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ORIGINAL ARTICLE

DENGUE HEMORRHAGIC FEVER INCLINATION TENDENCY IN EAST JAVA PROVINCE VILLAGES COMMUNITY-BASED TOTAL SANITATION

Kecenderungan Kejadian Demam Berdarah Dengue Menurut Cakupan Desa Sanitasi Total Berbasis Masyarakat di Jawa Timur

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ABSTRACT

Background: Dengue Hemorrhagic Fever (DHF) is one of the endemic diseases throughout the tropics and parts of the subtropics. One of the provinces that felt the impact of the dengue outbreak was East Java. Overall, villages implementing STBM coverage in East Java Province is good but incidence of DHF is still found in all districts or cities in the last 3-year period. **Purpose:** This study aims to analyze the relationship and the inclination tendency of Dengue Hemorrhagic Fever in East Java). **Methods**: This type of research is an observational study with a cross-sectional study design. The sample population used 38 regencies/cities in East Java Province. The data used are the health profile data of East Java Province in 2018, 2019, and 2020. The data analysis technique used descriptive by utilizing the Health Mapper application version 4.3.0.0 with product version 4.03. **Results:** The distribution of DHF incidence with the coverage of villages implementing STBM East Java in 2018, 2019, 2020 showed decrease the coverage of villages implementing STBM is also followed by an increase DHF cases every year. The coverage of villages that implement Community Based Total Sanitation (STBM) fluctuates every year. **Conclusion**: Areas with STBM villages cannot guarantee DHF-free zones but can prevent the transmission of Dengue Hemorrhagic Fever (DHF) by changing hygiene and sanitation behavior through community empowerment to create a good sanitation.

ABSTRAK

Latar Belakang: *Demam Berdarah Dengue (DBD) merupakan salah satu penyakit endemik di seluruh wilayah tropis dan sebagian wilayah subtropis.*

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Salah satu provinsi yang merasakan dampak dari wabah DBD yaitu Jawa Timur. Cakupan desa yang melaksakan STBM di Provinsi Jawa Timur secara keseluruhan cukup baik, tetapi kejadian DBD masih ditemukan di seluruh Kabupaten atau Kota dalam periode 3 tahun terakhir yaitu 2018-2020. ***Tujuan:*** *Penelitian ini bertujuan untuk melihat hubungan dan melihat kecenderungan peningkatan kejadian Demam Berdarah Dengue yang terjadi di Jawa Timur berdasarkan cakupan desa yang melaksanakan STBM (Sanitasi Total Berbasis Masyarakat).* ***Metode:*** *Jenis penelitian ini adalah penelitian observasional dengan desain studi cross sectional. Populasi sampel yang digunakan adalah sebanyak 38 Kabupaten/Kota di Provinsi Jawa Timur. Data yang digunakan adalah data profil kesehatan Provinsi Jawa Timur tahun 2018, 2019, dan 2020. Teknik analisis data adalah deskriptif dengan memanfaatkan aplikasi health mapper versi 4.3.0.0 dengan product version 4.03.* ***Hasil:*** *Distribusi kejadian DBD dengan cakupan desa yang melaksanakan STBM di Jawa Timur tahun 2018, 2019, 2020 menunjukkan bahwa penurunan cakupan desa yang melaksanakan STBM juga diikuti dengan peningkatan kasus DBD setiap tahunnya. Cakupan desa yang melaksanakan Sanitasi Total Berbasis Masyarakat (STBM) setiap tahun terjadi secara fluktuatif.* ***Kesimpulan:*** *Cakupan desa yang melaksanakan STBM tinggi tidak menjamin terbebas dari kejadian Demam Berdarah Dengue, Constanti dapat mencegah penularan Demam Berdarah Dengue (DBD) dengan mengubah perilaku higiene dan sanitasi melalui pemberdayaan masyarakat sehingga menciptakan lingkungan sanitasi baik.*

INTRODUCTION

Dengue Hemorrhagic Fever (DHF) is a disease that is found across tropical and subtropical countries. This disease, transmitted by the Aedes aegypti mosquito, is a worrisome apparition since it might spread swiftly in a particular location. Dengue Hemorrhagic Fever found in the world has become an international public health concern (1). According to Indonesia's health profile statistics for 2020, the reported cases of DHF in 2020 were 108,303, and the Case Fatality Rate (CFR) of DHF in Indonesia was 0.70% (2). Dengue fever is spread by the bite of an Aedes Aegypti carrying the dengue virus (3). There are numerous more mosquito species that may transmit dengue disease, including Aedes polynesiensis, Aedes Scutellaris, and Aedes Albopictus; however, these species are less common (4).

