

Visualization of Dengue Hemorrhagic Fever (DHF) Spread Mapping at Mitra Sehat Hospital, Situbondo

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ABSTRACT

Dengue Fever (DF) is a contagious disease caused by the dengue virus transmitted through the bite of *Aedes Aegypti* mosquitoes and sporadically always becomes an Extraordinary Incident (KLB) every year. Geographic Information System (GIS) is one of the tools that can be used to convey information about the spread of the disease and help analyze the condition of an area against the disease to determine the actions that must be taken to handle the disease. To produce this web-based Geographic Information System, data on Dengue Hemorrhagic Fever cases at Mitra Sehat Hospital are needed. This web-based Geographic Information System begins with data collection, followed by program development using the Google Form platform for data entry, Google Spreadsheet for data collection, and Google Data Studio for data visualization to make it easier to understand.

INTRODUCTION

Dengue hemorrhagic fever (DHF) is an infectious disease caused by the dengue virus of the Flavivirus genus transmitted through the bite of *Aedes aegypti* mosquitoes. This disease primarily affects children, characterized by high fever, bleeding, and can lead to death (Hariyana 2007).

Dengue Hemorrhagic Fever is a type of infectious disease that often leads to extraordinary incidents (KLB) in Indonesia. Situbondo Regency is one of the regions that experiences a rapid increase in the spread of Dengue Hemorrhagic Fever every year. Mitra Sehat Hospital is one of the hospitals that handles DHF cases in Situbondo Regency. The increase in the spread of Dengue Hemorrhagic Fever in Situbondo Regency is largely determined by the policies taken by relevant institutions, especially the Health Department (Yuniarti, Sudarsono, and Putra Wijaya 2014).

The Health Department is one of the departments within the Situbondo Regency government responsible for handling the spread of Dengue Hemorrhagic Fever. This department has implemented various measures to reduce the increase in Dengue Hemorrhagic Fever cases in Situbondo Regency. At Mitra Sehat Hospital, data presentation is still manually processed. One of the technologies that can be utilized to report extraordinary incidents (KLB) is using GIS (Geographic Information System) or web-based Geographic Information System. Through the constructed Web-GIS, accessing and reporting information about Dengue Hemorrhagic Fever at Mitra Sehat Hospital can be done more easily. Additionally, it is hoped that the constructed Web-GIS can also assist the government in preventing extraordinary incidents (KLB) of Dengue Hemorrhagic Fever outbreak spread in Situbondo Regency (S, Ottay, and J Kaunang 2015).

LITERATURE REVIEW

Dengue Fever (DF)

Dengue Hemorrhagic Fever is a disease characterized by various clinical symptoms such as sudden high fever without clear cause and lasting continuously for 2-7 days, the occurrence of bleeding manifestations (petechiae, purpura, epistaxis, melena, and hematuria), positive Tourniquet test. Thrombocytopenia (100,000/ μ l or less), and there is an increase in hematocrit by 20% or more, if in advanced status can be accompanied by liver enlargement (Susilowati and Cahyati 2021).

Geographic Information System (SIG)

Geographic Information System is a system designed to capture, store, manipulate, analyze, manage, and display all types of geographic data. GIS also relies on spatial data, which refers to data that relates to the position, objects, and relationships among them in Earth's space (Ayu and Simanjuntak, 2017).

METHODOLOGY

The data to be used in this study include:

1. Dengue Hemorrhagic Fever case distribution data from February to May 2024

The software used consists of:

1. Google Form
2. Google Spreadsheet
3. Google Data Studio

RESEARCH RESULT

An example of manually collected data at Mitra Sehat Hospital is shown as follows:

