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Research

Hospital based dengue hemorrhagic fever surveillance management in Buleleng District, Bali during Covid-19 pandemic

Manajemen surveilans demam berdarah dengue berbasis rumah sakit di Kabupaten Buleleng, Bali pada masa pandemi Covid-19

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Abstrak. Buleleng merupakan kabupaten dengan kasus Demam Berdarah Dengue (DBD) tertinggi di Indonesia tahun 2020. Untuk menurunkan angka kesakitan dan mencegah terjadinya kejadian luar biasa perlu dilakukan evaluasi sistem surveilans. Tujuan penelitian ini untuk mengevaluasi pelaksanaan surveilans DBD di Kabupaten Buleleng. Penelitian ini merupakan studi kualitatif yang dilakukan pada masa pandemi Covid-19. Lokasi penelitian di Kabupaten Buleleng kepada 27 informan yang terdiri dari satu petugas surveilans dinas kesehatan kabupaten serta 26 petugas surveilans rumah sakit dan puskesmas. Pengumpulan data primer menggunakan wawancara mendalam dan data sekunder menggunakan studi dokumen. Penelitian ini menggunakan teknik triangulasi, analisis data karakteristik responden dilakukan dengan analisis deksriptif dibantu oleh IBM SPSS Statistics versi 22 disajikan menggunakan tabel dan atribut surveilans dianalisis secara reduksi disajikan dalam bentuk narasi. Hasil penelitian menunjukkan 11,1% petugas masih berpendidikan Sekolah Menengah Atas, 25,9% petugas belum pernah pelatihan, 92,6% petugas melakukan rangkap tugas, 3,7% petugas memegang program dibawah satu tahun, 29,6% petugas sudah berusia diatas 40 tahun, belum tersedia anggaran pemberdayaan program juru pemantau jentik, sensitivitas dan nilai prediksi positif cukup rendah, kualitas data, akseptabilitas, kerepresentatifan dan stabilitas belum optimal. Pelaksanaan surveilans belum optimal karena keterbatasan tenaga, biaya dan belum terpenuhinya standar beberapa atribut surveilans. Pelaporan dan diagnosis kasus perlu diperbaiki sebagai langkah awal upaya pencegahan dan pengendalian DBD.
Kata kunci: demam berdarah dengue, surveilans, rumah sakit.

Abstract. *Buleleng is district with the highest cases of Dengue Hemorrhagic Fever (DHF) in Indonesia on 2020. To reduce morbidity and prevent the event of the outbreak, it is necessary to evaluate the surveillance system. The purpose of this study was to evaluate the implementation of DHF surveillance in the Buleleng District. This research is a qualitative study conducted during the Covid-19 pandemic. The research location was in the Buleleng District to 27 informants consisting of one surveillance officer from the district health office and 26 surveillance officers from the hospitals and primary health care. Primary data collected using in-depth interviews and secondary data using document studies. This research uses the triangulation technique, analyzed of respondent characteristics was carried out using descriptive analysis assisted by IBM SPSS Statistics version 22 presented using tables and surveillance attribute analysis is carried out by data reduction presented in narrative form. The results showed that 11.1% of officers were still educated to high school, 25.9% of officers had never been trained, 92.6% of officers carried out multiple tasks, 3.7% of officers held programs under one year, 29.6% of officers were aged above 40 years, there is no budget for the empowerment of larva monitoring program, sensitivity and positive predictive value is quite low, data quality, acceptability, representativeness and stability are not optimal. The implementation of the surveillance has not been optimal due to limited manpower, cost and unfulfilled standards for several surveillance attributes. Reporting and diagnosis of cases need to be improved as the first step in efforts to prevent and control DHF.*
Keywords: dengue hemorrhagic fever, surveillance, hospital

