Quality of life and medical costs of dengue patients at PKU Muhammadiyah Hospitals in Yogyakarta and Bantul

Cici Feronika Boisi[1], Barkah Djaka Purwanto[2], Woro Supadmi[3*], Imaniar Noor Faridah[3], Dyah Aryani Purwitasari[3]

[1]Postgraduate School, Faculty of Pharmacy, Universitas Ahmad Dahlan, Yogyakarta
[2]Faculty of Medicine, Universitas Ahmad Dahlan, Yogyakarta
[3]Faculty of Pharmacy, Universitas Ahmad Dahlan, Yogyakarta
*Corresponding author: woro.supadmi@pharm.uad.ac.id

Abstract
Background: The manifestation of dengue is a decrease in hematocrit and platelet levels, leading to a decrease in the patient's quality of life and having an impact on the patient's medical costs.
Objective: This study objective was to ascertain the quality of life and medical costs associated with dengue patients.
Method: This study employed a cross-sectional design at PKU Muhammadiyah Hospitals in Bantul and Yogyakarta from January to August in 2023. Pediatric patients' quality of life was assessed using the EQ-5D-Y questionnaire, while adult patients' using the EQ-5D-5L questionnaire. Data on patients' medical costs was obtained from the hospital's financial database. The data were then analyzed descriptively and presented as a percentage of quality of life and average medical costs.
Results: The results showed that pediatric DF patients in both hospitals reported anxiety and depression, with percentages 100% (Yogyakarta) and 75% (Bantul), respectively. Meanwhile, most adult DF patients experienced problems in carrying out routines, of 71.4% (Yogyakarta) and 50% (Bantul), respectively. Adult DHF patients in both hospitals reported pain and discomfort of 66.7% (Yogyakarta) and 100% (Bantul), respectively. The highest average medical costs paid by DF and DHF patients at PKU Jogja Hospital were IDR 4,919,450 and IDR 6,981,500. DF and DHF patients at PKU Hospital with *BPJS* insurance, with the highest average medical costs of IDR 2,726,245.5 (for DF patients) and IDR 4,797,700 (for DHF patients) to cover for laboratory costs.
Conclusion: Dengue fever infections are impacting the patient's quality of life and medical costs.
Keywords: Dengue, medical costs, quality of life

1. Introduction

According to the *World Health Organization,* dengue is a disease caused by dengue virus infection (DENV), which is spread through mosquito bites that attack the human body (WHO, 2023). Dengue is classified into Expanded Dengue Syndrome (DSS), Dengue Hemorrhagic Fever (DHF), and Dengue Fever (DF) (WHO, 2011). This disease is transmitted to individuals of all age groups, including children, adults, to the elderly (Kemenkes, 2020). There are four serotypes of dengue viruses, namely DEN-1, DEN-2, DEN-3, and DEN-4, including the Arthropod-Borne Virus group, the genus Flavivirus, and the Flaviviridae family. In general, if a patient has been infected by one of the four types of dengue virus, the body will have immunity to the virus, but it does not guarantee immunity to the other three types of viruses (Lee *et al.*, 2015; WHO, 2023). In 2023, the Indonesian Ministry of Health documented 28,576 cases of dengue diagnosed as DHF (Kemenkes, 2023). Meanwhile, Yogyakarta's health profile data in 2021 recorded 1187 dengue cases, with Bantul district reporting the highest incidence at 410 cases, and Yogyakarta

recorded the lowest at 93 instances. Furthermore, in Yogyakarta, 12 individuals were recorded with DHF cases which resulted in death, with the highest number coming from Kulon Progo district, accounting for 6 individuals (Dinkes DIY, 2021).

Dengue has the potential to reduce life expectancy (Martelli *et al.,* 2011). An individual's quality of life may be affected by their level of knowledge (Prasetyani, 2015). One of the generic instruments for measuring quality of life is the EuroQOL-5 Dimension (EQ-5D). This measurement instrument is a general instrument that is widely used in measuring health status in a population. The quality of life of patients after receiving treatment can be measured in 5 areas, including: 1) mobility; 2) self-care; 3) typical activities; 4) discomfort/pain; 5) depression/anxiety (van Reenen *et al.,* 2019). Meanwhile, VAS (visual analog scale) measurements are useful in assessing health status on a scale of 100 mm with scores ranging from 0 (indivative of very poor health level/equivalent to death) to 100 (representing excellent health) (van Reenen *et al.,* 2015).

