Evaluation of the dengue surveillance system during the COVID-19 pandemic in Gunungkidul Regency in 2021

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Abstract

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Purpose: The purpose of this study is to pinpoint the gaps in the Gunungkidul Regency's dengue monitoring system's implementation. **Methods:** Using the descriptive design. In the Gunungkidul Regency, questionnaires were used to collect primary data from the Health Office, 30 Public Health Centers, 3 Hospitals, and 1 Clinic. The d engue surveillance system assessment standard integrates the surveillance system system concept from the 2001 CDC guidelines with the attributes (Simplicity, Data Quality, Data Stability, Representation, System Acceptance, and Timeliness) and d engue surveillance system standards by directives from the Director General of Desease control of the Ministry of Health of the Republic of Indonesia in 2017. **Results:** Clinical criteria are used in Gunungkidul Regency to define dengue cases, whereas serological tests, such as NS-1, are rarely used there. Up to 4 (14%) of the health facilities had trouble accurately collecting reports of hospital suspicions, such as when the patient's residence was unclear and when they received treatment. According to 21 (70%) of the health centers, suspect reports were frequently collected from patients who had been admitted to hospitals outside the area. Notification letters were given to patients who had completed their treatment. The distribution of cases and the projection of an increase in instances cannot be accurately described using data from data management, as the data is not updated on a daily basis. Up to 15 health centers (50%) reported that hospital reports were frequently delayed. **Conclusion:** Weaknesses in the dengue surveillance system, particularly in the characteristics of simplicity, quality, data stability, and timeliness, contributed to an increase in the number of dengue cases from 2018 to 2020 in Gunungkidul Regency.

Keywords: dengue; evaluation; surveillance

INTRODUCTION

In 2020, 11 provinces in Indonesia reported the highest number of dengue fever cases, including Lampung Province, North Sumatra, DKI Jakarta, West Java, Banten, East Java, Central Java, Bali, East Nusa Tenggara, West Nusa Tenggara, and the Special Region of Yogyakarta (DIY) [1]. The Special Region of Yogyakarta Province is one of the provinces in Indonesia where all its city and regency areas are endemic to dengue fever. Since 2021, the incidence rate (IR) of dengue cases in the Special Region of Yogyakarta (DIY) has consistently shown figures higher than the target of the dengue control program outlined in the national medium-term development plan (RPJMN), which is 49.00 per 100,000 population. In 2019, the IR in DIY was 88.35 per 100,000 population and 94.15 per 100,000 population, with a total of 3,618 cases in 2020 [2]. For the past 5 years, districts and cities in the DIY Province have reported a high incidence of dengue fever cases. (IR) The number of dengue cases in the Special Region of Yogyakarta (DIY) has consistently shown figures higher than the target of the dengue control program outlined in the national medium-term development plan (RPJMN), which is 49.00 cases per 100,000 population. In 2019, the IR in DIY was 88.35 per 100,000 population and 94.15 per 100,000 population, with a total of 3,618 cases in 2020 [2]. For the past 5 years, districts and cities in the DIY Province have reported a high incidence of dengue fever cases.

Of the five regencies and cities in the DIY Province, from 2018 to 2020, Gunungkidul Regency showed an increasing trend in dengue incidence. In 2020, Gunungkidul Regency had the highest dengue incidence rate (IR) compared to other regencies and cities in DIY, at 131.27 per 100,000 population with 975 cases and four deaths, resulting in a Case Fatality Rate (CFR) of 0.41% [2].

The sub-district with the highest DBD IR in Gunungkidul Regency in 2020 is Wonosari Sub-district. Wonosari District is an endemic area for dengue fever, with the highest population density compared to other districts, at 1158.18 per square kilometer in 2020.

The COVID-19 pandemic has put tremendous pressure on healthcare services and their management systems worldwide. The WHO has emphasized the importance of maintaining efforts to prevent and detect other arbovirus diseases during this pandemic period, as the number of cases is increasing in several countries. The combined pandemic of COVID-19 and dengue fever poses a significant risk of spreading to vulnerable populations in an affected area, leading to co-infection [3].