PERIODE	01/02/2024 - 29/07/2024														
NO	NO RM	TGL DATAR	TGL PULANG	LAMA DIRAWAT	HARI PERAWATAN	NAMA	TGL LAR R	UMUR	LEJ	ALAMAT	ICD X	HASIL AKHIR			
1	114519	1/2/2024	8/2/2024	5	5	6 MUHAMMAD HILMIY	31/2/2020	4 L	4 L	AL TANJUNGGALAYA 1 BLOK DUSUN KOTA TAMBUN BERSUK BESUNG	A91	Sembuh			
2	114685	2/2/2024	8/2/2024	6	6	7 RAISA MALUDIYA SAPUTRI	11/2/2014	9 P	9 P	UTIRUASIRKAND, KETOWAN DUSUKA, ARGASA, SITUBONDO	A91	Sembuh			
3	114681	3/2/2024	8/2/2024	5	5	6 MAULIFA DHEA FIRA	17-11-1998	25 P	25 P	LEKSI DUKUNGAN BUKAH, WILKOL, BELITAK, SITUBONDO	AB1A01.0	Sembuh			
4	114683	4/2/2024	7/2/2024	3	3	4 FIKLA ALMAHROTUL YUNNA	8/2/2017	6 P	6 P	TARUM, TARUM, PRAJEKAN	A91	Sembuh			
5	036870	4/2/2024	10/2/2024	6	6	7 ARGA DESTRANSYAH	12/12/2014	9 L	9 L	KP WRINGIN ANOM	A91	Sembuh			
6	114623	5/2/2024	10/2/2024	5	5	6 MAULIDYATUL MAMA	20-02-2012	11 P	11 P	DUSUN LEMBARA KANDANG KAPONGAN	A91	Sembuh			
7	017314	5/2/2024	9/2/2024	4	4	5 AMELIA VITA RAHMA WATI	9/10/2011	12 P	12 P	DEBAYAN TENGGAN PINGE	A91	Sembuh			
8	114681	6/2/2024	8/2/2024	2	2	3 SAMSOCI	1/7/1978	47 L	47 L	LEKUR KAJUNI TANONG-GLUGUR MANGARAN	A90,A90.9	Sembuh			
9	114715	7/2/2024	12/2/2024	5	5	6 NATASYA ALIJA RAHMA	28-12-2012	11 P	11 P	KP KRAJAN BLEYOK BUNGATAN	A91	Sembuh			
10	114778	8/2/2024	14/2/2024	5	5	6 AHMAD FIKI ABDULLAH	24-04-2004	19 L	19 L	KP PACALAN, TAMBAR UKIR, KENDIT	AB1 D88.6	Sembuh			
11	112707	11/2/2024	15/2/2024	4	4	5 BILQISYA ROPKA PUTRI	8/4/2023	1 P	1 P	KP TANJUNG GLUGUR TENGAH SITUBONDO	A91	Sembuh			
12	114698	11/2/2024	15/2/2024	4	4	5 MUHAMMAD ALVARIZI HARI MULANA	9/7/2023	1 P	1 P	KP KRAJAN TIMUR PANJI LOR	A91	Sembuh			
13	114810	11/2/2024	15/2/2024	4	4	5 MOHAMMAD NURHEDI	14-08-2015	8 L	8 L	DUSUN GONGKENG KANDANG	A91	Sembuh			
14	091354	11/2/2024	17/2/2024	6	6	7 FADUL IMFAHIM	13-04-2014	9 L	9 L	KP TOKELAN KRAJAN	A91	Sembuh			
15	080976	12/2/2024	17/2/2024	5	5	6 ASTYA KULUMARO	18-10-2020	3 L	3 L	KP BUKKOL MANIS	A91	Sembuh			
16	114854	12/2/2024	15/2/2024	3	3	4 FARHAN FAZIN	22-04-2010	13 L	13 L	DUSUN AMPEL BERCAK, CERMEE, BONDOWOSO	D88.6,A91	Sembuh			