Introduction

Dengue Hemorrhagic Fever (DHF) is one of the emerging infectious diseases by Arthropod borne virus which is transmitted to humans through the bite of *Aedes aegypti* mosquito vector. DHF is characterized by a sudden fever that lasts for 2 until 7 days accompanied by bleeding manifestations, decreased platelets (thrombocytopenia), hemoconcentration marked by plasma leakage (increased hematocrit, ascites, pleural effusion, hypoalbuminemia) and accompanied by non-specific symptoms such as pain. headache, muscle and bone pain, pain behind the eyeball and rash on the skin.[1] DHF is still a global public health problem, especially in tropical and subtropical regions, one of which is in Indonesia.[2]

Management of DHF in Indonesia is still experiencing complex obstacles and challenges. Efforts to increase empowerment and community participation are still a priority strategy in efforts to prevent and control DHF. [2][3][4] Indonesia is a DHF endemic country.[5] Incidence of DHF in Indonesia has shown an increasing trend from year to year and its distribution area is increasingly widespread in all regencies and cities. [6] This is due to spread of dengue vectors in both residential and public places, the increase in population density, mobility and urbanization since the last three decades.[2]

Buleleng District is an area of northern Bali with highest DHF cases in Indonesia in 2020.[7] Buleleng is an endemic area of DHF and cases are always found every year. During five-year (2015-2020) the highest dengue cases were found on 2016 with a total of 3,787 cases and 15 deaths. DHF cases in 2020 were found to be 3,402 cases (Incidence Rate/IR=512 per 100,000 population) and 7 cases of death (Case Fatality Rate/CFR=0.21%). DHF cases on 2020 far exceed national indicator (IR<50 per 100,000 population) and DHF mortality rate is still below the national indicator (CFR<1%).[8]

Efforts to prevent and control DHF in Buleleng District have been carried out optimally. One of the prevention and control efforts carried out is to develop effective DHF surveillance to observe the disease continuously and systematically analyze conditions that influence to reduce morbidity, limit mortality and prevent the event of potential outbreaks.[9][10][11] The surveillance developed is routine surveillance based on the policy of the *Peraturan Menteri Kesehatan Republik Indonesia Nomor 45 Tahun 2014 Tentang Penyelenggaraan Surveilans Kesehatan*.[12] Currently DHF morbidity rate in the Buleleng District is still high and DHF outbreaks still occur.

To continuously and systematically observe DHF disease to reduce morbidity and prevent the event of potential outbreaks, it is necessary to evaluate ongoing DHF surveillance.[13] The results of the evaluation can later be used as input in planning interventions and improving existing DHF surveillance, so that efforts to prevent and control DHF will be more effective and efficient.[14] This study aims to evaluate implementation of DHF surveillance in the Buleleng District.

Method

This research is descriptive study using a qualitative study approach. This research was conducted during Covid-19 pandemic on February to March 2021. Data collected included primary and secondary data obtained from the Buleleng District Health Office, hospital and primary health care in Buleleng.

The informants in this study were 27 people consisting of one surveillance officer from the district health office and 26 surveillance officers from the hospital and primary health care. This study used in-depth interviews with selected informants and conducted a study of existing documents at the district health office, hospitals and primary health care in Buleleng District. The Secondary data used is the routine data of DHF cases which are sourced from the DHF register database of the health office.

In-depth interviews were conducted directly with one informant and virtual for approximately 40-60 minutes on 26 informants using interview guidelines. Before the interview, each informant has explained the research and asked to fill out an informed consent form. The interview guide in this study contains open-ended questions that aim to invite informants for think and reflect so that they are able to explore the problems that occur and closed questions that are only answered with the choice of "yes" or "no" based on the attribute aspect approach of the surveillance system consisting attributes of simplicity, flexibility, data quality, sensitivity, positive predictive value, acceptability, representativeness, timeliness and stability. Document studies are carried out using a checklist instrument and then reviewing case data and program supporting components.

The technique used to check validity of data research is the triangulation technique by comparing the supposed target with the reality

found in implementation of program and describing the obstacles and problems encountered in its implementation.

Data analysis of respondent characteristics was carried out using descriptive analysis assisted by *IBM SPSS Statistics version 22* and presented using tables. Surveillance attribute analysis is carried out by data reduction, namely summarizing, selecting several main things, focusing on important things and presented qualitatively a brief description (narrative). Conclusions are drawn through observation of the data that have been discussed.