In 2021, the Ministry of Health of the Republic of Indonesia (KEMENKES RI) launched six national strategies aimed at providing direction and synergizing the roles of all parties to achieve dengue control targets by the RPJMN until 2025. Two of the strategies include strengthening dengue surveillance. This research was conducted to evaluate the implementation of two dengue control strategies in Gunungkidul Regency by assessing the dengue surveillance system.

METHODS

Surveillance evaluation using descriptive methods. Data collection was conducted in Gunungkidul Regency from April to December 2021. The study subjects are data managers at the Gunungkidul District Health Office, 30 community health centers, three hospitals, and one clinic.

Data is analyzed, including quantitative and qualitative data. The standards for evaluating the dengue surveillance system use a combination of the CDC dengue surveillance system concepts from 2001 (simplicity, data quality, acceptability, representativeness, and timeliness) with the dengue surveillance system standards according to the guidelines from the Director General of Disease Control and Prevention, Ministry of Health of the Republic of Indonesia, 2017.

The instrument for the evaluation study uses a questionnaire consisting of respondent identity (8 questions), agency description (3 questions), personnel (2 questions), funding (2 questions), surveillance materials and tools (4 questions), dengue case data collection (11 questions, two open-ended questions), management and presentation of DBD case data (17 questions, two open-ended questions), and the timing of data collection, management, and reporting of case data (4 questions). Surveillance attributes simplicity (12 questions), data quality (7 questions, one open-ended question), data stability (6 questions), representativeness (2 questions, one open-ended question), timeliness (7 questions, three open-ended questions), acceptance (2 questions), Implementation of Dengue screening in community health centers/hospitals/clinics (10 questions).

Quantitative data includes the number of healthcare facilities involved in the dengue surveillance system, healthcare resources such as the number of data managers, average length of service, recording data including the completeness of data such as the date of onset of illness, date of admission to healthcare facilities, and average time for data collection, reporting, and response. Qualitative data includes transcripts of interview results from open-ended ques-

-tions, which provide in-depth explanations. These explanations include details about the data sources, the reasons behind delays and operational errors in the system, and how the system should ideally function.

RESULTS

Overview of the surveillance system in Gunungkidul Regency

The DBD surveillance system in Gunungkidul Regency is a passive system based in hospitals and community health centers, involving officers from each institution who play a role in controlling the system, referred to as data managers. Program managers are functional staff responsible for the implementation of control, eradication, or mitigation activities for health

issues, but not all surveillance data managers are DBD programmers in Gunungkidul Regency. The majority of data managers are male (67%), with an age range of 50-59 years (12%) and holding a bachelor's degree (59%). The educational background for Diploma 4 (D4) varies from the field of Nursing (7%), Diploma 4 (D4) Sanitarian (5%), and Diploma 3 (D3) in the field of Nursing (45%). The range of work experience for data managers varies from 6 months to 20 years, and the majority (88%) have a workload of 1-3 programs. The workload of dengue surveillance data managers has become one of the issues in the implementation of dengue surveillance in Gunungkidul Regency. During the COVID-19 pandemic, several data managers reported that they could not perform their other tasks because they prioritized COVID-19 reporting.
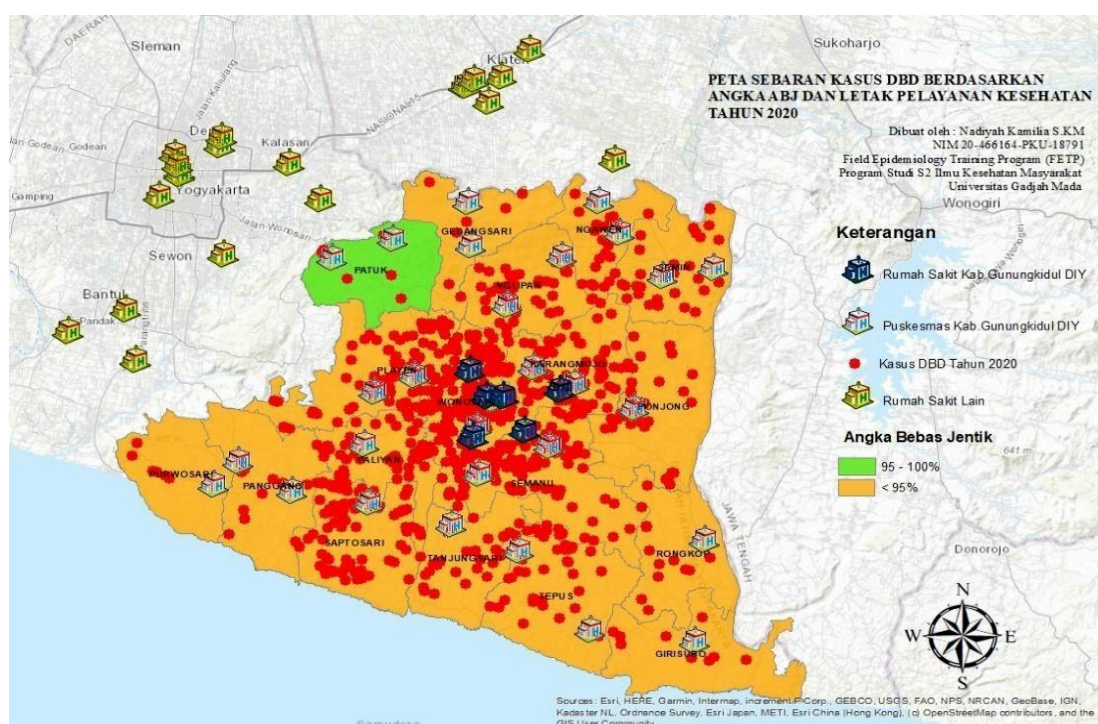