17	114893	13/2/2024	16/2/2024	3	3	4 NURUL ARSKA	18-07-2015	8 P	8 P	DUSUN WADUK BOTOLINGGO	A91	Sembuh			
18	111917	16/2/2024	21/2/2024	5	5	6 NANDA CANDRA LESMANA	23-09-2015	8 L	8 L	KP TELASIRUK UTARA 1/18 KETOWAN ARGASA SITUBONDO	A91	Sembuh			
19	114400	16/2/2024	21/2/2024	5	5	6 YUSYKA RAHMATILLAH	28-05-2008	15 P	15 P	PPW/ KP BARAT CURAH JERU PANJI	A91	Membak			
20	088986	18/2/2024	22/2/2024	3	3	4 MOHAMMAD HOSNOL YAGIN	4/5/2015	8 L	8 L	KP TANJUNG GEGER SELATAN	A91	Sembuh			
21	029338	19/2/2024	22/2/2024	3	3	4 SALSABILA RAISA AMEDIA	15-01-2027	17 P	17 P	KAMPUNG TIMUR, CURAH JERU, PANJI	A90	Sembuh			
22	115180	23/2/2024	25/2/2024	3	3	4 HANIFA HILWANI	25-12-2009	17 P	17 P	1 P/1 BUKORJDI JE KOPERASI NO 82 SIKARJADI TIMUR 1/9 AMPENAN TENGAH AMPENAN	A91A01.0	Sembuh			
23	090453	23/2/2024	26/2/2024	4	4	5 NERATUL HASANAH	7/11/89	27 P	27 P	MATARAM	A90	Sembuh			
24	092464	23/2/2024	25/2/2024	2	2	3 ZAINUR RAFIQI	1/3/2008	17 L	17 L	PROJEKAN LOR	A90	Sembuh			
25	113225	23/2/2024	26/2/2024	3	3	4 HANIFA HILWANI	25-12-2009	17 P	17 P	GRIYA PANJI MULYA BLOK 0 08	A90	Sembuh			
26	063161	24/2/2024	1/3/2024	5	5	4 HIKMATUL FITRIANI	27-07-2003	20 P	20 P	DUSUN BONDAT, 04002, KANGAYAN, SUMENEP	A01.0,A90	Sembuh			
27	115908	28/2/2024	29/2/2024	1	1	7 SABILLU KHARIZ ZACHWAN	22-01-2018	5 L	5 L	KP KRAJAN	AB1.2D3.9	Sembuh			
28	115332	27/2/2024	29/2/2024	2	2	4 ABDULLAH ALI NALFAL ASYGI	23-03-2007	18 L	18 L	DUSUN PERENG BATU SEMPOL PRAJEKAN	D88.6,A91	Sembuh			
29	115332	27/2/2024	29/2/2024	2	2	3 ILLI WARUKHA UN NAURRIGH S SYALSABILA	10/9/2008	13 P	13 P	KP KAYU PUTH, RAWA BONI, PAKUHAI, BANTEN	A91	Sembuh			
30	115334	27/2/2024	1/3/2024	4	4	4 SHAFRATUL LALY	18/1/2011	13 P	13 P	SEPUDI, SUMENEP	A90,A90.8	Membak			
30	092036	27/2/2024	2/3/2024	4	4	5 AL FAJAH	11/3/2014	9 L	9 L	KP KRAJAN	A91	Putang Paksa			
31	082647	27/2/2024	1/3/2024	3	3	4 LUSI ANDANI	18-05-1999	27 P	27 P	PAKAR HARGKA	A90R42	Sembuh			
32	115334	28/2/2024	1/3/2024	2	2	3 DINI GUDZYAH	9/12/2005	18 P	18 P	KARANG SENDOKI, KLABANG, BONDOWOSO	A01.0A80	Sembuh			
33	055879	28/2/2024	7/3/2024	7	7	6 WIRI KANDI TRIWIRA YANATA	18-03-2013	10 L	10 L	MIMBAAN	A91	Sembuh			