Result

Surveillance staff

Table 1. Distribution of Surveillance Officers Based on Educational Background

Education	Frequency	Proportion (%)
Senior High School	3	11,1
Diploma	8	29,6
Bachelor	15	55,6
Master	1	3,7
Total	27	100

Table 1 shows that the surveillance officers found there were still senior high school educational backgrounds as many as 3 people out of 27 surveillance officers (11.1%).

Table 2. Distribution of DHF Surveillance Officers Based on Training History

Training History	Frequency	Proportion (%)
Yes	20	74,1
No	7	25,9
Total	27	100

Table 2 shows that there are still 7 surveillance officers who have never been trained out of 27 surveillance officers (25.9%). DHF surveillance training in the Buleleng District that has been held includes training on a web-based *Sistem Kewaspadaan Dini dan Respon* (SKDR).

Table 3. Distribution of DHF Surveillance Officers Based on Workload

Number of programs	Frequency	Proportion (%)
1 Program	2	7,4
2 Program	10	37
≥ 3 Program	15	55,6
Total	27	100

Table 3 shows that majority of surveillance officers are charged with holding two until three surveillance programs or more as many as 25 out of 27 surveillance officers (92.6%) with dual duties that include surveillance programs for measles, malaria, chikungunya and others. several officers on duty in the service.

Table 4. Distribution of DHF Surveillance Officers Based on Length of Position

Length of Services	Frequency	Proportion (%)
< 1 year	1	3,7
1-5 year	20	74,1
6-10 year	6	22,2
Total	27	100

Table 4 shows that there are one person out of 27 people who have not held a surveillance program for one year (3.7%).

Table 5. Distribution of DHF Surveillance Officers Based on Age Group

Age group (year)	Frequency	Proportion (%)
26-30	9	33,3
31-35	5	18,5
36-40	5	18,5
41-45	5	18,5
46-50	1	3,7
>50	2	7,4
Total	27	100

Table 5 shows that there are 8 surveillance officers over 40 years old out of 27 surveillance officers (29.6%). One of obstacles encountered by officers who are over 40 years old is the problem of using computer programs.

Based on the results of the interviews with DHF surveillance officers at district health office, it was found that change the position of surveillance officers from old officers to new officers experienced various obstacles. The unavailability of Standard Operating Procedures (SOP) for main tasks of surveillance officers makes new officers experience difficulties in adapting to delegation of responsibilities from old officers, thus affecting surveillance activities.

Financing implementation of surveillance
Based on in-depth interviews and document studies, it was found that funding sources for DHF surveillance came from the Special Operational Assistance and Regional Incentive Funds. Funding sources are allocated for each DHF surveillance activity. Sources of funding from the special operational assistance are used for DHF prevention and control programs which include procurement of tools and materials for

fogging programs, larvacidation, eradication of mosquito nests, procurement of medical equipment to conduct epidemiological investigations, office stationery and surveillance forms. Sources of funding from regional incentive funds are used to accommodate officers in carrying out routine surveillance (transportation), training and technical field guidance, monitoring and evaluation as well as coordination meetings between sectors and programs. The results of evaluation also found that there was no funding available for the empowerment of larva monitoring cadres so that entomological surveillance had not been running optimally.

Simplicity

Based on the results of in-depth interviews, it was found that surveillance reporting uses national standard forms including the W1 form which is used to report daily cases of the event outbreak and the W2 form which is used to report weekly cases of the event outbreak. The report will then be converted into a PDF file and sent via the WhatsApp group for an analysis trend of the event outbreak, the results of which are used to design the event outbreak prevention programs. The flow of reporting DHF cases is carried out in stages starting from the primary health care level, district health office, provincial health office, then reported to the ministry of health. The flow of investigations into the event outbreak during the Covid-19 pandemic is carried out with strict health protocols. The investigation was carried out directly by primary health care surveillance officer to trace the risk factors causing the event outbreak and screening the population if suspected DHF with rumpleed test with a positive result, they will be referred directly to primary health care for complete blood tests and further treatment. Based on the results of document study, it was found that reports were also sent directly online to the ministry of health on *Sistem Kewaspadaan Dini dan Respon* (SKDR) website and could be accessed by district and provincial health offices.