Medical costs can predict the costs caused by one disease in a population (Kemenkes RI, 2013). Previous research from 2015, encompassing data from three provinces—Jakarta, Bali, and Yogyakarta—indicated that dengue fever imposed an economic impact of 381,150,000 USD (Nadjib, 2019). Another study conducted at Condong Catur Hospital, Yogyakarta in 2019 showed that the cost of treatment for dengue patients refers to the clinical pathway of IDR 119,127,000.00 (Rohman & Susilowati, 2020). The rise in dengue incidence affects the financial burden of medical expenses incurred by both individuals and the government, which can be assessed through the treatment burden that includes direct costs (Halasa *et al*., 2012).

The aim of this research was to find out the level of quality of life and cost of treatment for dengue patients when hospitalized at the two hospitals that were the research locations.

2. Method

2.1. Research design

The current study employed a cross-sectional design from January to August 2023. It was conducted at two PKU Muhammadiyah hospitals in Yogyakarta and Bantul. The research ethics committee of PKU Muhammadiyah Hospital Yogyakarta has provided a statement of ethical feasibility for this study through letter number Ref.: 00069/KT.7.4/III/2023. We also obtained a research permit from PKU Muhammadiyah Hospital in Bantul through letter number: 2554/P.24.2/VIII/2022 dan 010/KET/B/03.23.

2.2 Sampling and data collection techniques

Respondents were selected based on the study's objective and design. Respondents included patients diagnosed with expanded dengue syndrome (DSS), dengue hemorrhagic fever (DHF), and dengue fever. The respondents consisted of patients of all age groups who were hospitalized at the specified hospitals between January and August 2023. The patients should consent to participate in the study by signing an informed consent. The exclusion criteria for this study included patients suspected or confirmed to have COVID-19, those with comorbidities, individuals referred to other hospitals, and patients who had died.

Data collected in this study included patient characteristics, including gender, age, payment status, and length of hospital stay. Quality of life of pediatric patients was determined using the EQ-5D-Y questionnaire, while quality of life of adult patients was determined using the EQ-5D-5L questionnaire. Prior to their use, the questionnaire items had been translated into Indonesian and validated with an r-value of 0.718 (Sari *et al.*, 2015). Quality of life was measured through five dimensions, including walking ability, daily activities, self-care, discomfort/pain, and sadness/depression/anxiety. Respondents' health scores were measured through their perceptions using the VAS scale. Data on medical expenses would refer to direct medical costs obtained from the database in the finance unit at both hospitals. Medical expenses included the cost of nursing and doctor services, inpatient costs, and pharmaceuticals.

2.3 Data analysis

The data were then analyzed descriptively and presented as a percentage of quality of life and average medical costs.

3. Results and discussion

Patients with dengue who were hospitalized throughout January-August 2023 at the study locations amounted to 20 patients. These patients were selected according to the inclusion and exclusion criteria. Details of dengue patients who matched the characteristics of the study are presented in **Table 1**.

Table 1 shows that dengue can attack individuals of all age groups. The largest number of DHF cases were found among children and adolescents. At the PKU Muhammadiyah Hospital in Bantul, the number of children aged 1-15 years infected with dengue was 57.1%. Meanwhile, at the PKU Muhammadiyah Hospital in Yogyakarta City, 53.8% of adolescents aged 16-25 years

were infected with dengue. This data pertains to the findings of a study by Ratnawiningsih *et al.* (2022) which stated that the patients most infected with dengue were adolescents and children. The child's underdeveloped immune system is the explanation for the increased susceptibility to dengue infection in children. Meanwhile, in cases of dengue infecting adolescents, this is comparable to the study (Islammia *et al.,* 2022), which stated that 32% of dengue patients were adolescents aged 17-25 years. This study found that adolescents possess an elevated risk of *Aedes aegypti* mosquito bites due to their frequent engagement in outdoor activities.