East Java was one of the provinces affected by the dengue outbreak. According to the DHF morbidity rate in 2018, the number of DHF patients in most districts or cities significantly rose compared to the previous year. In 2018, the incidence rate or morbidity of DHF in East Java was 23.90 per 100,000 people, increasing from 4 per 100,000 people in 2017 (5). As shown in the number of DHF patients in 2019, most districts or cities saw a gain over the previous year. DHF incidence rate in East Java in 2019 was 47 per 100,000 people, an increase over 2018 (6). According to the number of DHF patients in East Java in 2020, DHF patients in East Java had dropped from 2019. The number of DHF patients in East Java in 2020 was 8,567, with 73 deaths. In East Java, the incidence rate or morbidity rate of DHF in 2020 is 21.50 per 100,000 people, which is in line with the overall objective of 49 per 100,000 people. Whereas the mortality rate or case fatality rate is 0.90%, which complies with the central government's death rate objective of 1% (6).

There are outcomes and outputs in the STBM program. A decrease in the incidence of dengue fever and other environmental-based diseases connected to sanitation and behavior is an outcome indicator in the STBM program. Improving environmental health via basic sanitation is one of the Millennium Development Goals (MDGs), with the realization focused on lowering disease rates and controlling disease transmission related to environmental sanitation, one of which is Dengue Hemorrhagic Fever (7). Health awareness on sanitation can be related to the transmission of dengue fever, especially in tropical and subtropical developing countries (8). Bad environmental factors also have a role in the transmission of

dengue that can cause dengue vector mosquito population to increase (9).

Transmission of dengue cases in East Java tends to be influenced by population density, population mobility, urbanization, economic growth, community behavior, climate change, environmental sanitation conditions, and clean water availability (6). Since 2019, DHF cases have increased compared to the previous year, and vigilance against spikes in cases in each period is always increased, so it is hoped that there will be no outbreaks (10). Community-Based Total Sanitation (STBM) is a way of encouraging hygiene and sanitation practice with community empowerment using the triggering method wherein the community will feel ashamed of their environment if their home environment looks dirty (11).

Strategic efforts made to control DHF include increasing early diagnosis and adequate management of DHF cases in health facilities and increasing health promotion of a Clean and Healthy Lifestyle (PHBS) (5). Increasing 3M Plus Mosquito Nest Eradication (PSN) operations at least once a week on a regular, consistent, and quality basis by implementing *Satu Rumah Satu Jumantik* movement, monitoring cases in the community and health care facilities, improving early diagnosis and sufficient management of DHF cases in health facilities, cross-sectoral coordination, and increased health promotion are all strategic initiatives that may be carried out for the prevention and control of DHF (6,12).

STBM comprises five pillars along with outputs that serve as a reference for its implementation (7). The Community-Based Total Sanitation Program (STBM) must be implemented optimally and consistently to achieve the expected goals, one of which is the prevention of Dengue Hemorrhagic Fever. Based on the range of villages that use STBM, this research intends to analyze the relationship and the inclination tendency of Dengue Hemorrhagic Fever in East Java.

METHODS

This research used descriptive analytic method with correlation study design. The population in this study is districts or cities in East Java Province. The dependent variable in this study is the incidence of Dengue Hemorrhagic Fever, while the independent variable of the study is villages that adopted community-based total sanitation (STBM) coverage in East Java in 2018, 2019, and 2020.

The data used in this study are secondary data from the East Java Health Profile in 2018, 2019, and 2020. The data analysis technique used in this study is descriptive by utilizing the Health Mapper application version 4.3.0.0 with product version 4.03. The application was developed by the WHO which aimed to meet the information needs of disease in all national and global level programs. The data will be presented in a map of DHF incidence with villages that adopted community-based total sanitation (STBM) using a regional distribution map. Data analysis used the Spearman correlation test with the help of SPSS software to process the data.