Flexibility

Based on the results of in-depth interviews, it was found this surveillance can be carried out simultaneously with surveillance of chikungunya and malaria, which are zoonotic and emerging diseases. The results of document study found that specified reporting format had been updated as needed within a certain period which had been socialized before form was used without any significant additional labor, cost and time. The form used is also equipped with a filling guide. Based on the results of the interview, it was also

found that the case definition used was taken from the guidelines the Ministry of Health Republic of Indonesia which refers to the World Health Organization (WHO). Case definition develops following changes in time according to development the results scientific research studies.

Data quality

Based on the results of the document study, it was found that completeness of data reporting has not been able to pass the national data completeness standard of 90%. There is still some data from names and addresses in DHF routine register of the district health office that needs to be validated and reconfirmed because there was an error in data input by surveillance officer in the field due to not inputting it according to standard formula given by surveillance officer from the district health office.

Sensitivity

Based on the results of the document study, this surveillance system is not sufficient to describe the actual situation because there are still several false positive cases. This happened because DHF case reporting system in the hospital was not optimal. This surveillance system is also not able to accurately predict the occurrence of the event outbreaks.

Positive Predictive Value

Based on the results of document study, it was found that several hospital DHF case reports when confirmed with the DHF diagnosis criteria the Ministry of Health Republic of Indonesia was Dengue Fever. (DF). Reporting cases of Dengue Shock Syndrome (DSS) when confirmed with diagnostic criteria the Ministry of Health Republic of Indonesia is correct. This is because the clinical symptoms of DSS tend to be more specific and are strengthened by the results of a more comprehensive diagnostic examination.

Acceptability

Based on the results of in-depth interviews, it was found that the involvement of related parties in the discovery of DHF cases was quite low. The involvement of private doctors or midwives and private clinics is not optimal for cooperation in reporting cases. Almost all cases of DHF were found in the hospital and even experienced complications of shock due to delay in receiving treatment. Based on the document study, it was found that the use of DHF data was still used only by the district health office and academics or students from universities in need, no other party had used DHF data except for program intervention planning and research materials.

Representativeness

Based on the results of in-depth interviews, it was found there were still many patients who were treated for DHF at the hospital when registering for treatment registration using birth address on the *Kartu Tanda Penduduk* (KTP) instead of using domicile where the patient lived and area of the *Kartu Indonesia Sehat* (KIS) health facility owned so that patient will be recorded as a patient at the place of birth, not as a patient at the primary health care in area of origin the patient.

Timeliness

Based on the results of in-depth interviews, it was found the response of surveillance officers to carry out epidemiological investigations for outbreak event situations was followed up within 72 hours since the case was confirmed. It was still found that some primary health care surveillance officers reported that routine data were almost past the given time limit due to their high workload. Complete reports are received no later than the 10th (tenth) of the following month considering that data must be collected is manual reporting and web-based reporting. In 2021 as of March, 100% of primary health care have submitted reports on time so that the timeliness of this surveillance is categorized as good in terms of national surveillance indicators with a minimum standard of 80% set by the Ministry of Health Republic of Indonesia. All parties involved, especially the health office, must provide motivation to increase the commitment of officers in carrying out data reporting activities every week.

Stability

Based on the results of in-depth interviews, it was found the ability of officers to manage databases experienced problems in several primary health care because they had not been able to operate the recording and reporting system properly. During data processing, there has never been computerized system damage or data loss. Based on the results of document study, it was found that surveillance data was created in a special folder to facilitate data storage process. Data is also entered into a flash disk to prevent data loss so that data is reliable and available when needed. The computer equipment used still in good condition with sufficient quantities. The means of transportation used to support surveillance activities are private vehicles (motorcycles) or primary health care ambulances. The communication tool in surveillance process uses a personal communication tool (mobile phone) by the surveillance officer. These components are available sufficiently so that they are able to support surveillance activities.