Figure 1. Map of DBD case distribution based on ABJ and healthcare service locations in 2020

Figure 1 shows the distribution of Dengue Hemorrhagic Fever (DHF) cases in Yogyakarta Province in 2020, indicated by red dots spread throughout various sub-districts. The background color gradient represents the Breteau Index (BI), with orange areas showing high mosquito larvae density, correlating with high case concentrations. The map also marks the locations of healthcare facilities, including public and private hospitals, which are mostly clustered in urban areas.

Six out of seven hospitals in Gunungkidul Regency are involved in data reporting, including the treatment

of dengue fever patients. The hospital that is not involved in this data reporting includes Saptosari Hospital, located in Saptosari District. In addition to the confirmed DBD case reports from hospitals and clinics, several community health centers (puskesmas) in Gunungkidul Regency also reported these cases because they diagnose and treat DBD patients. The capabilities of the puskesmas laboratories, such as platelet, hematocrit, and plasma examinations, are considered sufficient to establish a DBD diagnosis. However, only 11 (36%) puskesmas reported suspected DBD cases to the Gunungkidul District Health Office in 2020.

Simplicity of the surveillance system

According to the CDC (2001), a surveillance system is considered simple if it can be easily implemented. The simplicity of the surveillance system can be assessed by looking at indicators such as the ease of defining cases, data collection, recording, and reporting.

According to several community health centers, DBD cases are defined based on hospital laboratory results. There is no clear understanding of the data manager's knowledge regarding the mentioned dengue case definition. The response from the data manager only considers their role as data collectors and believes that the authority to determine whether a patient has DBD or not lies with the hospital, based on signs and symptoms, clinical laboratory results, and the NS-1 rapid test. The knowledge of data managers in Gunungkidul Regency is lacking in this regard.

"Well, that's usually still in the lab, so it's still the first if there's a fever for three days without symptoms, ehh, the others without symptoms still have lab results, but based on yesterday's experience during COVID, there hasn't been any Dengue Fever here, we haven't stocked NS-1 for a long time, so just accept it clean from the hospital, right, just refer it yourself." (Puskesmas Ponjong 1)

Simple case collection because all confirmed dengue case reports from hospitals, clinics, community health centers, and independent doctor practices are reported using the Gunungkidul DBD WhatsApp Group. The group consists of all DBD programmers from the health department, community health centers, hospitals, and clinics, so when hospitals, clinics, or independent doctor practices send a notification letter about suspected patients, the group receives it

Dengue hemorrhagic fever (DHF) can be directly referred by the community health center (puskesmas) to conduct an epidemiological investigation (PE). However, it is not simple when the collection is conducted at hospitals and clinics located outside Gunungkidul Regency. There is no communication flow for confirmation reports with those hospitals and clinics, so it has to go through the patients. The collection of dengue fever data in Gunungkidul Regency, especially across borders, is not simple. As many as 26 (86%) community health centers and 3 (100%) hospitals stated that the recording forms were simple and not difficult. However, 4 (14%) community health centers had difficulty recording the suspected hospital reports, with reasons including unclear patient addresses, incomplete form filling, lack of clear phone numbers, and the date when the patient was treated. Thus, the recording activity is not straightforward.