RESULTS

Distribution of Dengue Hemorrhagic Fever Case in the Villages Adopting Community-Based Total Sanitation

East Java Province had 9,425 cases of Dengue Hemorrhagic Fever in 2018. In East Java, 87.60 % of villages adopt STBM (Figure 1). Dengue Hemorrhagic Fever cases were reported in all parts of East Java that year, particularly in 38 districts or cities. The most cases happened in Ngawi Regency, with 827 cases and a village percentage of 100% adopting STBM, approximately 66.80 %. Fewer cases were reported in Mojokerto City, where there were 10, with a total of villages using STBM of 100% (Tables 1 and 2). Dengue Hemorrhagic Fever cases in East Java Province went from 9,425 to 18,397 in 2019. The rise in dengue cases was matched by a 92.40% increase in the villages adopting STBM (Figure 1). In that year, cases of DHF happened in all areas in East Java, notably 38 districts or cities and there were areas with villages that adopted STBM <100%. Pacitan Regency (268 cases to 629 cases with 100% coverage to 90.10 %), Ponorogo Regency (443 cases to 1721 cases with 98.70 % coverage to 97.70 %), Jember (389 cases to 988 cases with a coverage of 87.10 % to 41.50 %), and Bangkalan (114 cases to 171 cases with 100% coverage to 59.40 %) experienced a surge in dengue cases (Table 1 and 2).

Dengue Hemorrhagic Fever cases in East Java Province reduced from 18,397 to 8,567 in 2020. The drop in dengue cases that year was followed by a decrease in the villages using STBM, which was reduced to 90.90 % (Figure 1). Cases of

Dengue Hemorrhagic Fever appeared in all parts of East Java that year, particularly in 38 districts or cities, and there were villages with <100% STBM coverage. There was no rise in dengue cases followed by a decrease in villages adopting STBM, although the number of villages adopting STBM remained constant, particularly Pacitan Regency (629 cases to 727 cases with 90.10 % coverage) and Batu City (25 cases to 61 cases with 100% coverage) (Table 1 and 2).

Distribution of Dengue Hemorrhagic Fever Incidence Based in the Villages Adopting Community-Based Total Sanitation in 2018, 2019, and 2020

Figure 1 demonstrates that, as the villages adopting Community-Based Total Sanitation decreases, so does the number of dengue cases in East Java Province. Meanwhile, certain districts or cities have shown a decrease in dengue cases, despite a significant reduction in the number of villages adopting Community-Based Total Sanitation. Every year, the number of villages that use STBM changes.

According to the results of the Spearman correlation test (Table 3), it is evident from 38 samples (N) that, in 2018, there was a significant correlation between DHF cases and the villages that adopted STBM in East Java Province with p value = 0.01 < 0.05 and the correlation coefficient value (r = -0.42) is obtained for the villages that adopt STBM, indicating the criteria for a moderate correlation between DHF cases and the villages adopting STBM in East Java Province in 2018 and the direction of the relationship is negative. The above suggests that the increase in DHF cases in 2018 is then followed by a decrease in the villages adopting STBM in East Java Province.

There was a significant correlation between DHF and the villages that adopt STBM in East Java Province in 2019, with a p-value = 0.01 < 0.02 and a correlation coefficient value (r = -0.34), indicating that the conditions for low correlation between cases of DHF and villages that adopt STBM in East Java Province in 2019 were reached. This implies that the rise in Dengue Hemorrhagic Fever cases in 2019 was followed by a decrease in the villages adopting STBM in East Java Province.

There is a strong correlation between Dengue Hemorrhagic Fever and the villages that adopt STBM in East Java Province in 2020, with p value = 0.04 < 0.05 and the correlation coefficient value (r = -0.36) to the villages that adopt STBM; this implies the condition for a weak relationship between Dengue Hemorrhagic Fever cases and the villages that adopt STBM in East Java Province. It indicates that the increase in DHF cases in East Java Province in 2020 will correspond with a decrease in the villages adopting STBM.