Discussion

Referring the Centers for Disease Control and Prevention (CDC) standard regarding the implementation of an epidemiological surveillance system, one of the indicators for the implementation of a health epidemiological surveillance system is evaluated by using a surveillance system attribute approach.[9][10][15] In general, the purpose of DHF epidemiological surveillance is to provide data and information on the epidemiology of DHF disease as a basis for health management for decision making in planning, implementing, monitoring, evaluating health programs and increasing awareness and responding to outbreaks events quickly and right. In particular, the purpose of surveillance of DHF cases is to monitor the trend of DHF and to be aware the outbreaks occurrences of DHF and the efforts to overcome them. [2][16]

DHF surveillance in the Buleleng District is carried out by Buleleng District Health Office, 20 primary health cares and 7 network hospitals in the Buleleng District area. DHF surveillance is carried out intensively between hospitals, primary health care and health offices follow up efforts to control DHF cases and prevent the event outbreaks. Implementation of DHF surveillance in the Buleleng District was carried out using a passive surveillance approach with routine surveillance methods. Passive surveillance is carried out through monitoring the progress of DHF cases reported by network hospitals (diagnosed DHF patients) to the health office. [8]

Surveillance officers have a double workload which can be seen from the majority being charged with carrying out two or three surveillance programs. The lack ability of some surveillance officers to use computers because they are over 40 years old and it is still found that officers have not attended surveillance training, especially *Sistem Kewaspadaan Dini dan Resepon* and there are still surveillance officers with senior high school education. The replacement of position the surveillance officer from the old officer to the new officer also encountered problems because there were no SOP for the main duties of the surveillance officer.

Funding for larva monitoring program is not yet available so that the process of monitoring larva on a regular basis has not been able to be carried out. This is not in line with the governments program, which plans a one-house, one-interpreter larva monitoring program so as to prevent dengue fever transmission. [2] Advocacy should be carried out reempower the larva monitoring program that has been stopped previously so that it is able to carry out its roles, duties and functions in assisting the implementation of entomological surveillance as a basis for consideration of policy making and the preparation of plans for DHF control programs.

The simplicity of a surveillance system includes simplicity in structure and ease of operation. [10] Surveillance system should be designed as simple as possible but still achieve the desired objectives. [17] The recording and reporting of surveillance is simple enough so that it looks transparent which can be accessed, used and evaluated by various interested sectors. [18][19] Primary health care is also quite capable of doing web-based reporting because it has been supported by WiFi network access that has been provided by the local government so that it does not interfere with reporting process activities.

A flexible surveillance system can adapt to changing information requirements or implementation situations without significant increases in cost, effort and time. [20] Flexible surveillance can accept, among other things, newly identified diseases and health problems, changes in case definitions and variations of reporting sources.[15] This surveillance system is generally flexible. This surveillance can be carried out simultaneously with surveillance for zoonotic diseases and similar arboviruses. Reporting formats and case definitions are also continuously updated according to scientific developments. Flexibility assessment is very difficult to do if the surveillance component is not able to keep up with the development of scientific information.[21]

Quality of the data depends on its completeness and validity. Data that is usually collected includes demographic characteristics of the affected population, completeness of the health program and presence or absence of potential risk factors. Data quality is affected by the performance of screening and diagnostic checks, clarity of hardcopy or electronic surveillance forms, quality of training and supervision of people completing surveillance forms and data management.[16] Data quality of this surveillance needs to be improved so that it reaches predetermined standard. The Data quality is evaluated from the completeness

of filling in the recording and reporting forms as well as data collected in DHF control program. In effort to maintain quality of data surveillance, supervision and technical guidance the primary health care are carried out periodically by surveillance officers from district health office. [22]

The sensitivity of a surveillance system can be seen from the level of data collection which is the extent to which the cases proportion of disease or health problem is detected by the surveillance system to prevent the event outbreak.[10] Sensitivity is influenced by individual factors with certain diseases or health problems who seek health care, diseases or conditions to be diagnosed and the sensitivity of diagnostic tests and cases reported in the system for certain diagnoses.[16] This surveillance system is not optimal in predicting the occurrence of outbreak events so that outbreak events are still found in several areas. This condition has contributed to high number of cases reported for incidence of DHF. This causes the highest number of DHF in Buleleng District in Indonesia. Surveillance systems that have good sensitivity can predict DHF outbreaks in advance so they can handle them properly.[21]