"In the recording of KDRS, we have adjusted to the format provided by the Health Department, it's easy, not difficult" (RSUD Wonosari).

Case reports begin at healthcare facilities such as hospitals, clinics, and community health centers, and are then reported to the Gunungkidul District Health Office. After the report is made to the Gunungkidul District Health Office, the KDRS report is forwarded to the community health center within 24 hours for an epidemiological investigation.

The results are then periodically reported to the Provincial Health Office. The simple dengue case reporting flow in Gunungkidul Regency is in accordance with the 2017 dengue case management guidelines from the Director General of Disease Control and Prevention, Ministry of Health of the Republic of Indonesia, 2017, as illustrated in Figure 2.
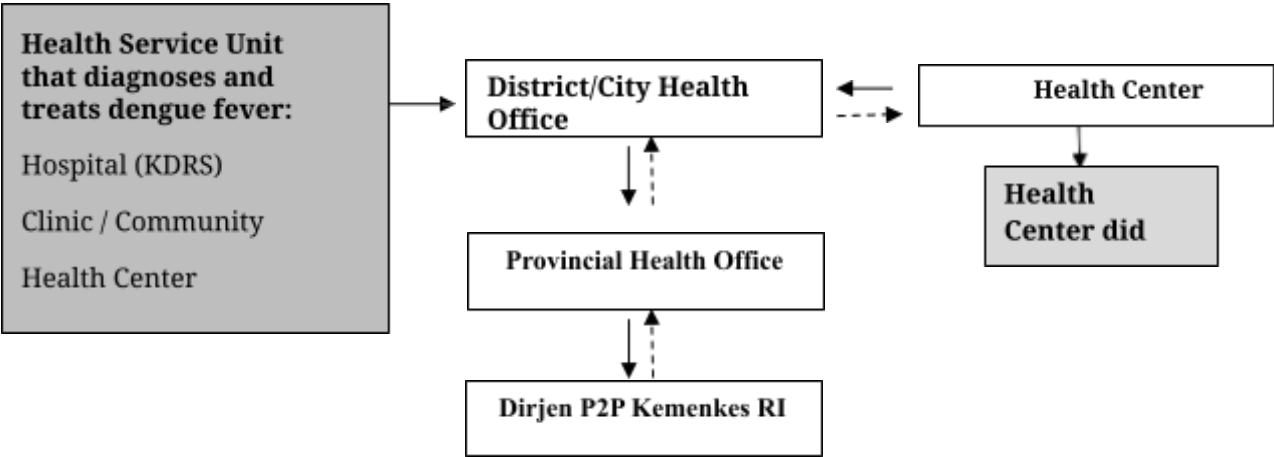

Figure 2. Flow of reporting DBD cases in Gunungkidul Regency

There are difficulties in defining cases for data managers because they only rely on medical confirmation reports from hospitals and clinics. The collection process is also not straightforward for hospitals and clinics across borders, as well as their recording and reporting. Therefore, the simplicity of the surveillance system in Gunungkidul Regency is considered not simple.

Quality of surveillance system data

According to the CDC (2001), data quality can be assessed from the completeness and validity of the data recorded in the epidemiological surveillance system. Data is considered complete when confirmed cases are fully completed and validated by the health agency reporting the confirmed dengue cases.

Out of 973 dengue cases in Gunungkidul Regency, 77 (7.8%) cases did not record the hospital origin, and the records also did not include the patient's medical record number, phone number, condition at the initial diagnosis, laboratory results, and diagnosis date. Based on the dengue surveillance performance indicators of the District/City Health Office, a good performance is considered if the percentage of completeness in sending reports from community health centers (K-DBD, DP-DBD, and W2 DBD) to the Health Office is 90%. The completeness of the report is the percentage of reporting units (community health centers) that submit reports to the Health Office each month. The Health Office did not create the monthly reporting completeness percentage because the DBD programmer lacked the necessary knowledge to do so.