Table 1
Distribution of Dengue Hemorrhagic Fever Cases in East Java Province in 2018, 2019, and 2020

District/City	2018	Desc.	2019	Desc.	2020	Desc.
Kab. Pacitan	268	-	629	Increase	727	Increase
Kab. Ponorogo	443	-	1,721	Increase	152	Decrease
Kab. Trenggalek	276	-	507	Increase	367	Decrease
Kab. Tulungagung	463	-	899	Increase	275	Decrease
Kab. Blitar	355	-	671	Increase	199	Decrease
Kab. Kediri	486	-	1,398	Increase	338	Decrease
Kab. Malang	751	-	1,570	Increase	1,409	Decrease
Kab. Lumajang	33	-	171	Increase	153	Decrease
Kab. Jember	389	-	988	Increase	945	Decrease
Kab. Banyuwangi	34	-	138	Increase	225	Increase
Kab. Bondowoso	249	-	383	Increase	278	Decrease
Kab. Situbondo	120	-	448	Increase	331	Decrease
Kab. Probolinggo	90	-	440	Increase	170	Decrease

(Continued)

Table 1
Continued

District/City	2018	Desc.	2019	Desc.	2020	Desc.
Kab. Pasuruan	191	-	190	Decrease	119	Decrease
Kab. Sidoarjo	272	-	367	Increase	148	Decrease
Kab. Mojokerto	406	-	267	Decrease	97	Decrease
Kab. Jombang	528	-	344	Decrease	142	Decrease
Kab. Nganjuk	220	-	318	Increase	31	Decrease
Kab. Madiun	124	-	305	Increase	86	Decrease
Kab. Magetan	159	-	471	Increase	276	Decrease
Kab. Ngawi	827	-	1411	Increase	271	Decrease
Kab. Bojonegoro	589	-	520	Decrease	78	Decrease
Kab. Tuban	153	-	398	Increase	43	Decrease
Kab. Lamongan	146	-	387	Increase	112	Decrease
Kab. Gresik	204	-	441	Increase	84	Decrease
Kab. Bangkalan	114	-	171	Increase	104	Decrease
Kab. Sampang	214	-	265	Increase	229	Decrease
Kab. Pamekasan	176	-	328	Increase	187	Decrease
Kab. Sumenep	292	-	369	Increase	129	Decrease
Kota Kediri	80	-	223	Increase	160	Decrease
Kota Blitar	146	-	254	Increase	85	Decrease
Kota Malang	73	-	527	Increase	304	Decrease
Kota Probolinggo	31	-	215	Increase	76	Decrease
Kota Pasuruan	46	-	92	Increase	34	Decrease
Kota Mojokerto	10	-	24	Increase	11	Decrease
Kota Madiun	78	-	245	Increase	58	Decrease
Kota Surabaya	321	-	277	Decrease	73	Decrease
Kota Batu	78	-	25	Decrease	61	Increase
Total	9,435	-	18,397	Increase	8,567	Decrease

Source: East Java Province Health Profile Data 2018, 2019 and 2020

Table 2
Distribution of Incidence Based in the Community-Based Total Sanitation Villages in 2018, 2019, and 2020

District/City	2018	Description	2019	Description	2020	Description
Kab. Pacitan	100.0	-	90.1	Decrease	90.1	Constant
Kab. Ponorogo	98.7	-	97.7	Decrease	100.0	Increase
Kab. Trenggalek	100.0	-	100.0	Constant	100.0	Constant
Kab. Tulungagung	90.4	-	100.0	Increase	81.2	Decrease
Kab. Blitar	77.0	-	91.1	Increase	86.7	Decrease
Kab. Kediri	89.0	-	98.8	Increase	99.7	Increase
Kab. Malang	80.0	-	90.8	Increase	93.3	Increase

(Continued)