Figure 1. Manual Form Data DF Mitra Sehat Hospital

Paper-based forms like the one shown in the above figure are certainly prone to getting misplaced or lost. Therefore, the author attempted to create a system using Google Form as the input UI medium.

Figure 2. Concept Google Form as media UI Input

The concept of google form inputted by reporting officers every month if there are additional cases of DHF. By using google form, the inputted data will automatically be connected to google spreadsheet.

1	Timestamp	Email Address	NO REKAM MEDIS	NAMA PASIEN	TGL LAHIR	UMUR	JENIS KELAMIN	ALAMAT	LAMA DIRAWAT
2	15/05/2024 19:58:56	nadhilpermatas@gmail.i	114519	MUHAMMAD HILMI	03/11/2020	4 TAHUN	L	JL. TANJUNGGALUA 1 RW 5 HARI	
3	15/05/2024 20:02:35	nadhilpermatas@gmail.i	114565	RAISA MAMLIYIA SARI	11/02/2014	9 TAHUN	P	CITRO ASMORO, KETO 6 HARI	
4	15/05/2024 20:09:09	nadhilpermatas@gmail.i	114568	MAULIFA DHA FIRA	17/11/1999	25 TAHUN	P	DSN TEGALSARI 061/01 6 HARI	
5	15/05/2024 20:23:39	nadhilpermatas@gmail.i	114593	FIOLA ALMAHROTUL Y	09/08/2017	6 TAHUN	P	TARUM TARUM, PRAJE 3 HARI	
6	15/05/2024 20:29:13	nadhilpermatas@gmail.i 000570		KRGA DESTRIANSYAH	12/12/2011	9 TAHUN	L	KP WIRINGIN ANOM 6 HARI	
7	15/05/2024 20:39:22	nadhilpermatas@gmail.i	114623	MULIDJATUL MAMA	20/02/2016	8 TAHUN	P	DUSUN LEMBUNG, KAS 5 HARI	
8	15/05/2024 20:41:00	nadhilpermatas@gmail.i 017314		AMELIA MITA RAHMA Y	09/10/2011	12 TAHUN	P	GEBANGAN TENGAH / 4 HARI	
9	15/05/2024 20:43:23	nadhilpermatas@gmail.i	114651	SAMSODI	01/07/1979	47 TAHUN	L	OLIGUR KRAJAN TAN 2 HARI	
10	15/05/2024 20:45:19	nadhilpermatas@gmail.i	114715	NATASYA AULIA RAHM	26/12/2012	11 TAHUN	D	KP KBAJAN, BLETOK 15 HARI	
11	15/05/2024 20:47:06	nadhilpermatas@gmail.i	114775	AHMAD FIKI ABDIL LA	24/04/2001	19 TAHUN	L	KP BACALAN, TAMBAK 5 HARI	
12	16/05/2024 19:56:51	nadhilpermatas@gmail.i	112767	BILQISYA ROFIKA PUTI	08/04/2023	1 TAHUN	P	KP TANJUNGGALUR 4 HARI	
13	16/05/2024 19:58:54	nadhilpermatas@gmail.i	114888	MUHAMMAD ALVARIZI	05/07/2023	0 TAHUN	L	KP KRAJAN TIMUR PAJ 4 HARI	
14	16/05/2024 20:00:47	nadhilpermatas@gmail.i	114810	MOHAMMAD NURHEDI	14/02/2015	8 TAHUN	L	DUSUN CONGKENG K 4 HARI	
15	16/05/2024 20:02:36	nadhilpermatas@gmail.i 001354		FAIDUL MAFAHM	13/04/2014	9 TAHUN	L	KP TOKELAN KPAJAN 6 HARI	
16	16/05/2024 20:04:16	nadhilpermatas@gmail.i 000570		AISYA KHUMAIRO	15/10/2020	3 TAHUN	P	KP BUKKOL MANIS 5 HARI	
17	16/05/2024 20:06:52	nadhilpermatas@gmail.i	114654	FAHRAN FAIZIN	22/04/2011	13 TAHUN	L	DUSUN AMPIL BEBOA 3 HARI	
18	16/05/2024 20:08:18	nadhilpermatas@gmail.i	114803	MIRRUL ANSARA	15/07/2015	8 TAHUN	D	DUSUN MADUK BOTOL 3 HARI	
19	16/05/2024 20:10:28	nadhilpermatas@gmail.i	115117	NANDIA CANDIRA LESM	23/02/2015	9 TAHUN	L	KP TEGALSARI UTARA 5 HARI	
20	16/05/2024 20:12:26	nadhilpermatas@gmail.i	114569	MURTIKA RAHMATI FA	20/05/2006	15 TAHUN	P	PPWS / KP BARAT CIUR 5 HARI	

Figure 3. Concept Google Spreadsheet in Case DF Mitra Sehat Hospital

The concept of google spreadsheet is inputted by reporting officers. The data inputted by officers through google form will automatically be recorded in google spreadsheet. By using google form and google spreadsheet, it will facilitate reporting officers to record data.