"There is none, just take the data from the hospital, I will summarize it and forward it to the community health center, so the report to the community health center only has cases, later there will be validation and then everything will be summarized (Gunungkidul District Health Office)."

The results of the reporting completeness calculation based on the health centers that reported in 2019 show that the health center reporting dengue cases was Girisubo Health Center (3%). In 2020 (14%), the health centers reporting dengue cases included Girisubo Health Center, Ngawen II Health Center, Paliyan Health Center, and Wonosari I Health Center. In 2021 (0%), no health centers reported confirmed dengue cases.

The Gunungkidul District Health Office does not receive weekly and monthly reports from the community health centers. Additionally, receiving only ABJ reports based on epidemiological investigation does not result from periodic larva monitoring.

Meanwhile, based on the data management for determining the stratification of DBD endemicity per sub-district in Gunungkidul Regency, it has also not been created. According to the above results, the confirmed case data was not fully completed, and the data collectors did not validate with the health agencies reporting the confirmed dengue cases, resulting in the quality of the dengue surveillance system data in Gunungkidul Regency being deemed unqualified.

Stability of surveillance system data

According to the CDC (2001), stability is related to the reliability and availability of the surveillance system. Reliability is the ability to collect, organize, and provide data accurately without errors. At the same time, availability is the ability to be operational when needed. Since the COVID-19 pandemic entered Gunungkidul Regency in 2020, the implementation of data validation has not been carried out anymore. Therefore, the unavailability of data is not continuously addressed, so if the data is needed, it must be requested again from the Gunungkidul District Health Office when required. According to the CDC dengue surveillance evaluation guidelines (2001), stability in the dengue surveillance system is the ability to depict the spatial-temporal distribution of dengue. as many as 4 (13%) health centers present data on endemicity and case distribution through mapping, as many as 14 (46%) health centers present the results of DBD case data analysis by observing the trend of transmission seasons by creating min-max graphs, As many as 8 (26%) health centers did not present the analysis of DBD trends in demographics and geography.

The Surveillance System in Gunungkidul Regency is unable to collect, organize, and provide DBD epidemiological data effectively. The availability of data is also not implemented within a definite timeframe. Thus, the surveillance system is unstable.

Representation of the surveillance system

According to the CDC (2001), the epidemiological surveillance system must be able to represent the accuracy of case occurrences over time, reflecting the distribution of cases in the population based on place and person in accordance with the objectives of surveillance.

Wonosari District and Playen District have the highest incidence rates of dengue fever among other districts in Gunungkidul Regency. From 258 DBD cases in Wonosari District, (73.6%) were treated at Wonosari Regional General Hospital. Of the 118 dengue fever cases in Playen District, (40.7%) were treated at Wonosari Regional Hospital and (35.6%) were treated at PKU Muhamadiyah Wonosari Hospital. Thus, more

cases are treated at the Gunungkidul District Hospital. However, several other sub-districts with fewer reported DBD cases have been reported to have more patients being treated in hospitals outside Gunungkidul Regency.

From 9 DBD cases in Purwosari District, 6 (66.6%) cases were treated in hospitals outside the area. Of 11 dengue cases in the Panggang District, 4 (36.7%) cases were treated in hospitals outside the area. Out of 9 DBD cases in Gendangsari District, 5 (55.8%) were treated in hospitals outside the area.

In 2020, out of 975 cases, 432 (44.3%) cases were confirmed by the Wonosari Regional General Hospital (RSUD). Service facilities such as clinics represent more cases in Tanjungsari District, while health facilities like hospitals located outside Gunungkidul Regency represent Purwosari, Gendangsari, Ngawen, and Panggang Districts. This is because the location of these sub-districts is far from access to hospitals in the city center of Gunungkidul Regency and is situated on the border between regencies. The available health facilities represent the distribution of dengue fever cases in Gunungkidul Regency. The distribution of cases by sub-district illustrates that the DBD surveillance system in Gunungkidul Regency can capture cases well, and the system can be considered representative. Timeliness of the Surveillance System

According to the CDC (2001), timeliness reflects the speed between steps in the public health surveillance system, namely the speed between detection, reporting, and response. The reporting time for data to the Gunungkidul District Health Office to record confirmed dengue case reports, as agreed, is less than 24 hours, while the reporting of case summaries per sub-district by community health centers is on the 4th of every month. The time for reporting data to the Provincial Health Office of DIY, as agreed, is on the 4th of every month, and the timeliness of the Gunungkidul District Health Office's reporting to the Provincial Health Office of DIY is 100%.

