, H. A. A., Elawad, K., Ali, D. A., Idries, A. M., & Vilakazi, B. (2020). Electronic notifiable disease reporting system from primary care health centres in Qatar: a comparison of paper-based versus electronic reporting. *BMJ Innovations*, 6(1), 32–38. https://doi.org/10.1136/bmjinnov-2018-000329

Sylvestre, E., Cécilia-Joseph, E., Bouzillé, G., Najioullah, F., Étienne, M., Malouines, F., Rosine, J., Julié, S., Cabié, A., & Cuggia, M. (2022). The role of heterogenous real-world data for dengue surveillance in Martinique: observational retrospective study. *JMIR Public Health and Surveillance*, 8(12), e37122. https://doi.org/10.2196/37122

Sylvestre, E., Joachim, C., Cécilia-Joseph, E., Bouzillé, G., Campillo-Gimenez, B., Cuggia, M., & Cabié, A. (2022). Data-driven methods for dengue prediction and surveillance using real-world and big data: a systematic review. *Plos Neglected Tropical Diseases*, 16(1), e0010056. https://doi.org/10.1371/journal.pntd.0010056

Tsukada, K., Nishiki, S., Fukusumi, M., Hidajah, A. C., Susilastuti, F., Sawitri, A. A. S., Aradea, I.W.S., Wahyono, T. Y. M.H., Sutiningsih, D., Kusariana, N., Wiratama, B. S.S., Dwinata, I.O., Kuboki, I., Winiar, R. D., Ayunni, R., Fillah, N. A. D., … Dinihari, T. N. (2025). Strengthening cross-regional networks: evaluation of indonesia's national early warning alert and response system by field epidemiology training programmes from Indonesia and Japan, 2023. *Western Pacific Surveillance and Response Journal*, 16(3), 1–4. https://doi.org/10.5365/wpsar.2025.16.3.1243

Weng, S.L., Hung, F.Y., Li, S.T., Liou, B.H., Yeung, C.Y., Tai, Y.L., Wu, Y.H., Huang, Y.N., Chiu, N.C., Lin, L.Y., Chi, H., & Lin, C.Y. (2025). Dengue epidemiology in 7 southeast asian countries: 24-year, retrospective, multicountry ecological study. *Interactive Journal of Medical Research*, 14, e70491. https://doi.org/10.2196/70491

Wiley, K., Hilts, K. E., Ancker, J. S., Unruh, M. A., Jung, H., & Vest, J. R. (2020). Organizational characteristics and perceptions of clinical event notification services in healthcare settings: a study of health information exchange. *Jamia Open*, 3(4), 611–618. https://doi.org/10.1093/jamiaopen/ooaa065

Wong, D., Bonnici, T., Gerry, S., Birks, J., & Watkinson, P. (2024). Effect of Digital early warning scores on hospital vital sign observation protocol adherence: stepped-wedge evaluation. *Journal of Medical Internet Research*, 26, e46691. https://doi.org/10.2196/46691

Zhang, W.X., Zhao, T.Y., Wang, C.C., He, Y., Lu, H.Z., Zhang, H.T., Wang, L.M., Zhang, M., Li, C.X., & Deng, S.Q. (2025). Assessing the global dengue burden: Incidence, mortality, and disability trends over three decades. *PLOS Neglected Tropical Diseases*, 19(3), e0012932. https://doi.org/10.1371/journal.pntd.0012932