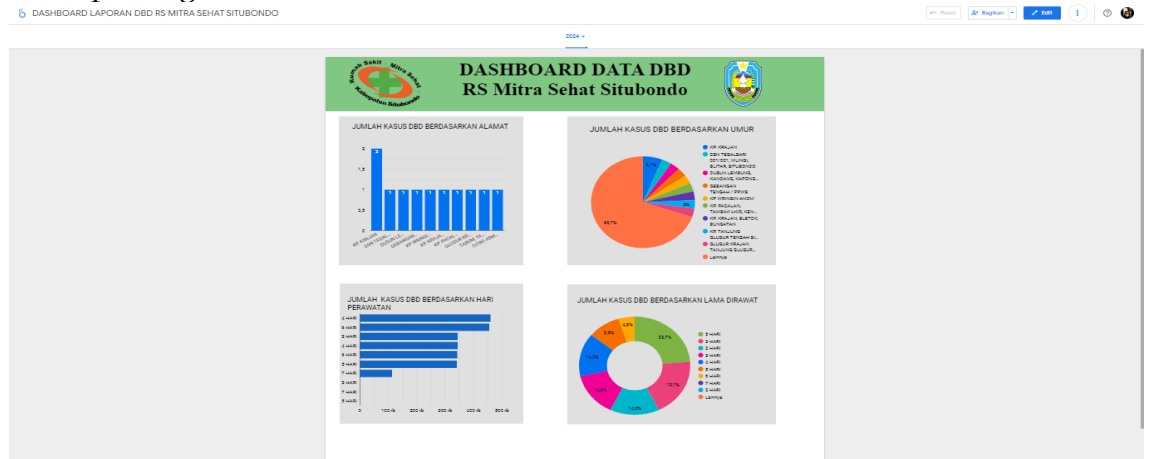


Figure 4. Dashboard Data DF Mitra Sehat Hospital

The concept of the dashboard created by the author, which is online-based. Therefore, whenever there is data inputted in the google spreadsheet, the dashboard is also automatically updated. The advantage of this website is that if there are changes such as additions or reductions in the data of the google spreadsheet used, then the dashboard created will be updated automatically.

The resulting website can be accessed through a browser on the site: <https://lookerstudio.google.com/reporting/61847e50-d493-48c8-9b57-b73e199dcacf>.

The Result in Web Browser

The Dengue Hemorrhagic Fever disease data website, which is ready to be used, was then tested by accessing it through several web browsers used by the reporting officers of Mitra Sehat Hospital via desktop and smartphone.

Table 1. The results of the access testing that has been conducted

Hardware	Web Browser	Result
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Computer	<i>Internet Explorer 11</i>	Succesfull
	<i>Google Chrome 124.0.6367</i>	Succesfull
	<i>Mozilla Firefox 126.0</i>	Succesfull
Smartphone	<i>Google Chrome 124.0.6367</i>	Succesfull
	<i>Mozilla Firefox 126.0</i>	Succesfull
	<i>Opera Mini 82.3.4342</i>	Succesfull

DISCUSSION

Mitra Sehat Hospital still uses manual methods for data reporting. Therefore, the author attempted to create a system for reporting DHF cases using google spreadsheet and google data studio to display a dashboard. Both applications can be accessed anytime and anywhere by Mitra Sehat Hospital's reporting officers. The online-based dashboard can be automatically updated by the system, thus avoiding data errors or errors in the final results of data processing. With data connected to the dashboard, reporting officers are greatly assisted in monitoring performance and expediting decision-making.

By utilizing google data studio, it can facilitate reporting officers in reporting DHF case data to the Health Department. With google data studio, creating simple reports is made possible, and the author hopes to assist in addressing DHF cases occurring in Situbondo Regency.

CONCLUSSION AND RECOMMENDATION

It can be concluded that the use of google spreadsheet and google data studio as a dashboard for DHF case reports at Mitra Sehat Hospital is highly suitable for the needs. With this dashboard, then:

1. The dashboard can provide easier and more informative information regarding DHF case data at Mitra Sehat Hospital;
2. The dashboard can provide real-time data visualization results;
3. With the data input system through google spreadsheet, the availability of data for external audit purposes can be prepared quickly.

Processing and visualizing data using google data studio is an alternative solution that institutions can use to generate informative dashboards. google data studio has features that support various data sources, making it easy to integrate reports from different data sources. With google data studio, sharing reports with other users without compromising the security of displayed information can be done easily.

ADVANCED RESEARCH

The limitation of this study is its broad scope, which is related to the overall process of mortality data management. It would be beneficial if future researchers could focus more on one aspect of its management, thus providing more detailed research results.

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