As many as 7 (23%) community health centers reported that case reporting by sub-district was sent to the Gunungkidul District Health Office in less than 24 hours, and 15 (50%) community health centers reported that the time needed to conduct an epidemiological investigation (PE) was less than 24 hours. However, some community health centers admitted that hospital reports often experienced delays. Thus, the dengue surveillance system in Gunungkidul Regency is not timely.

Acceptance of the DBD surveillance system

The assessment of the acceptability attribute is seen from the number of parties involved in dengue surveillance. The dengue surveillance system in Gunungkidul Regency is acceptable because many hospitals participate in reporting DBD KDRS to the Gunungkidul Regency Health Office.

DISCUSSION

The reporting of dengue fever cases by the Gunungkidul District Health Office, along with hospitals, clinics, and community health centers, is generally in accordance with the recommendations from the 2017 dengue case management guidelines by the Director General of Disease Control and Prevention, Ministry of Health of the Republic of Indonesia. However, the actual reporting of cases in the field differs. The Gunungkidul District Health Office has a weakness in forming a network of cooperation with several hospitals in other districts and cities. According to PERMENKES No. 45 of 2014 on the Implementation of Health Surveillance, the implementation of the health surveillance network is carried out by health surveillance organizers at both central main units and central UPT (Ministry of Health UPT), research and development centers, data and information centers, Provincial Health Offices and Provincial Health Office UPT, as well as District/City Health Offices and District/City Health Office UPT, both in normal conditions and during outbreaks or epidemics. If patients from Gunungkidul Regency choose to seek treatment in other regencies or cities, some hospitals lack the capability to send the KDRS. Due to limited access, the healthcare unit treating the dengue fever patient forwards the letter to the patient after completing their treatment, which results in the KDRS being sent late.

Many health surveillance systems have proven difficult to enforce and maintain, especially due to the challenges of implementing and enforcing collaborative efforts for cross-stakeholder surveillance activities with different values, cultures, and interests [4].

This weakness significantly impacted the rise in cases from 2020 onwards, as they could remain undetected or be deemed inaccurate. Additionally, the slow submission of case reports from hospital and clinic KDRS leads to delays in rapid responses such as epidemiological investigations, resulting in cases not being effectively controlled in the community. Prevention and control of dengue fever require an effective cross-sectoral approach between the Ministry of Health and other relevant ministries, as well as government agencies, the private sector, including private healthcare providers, non-governmental organizations, and local communities [1].

The timeliness indicator of KDRS delivery is very important in determining data validity [5]. Quick and accurate reporting will greatly influence the analysis of dengue fever for the early warning system of potential epidemic diseases. Reports received untimely or late will cause the processed data to be irrelevant to the current reality, making it unusable for decision-making by policymakers [6].

Based on the research results on the determination of the DBD case definition, almost all work areas in the Gunungkidul District Health Office use clinical criteria as a reference in defining DBD cases. The use of Rapid IgG, IgM, and NS-1 antibodies in case confirmation is very minimal in Gunungkidul Regency. The low demand for stock, both for community health centers and hospitals, has caused the stock at the Gunungkidul District Health Office to be limited year after year. In defining DBD cases, there is no consensus among the DBD data editors from the health department, community health centers, and hospitals. Some services in Gunungkidul Regency consider that the use of NS-1 is only applicable in certain cases, and also believe that establishing a DBD diagnosis based on specific criteria is entirely the hospital's prerogative.

The definition of DBD cases did not change during the COVID-19 pandemic; the case definition uses clinical diagnostic criteria. The clinical diagnostic criteria for defining Dengue Fever (DF), Dengue Hemorrhagic Fever (DHF), Dengue Hemorrhagic Fever with Shock (DSS), and Expanded Dengue Syndrome (unusual manifestation) [7]. Cost becomes a potentially significant factor; doctors may be forced to rely on their clinical criteria rather than laboratory criteria, as accurate diagnosis tends to be expensive and time-consuming [8].