Table2
Continued

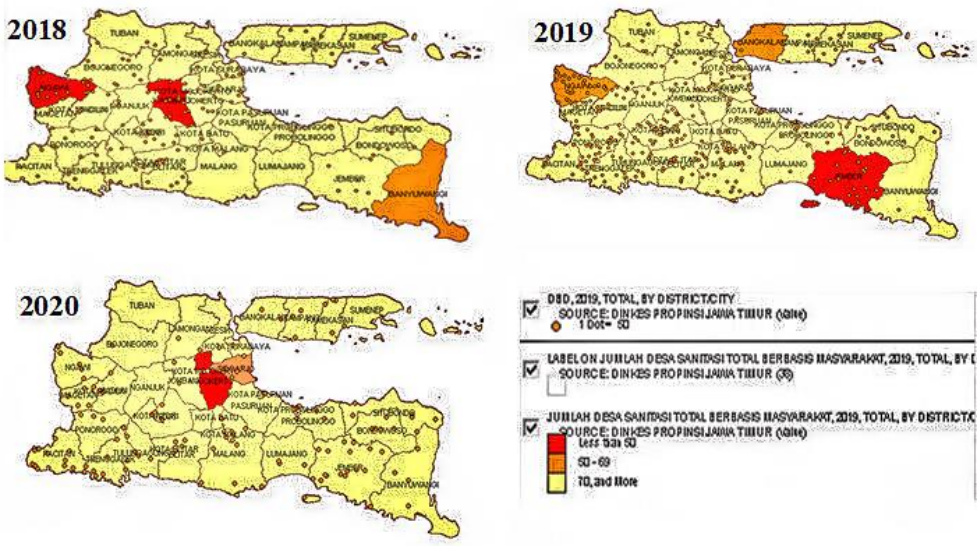
District/City	2018	Description	2019	Description	2020	Description
Kab. Lumajang	100.0	-	100.0	Constant	100.0	Constant
Kab. Jember	87.1	-	41.5	Decrease	71.8	Increase
Kab. Banyuwangi	64.5	-	100.0	Increase	100.0	Constant
Kab. Bondowoso	95.9	-	100.0	Increase	100.0	Constant
Kab. Situbondo	100.0	-	100.0	Constant	100.0	Constant
Kab. Probolinggo	79.7	-	80.0	Increase	80.6	Increase
Kab. Pasuruan	83.8	-	93.2	Increase	98.6	Increase
Kab. Sidoarjo	69.7	-	72.0	Increase	56.7	Decrease
Kab. Mojokerto	100.0	-	100.0	Constant	5.9	Decrease
Kab. Jombang	18.0	-	100.0	Increase	100.0	Constant
Kab. Nganjuk	100.0	-	100.0	Constant	100.0	Constant
Kab. Madiun	91.7	-	97.6	Increase	100.0	Increase
Kab. Magetan	100.0	-	100.0	Constant	100.0	Constant
Kab. Ngawi	41.5	-	66.8	Increase	100.0	Increase
Kab. Bojonegoro	100.0	-	94.9	Decrease	100.0	Increase
Kab. Tuban	92.1	-	100.0	Increase	100.0	Constant
Kab. Lamongan	100.0	-	100.0	Constant	100.0	Constant
Kab. Gresik	93.3	-	100.0	Increase	100.0	Constant
Kab. Bangkalan	100.0	-	59.4	Decrease	80.8	Increase
Kab. Sampang	93.8	-	97.3	Increase	98.9	Increase
Kab. Pamekasan	100.0	-	119.0	Increase	100.0	Decrease
Kab. Sumenep	87.1	-	87.1	Constant	95.8	Increase
Kota Kediri	100.0	-	100.0	Constant	100.0	Constant
Kota Blitar	100.0	-	100.0	Constant	100.0	Constant
Kota Malang	96.5	-	100.0	Increase	100.0	Constant
Kota Probolinggo	100.0	-	100.0	Constant	100.0	Constant
Kota Pasuruan	100.0	-	100.0	Constant	100.0	Constant
Kota Mojokerto	100.0	-	100.0	Constant	100.0	Constant
Kota Madiun	100.0	-	100.0	Constant	100.0	Constant
Kota Surabaya	100.0	-	100.0	Constant	100.0	Constant
Kota Batu	100.0	-	100.0	Constant	100.0	Constant
Total	87.6	-	92.4	Increase	90.9	Decrease

Source: East Java Province Health Profile Data 2018, 2019 and 2020

Table 3
Correlation between Dengue Hemorrhagic Fever (DHF) and the Villages that adopt STBM in East Java Province

	Villages Adopted STBM in 2018			Villages Adopted STBM in 2019			Villages Adopted STBM in 2020		
	N	P-Value	r	N	P-value	r	N	P-Value	r
Dengue Hemorrhagic Fever (DHF)	38	0.01	-0.42	38	0.03	-0.36	38	0.04	-0.34

Source: Secondary Data Processing Results



Source: Secondary Data Processing Result

Figure 1. Distribution of Dengue Hemorrhagic Fever Cases in Villages in East Java Province on 2018, 2019, and 2020

DISCUSSION

Distribution of Dengue Hemorrhagic Fever Cases in Villages Adopting Community-Based Total Sanitation

The distribution of DHF cases in villages that adopted community-based total sanitation (STBM) in East Java throughout 2018, 2019, and 2020 revealed that an increase in DHF cases will correspond with a decrease in the villages that adopted STBM. East Java is subdivided into 38 regencies or cities, and dengue cases are reported year after year. Multiple efforts to prevent DHF unusual events must be done systematically, both at the group and individual levels. At the group level, there are mosquito eradication programs in standby villages, STBM levels, healthy homes, and clean and healthy living behavior (PHBS) (13). In implementation, STBM requires skilled human resources spread throughout Indonesia and one of its most important components is the presence of qualified facilitators and spread throughout Indonesia (14).