The positive predictive value is the proportion of the population identified as cases by a surveillance system and in fact cases. [16] Surveillance with a low positive predictive value will result in many cases that are other diseases and not disease targeted for surveillance.[9] As a result there is a waste of funding especially if the fake cases are investigated as epidemics. Predictive power is influenced by prevalence and incidence of disease as well as tool sensitivity. Positive predictive value of this surveillance system is quite low and needs to be improved because there are still some false positive cases. The predictive ability of this surveillance system is measured by the proportion of those identified as cases and actually suffering from the disease. Positive predictive value of this surveillance is calculated from the proportion of hospital DHF case reports that have DHF which is carried out through confirmation based on case definition the Ministry of Health Republic of Indonesia.

Acceptability describes the level participation of individuals, organizations, and health institutions in implementing the surveillance system.[23] The interaction of system with those involved, including patients, diagnostic officers and reporters, greatly influences the success of surveillance system.[16] Acceptability of this surveillance system is quite low. The involvement of private sector has not been able to cooperate

in reporting cases and the utilization of DHF data has not been carried out properly. The government and the policy makers involved must be able to empower various related sectors, both private and nongovernment organizations, in collaborating to support surveillance so that surveillance performance can increase.[24]

A representative surveillance system will accurately describe the occurrence of health event within a certain period, distribution of the event in the community by place, person (characteristics of the population: age, socioeconomic status, geographic location, time of day (history of health events: latent period), modes of transmission and spread, fatal outcomes, available prevention and control measures: on-site diagnostic tests, referral patterns by doctors and data sources: mortality rates to be compared with incidence rates and laboratory reports to be compared with doctor reports.[16] Data quality is a characteristic of a representative surveillance system, not only being able to solve cases but also demographic descriptions and information on risk factors. This surveillance system in general is still not sufficient to describe the actual situation. Many data on patient residence are found that are not by the underlying conditions. This condition will make it difficult for surveillance officers to carry out epidemiological investigations and mapping the area of incident. We recommend the admissions hospital or primary health care as the front line of health services when receiving patients for treatment, data collected on the right place to live according the location of patients illness so that it will make easier for surveillance officers to carry out epidemiological investigations.

Timeliness describes the speed or deceleration between steps in a surveillance system. Timeliness in the surveillance system must be assessed in terms the availability of information on efforts to control or prevent disease, both in terms of immediate countermeasures and long-term plans for prevention efforts.[16] The timeliness of responding the event outbreak and sending reports using the form provided is generally good. The feedback given from provincial health office to district or from district health office to primary health care is only in form of absentee reports and simple data analysis submitted at program coordination meetings.

The stability of the surveillance system must have reliability and availability. [23] Reliability is the ability to collect, manage and provide correct data without failure and availability is the ability

to operate when needed.[10] Stability of this surveillance system is not good due to the limited ability of officers to operate recording and reporting system application properly. Efforts to increase the capacity of officers in form of workshops and training will be able to improve the knowledge and attitudes of surveillance officers. [25] Supporting facilities for surveillance, such as transportation and communication equipment, are available in sufficient numbers to assist the process of surveillance activities.

Conclusion and Suggestion

The implementation of DHF surveillance in Buleleng, Bali during Covid-19 pandemic has not run optimally, as can be seen from high double workload of officers, lack ability of officers to use computers, not all officers have attended training, there is no budget for the empowerment of larvae monitor program and the attribute standards such as data quality, sensitivity, positive predictive value, acceptability, representativeness and stability have not been fulfilled.

The District Health Office and its staff are expected to strengthen several aspects, especially the case reporting system to improve performance the surveillance system as the first step in preventing and controlling DHF.

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Authors Contribution

IGPA as designed the research concept, wrote the original manuscript, data collected and analyzed, AASS and IMSY as data supervised.

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