The map of DBD case distribution with healthcare facilities in Gunungkidul Regency shows that the hospital serving as a referral for DBD patients is still close to Wonosari District. As a result, other districts, especially those far from the borders with other regencies/cities, choose to refer suspected DBD patients to hospitals in other regencies/cities. The involvement of community health centers in managing DBD cases is considered potentially helpful in capturing more DBD cases if the laboratory, rapid DBD tests, and inpatient facilities are adequate in Gunungkidul Regency. However, not all community health centers in Gunungkidul Regency with that capability manage DBD cases. Therefore, cases cannot be recorded properly. This weakness significantly compromises the validity of DBD data in Gunungkidul Regency, particularly during the 2020 outbreak.

This weakness does not only occur in Gunungkidul Regency, according to the justification presented in the STRANAS dengue control 2021-2025 preparation materials, the dengue surveillance system in Indonesia is currently not optimal in early case detection. Reporting of dengue cases in hospitals is accompanied by a long reporting time until the information is received by the health department or community health center. This causes the follow-up reporting to be slow. In addition, the observation data on vector, environmental, and agent risk factors have not yet been integrated with dengue case data, resulting in a fragmented surveillance system that is unable to prevent extraordinary events. The management of outbreaks still relies on the central role [1].

Another weakness that could affect the increase in DBD cases in 2020 in Gunungkidul Regency is the outbreak detection instruments, such as the completeness of reports, making monthly routine reports, data processed in the form of graphs, maps depicting spatial and temporal distribution, which were not created by the community health centers and the Gunungkidul Regency Health Office. This weakness is influenced by the low knowledge of DBD data managers, and the improvement of data managers' knowledge can be achieved by providing training on the management of DBD epidemiological data. In accordance with PERMENKES RI no PV.02.01/Menkes/721/2018 regarding DBD preparedness, one of the measures is to enhance the capacity of DBD prevention and control resources, including the improvement of human resource capacity, costs, as well as materials and equipment. In addition to their limited knowledge, data managers also have multiple tasks that burden and hinder their work as surveillance data editors.

Training is highly needed so that officers become skilled in conducting surveillance activities [9]. All forms of training aim to serve as a refreshing and enhancement of knowledge, particularly in cognitive aspects. According to (Syairaji, 2019), there is a significant relationship between training and the improvement of workers' cognitive knowledge, whereas dual work, whether directly or indirectly, can disrupt the implementation of surveillance tasks, especially in terms of work time allocation [10].

The weaknesses in the surveillance system in Gunungkidul Regency must be addressed immediately, as continuous monitoring of these weaknesses will impact data validation. Inaccurate data validation will impact the early warning system for outbreaks, making it impossible to prevent an increase in cases during certain periods.

CONCLUSION

In the implementation of the surveillance system in Gunungkidul Regency, there are weaknesses regarding human resources, knowledge, and overlapping tasks that significantly affect the system's performance in the field. The surveillance system in Gunungkidul Regency has several weaknesses, including non-straightforward case recording and reporting, poor-quality data collection and management, and delays in receiving and dispatching case reports.

In an effort to improve dengue control in Gunungkidul Regency, the quality of reporting must be supported by strengthening networks integrated with the Health Office and cross-border primary health care facilities-hospitals. Recording is also important in this system, so reporting formats such as creating graphs, tables, and managing basic epidemiological data require special skills. The knowledge and skills of data managers and DBD programmers must be continuously updated. To capture as many cases as possible, it is recommended that health centers strengthen the early detection of DBD cases at the health center by ensuring an adequate supply of NS-1. Sending monthly routine DBD case reports according to the time agreed upon with the Health Office. Completing the reporting by creating graphs, case maps by sub-district, and other epidemiological data that can illustrate the DBD cases in the Puskesmas area epidemiologically.

Hospitals and clinics in Gunungkidul Regency play a very important role in controlling DBD cases. Researchers recommend stopping the practice of submitting suspected patient reports or KDRS reports to DBD patients so that cases can be promptly and effectively responded to through epidemiological investigations. In making the suspected report, it is expected to complete the reporting format according to the items in the 2017 DBD case management guidelines by the Director General of Disease Control and Prevention (Dirjen P2P) of the Ministry of Health in the KDRS attachment section.

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