STBM (Community-Based Total Sanitation) is a strategy for improving hygiene and sanitation practice with community empowerment that uses the triggering technique. Other studies also indicated that increased awareness can reduce the incidence (15). Five pillars are also output and applied as a standard for implementation: 1. stop open defecation, 2. wash hands with soap (CTPS), 3. drinking water and clean food management, 4. domestic waste management (PS-RT), and 5. domestic liquid waste management (PLC-RT). Long-term STBM will be able to minimize the morbidity and mortality of a disease resulting from

inadequate sanitation, as well as stimulate the realization of a healthy and independent community groups (16).

The Villages Adopting Community-Based Total Sanitation in 2018, 2019, and 2020 with Dengue Hemorrhagic Fever Cases

Areas with STBM villages cannot guarantee DHF-free zones since, in addition to sanitation, other factors such as the environment (availability of container lids, wire mesh availability, and space among houses) including community characteristics (education, work, and behavior) might influence the frequency of dengue fever (17).

Dengue Hemorrhagic Fever cases increased in East Java Province throughout 2018, 2019, and 2020, followed by an increase in the number of villages adopting STBM. According to the findings of the research, there is a significant relationship between DHF cases and the villages adopting STBM in East Java Province throughout 2018, 2019, and 2020. The findings also show a weak relationship, implying that an increase in Dengue Hemorrhagic Fever cases would coincide with a decrease in the number of villages adopting STBM in East Java Province throughout 2018, 2019, and 2020. Environmental cleanliness has a significant impact on the number of the Aedes aegypti mosquito in the community, hence it must be prioritized in the management of the dengue vector (18). According to previous research there is a significant relationship between attitudes toward environmental sanitation with the incidence of dengue (19). Unhealthy home environmental conditions are the main contributing factor to the proliferation of dengue vector cause; therefore, it is necessary to prevent efforts through community empowerment in community-based total sanitation, especially in areas that are endemic for dengue fever (20). Overcoming poor sanitation by giving people a full understanding can also reduce the pain and death from dengue fever, as well as other infectious diseases in tropical developing countries (21).

To obtain the anticipated outcomes, the Community-Based Total Sanitation Program must be performed ideally and comprehensively from the national level to the village/sub-district level (22). Proper sanitation can help to avoid disease transmission caused by inadequate sanitation, such as Dengue Hemorrhagic Fever DHF (23). In addition, this condition is influenced by the low participation of the community in behaving and inviting other community members in maintaining environmental sanitation (24). The importance of community participation it is the best approach to solving health problems in developing countries (25).

Priority intervention program actions should be conducted in Mojokerto Regency because it has experienced a significant decrease in the number of villages adopting STBM, which was 5.90 % in 2020 compared to 100% in 2018 and 2019. Interventions for program activities that can be implemented to increase the number of villages adopting Community-Based Total Sanitation include: 1. instituting a systematic approach and social unity from relevant people at the district or city level to the village level; 2. involving an active role or community participation in the planning, implementation, budgeting, and evaluation of activities; and 3. conducting continuous observations to ensure STBM implementation. Local government should try to support local communities in the dengue fever prevention program so that the community is able to make efforts to prevent DHF (26).

Research Limitations

There are no further data on ventilation screens, household and liquid waste management. These data can be used as a support for analysis to see the causes of dengue cases in areas with high STBM coverage.

CONCLUSION

The increasing incidence of Dengue Hemorrhagic Fever will coincide with a decrease of villages implementing STBM coverage in East Java. High village implementation of STBM coverage cannot eradicate the incidence of Dengue Hemorrhagic Fever, but can prevent its transmission of by changing hygiene and sanitation behavior through community empowerment to create a good sanitation.

CONFLICT OF INTEREST

There is no conflict of interest in this writing.

AUTHOR CONTRIBUTIONS

GAF: Conceptualization, Methodology, and Software. LYH: Writing-Reviewing, Editing and Supervision.

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