Table 1. Characteristics of dengue patients in both hospitals in january-august 2023

Characteristics	Number of patients					
	PKU Muhammadiyah Yogyakarta n=13(%)			PKU Muhammadiyah Bantul n=7(%)		
	DF	DHF	DSS	DF	DHF	DSS
Age group						
1-15 years old	3(23.1)	-	-	4(57.1)	-	-
16-25 years old	6(46.2)	1(7.7)	-	1(14.3)	-	-
26-59 years old	1(7.7)	1(7.7)	-	-	1(14.3)	-
>60 years old	-	1(7.7)	-	1(14.3)	-	-
Gender						
Female	5(38.5)	1(7.7)	-	3(42.9)	-	-
Male	5(38.5)	2(15.4)	-	3(42.9)	1(14.3)	-
Occupation						
Working	4(30.8)	2(15.4)	-	2(28.6)	1(14.3)	
Not working	6(46.2)	1(7.7)	-	4(57.1)	-	
Education						
No education	1(7.7)	-	-	1(14.3)	-	-
Elementary school	2(15.4)	-	-	3(42.9)	-	-
Junior high school	-	1(7.7)	-	-	-	-
Senior high school	4(30.8)	1(7.7)	-	1(14.3)	1(14.3)	-
University	3(23.1)	1(7.7)	-	1(14.3)	-	-
Payment Status						
BPJS (national insurance)	8(61.5)	2(15.4)	-	6(85.7)	1(14.3)	-
No insurance	2(15.4)	1(7.7)	-	-	-	-
Length of hospital stay						
Average length = 4 days	1(7.7)	2(15.4)	-	4(57.1)	-	-
Average length ≤ 4 days	5(38.5)	1(7.7)	-	2(28.6)	-	-
Average length >4 days	4(30.8)	-	-	-	1(14.3)	-

The majority of dengue cases in both hospitals were male, with 7 and 4 individuals, respectively. These data illustrate that men have a higher risk of dengue infection compared to

women. Sihite's research also states that dengue is more likely to infect men (68.24%), because men tend to have higher activities and mobility outside the home than women (Sihite *et al.,* 2017). This finding is also in accordance with data from the Indonesian Ministry of Health, indicating that the dengue virus infects more men (53.08%) than women (Kemenkes RI, 2021).

Based on employment status, the dengue virus mostly infects unemployed people, namely 11 patients from both hospitals. The data found is relevant to the research of Ramadani *et al.* (2023) which indicated that unemployed dengue sufferers were 62.9%. The reason is that most dengue patients are students and elderly who are no longer economically active, typically engaging in activities centered around their homes. This condition affects their inadequate knowledge regarding dengue prevention. Because the transmission and spread of dengue disease occurs evenly in the same environment, these unemployed people are susceptible to being infected due to limited information. Dengue disease transmission occurs in all populations. High number of cases in neighborhoods with high population and high mobility (Carrington & Simmons, 2014).

Dengue patients at PKU Muhammadiyah Hospital, Yogyakarta City were mostly dominated by high school graduates (38.5%). This result is relevant to previous research which found that education level is usually related to the diversity of activities and busyness that reduce body immunity (Ramadani *et al.,* 2023). This finding is also related to the research results of Dwi *et al*. (2011) which revealed that most infected patients had a high school education level, totaling 84 people (41%).

The payment status of dengue patients in both hospitals is divided into two methods, namely *BPJS* (insurance) and general (without insurance). In this study, most patients (76.9% and 100% respectively) utlized insurance or using *BPJS* services for payment. Payment via *BPJS* is an indication of increased public awareness of utilizing national health insurance from the government. This is in accordance with previous research at PKU Muhammadiyah Bantul Hospital in 2022, suggesting that patients whose payment status utilized government insurance (BPJS) had a higher percentage, namely 82.5% compared to patients who paid for hospital services without insurance (*BPJS*) (Ratnawiningsih *et al.,* 2022).

The shortest length of hospital stay for patients was 2 days and the longest was 9 days. From the findings of this study, dengue patients spent less than or equal to 4 days in each hospital. The findings align with the results of Amini's study which revealed that the length of

hospitalization of dengue patients was ≤ 4 days (77.3%) (Amini *et al.,* 2019). Length of hospitalization the most <6 days 67 patients (71%), and the most discharged conditions were 93 patients (99%) recovered (Islammia *et al*, 2022).

The quality of life of child respondents aged 1-15 years was assessed using the EQ-5D-Y questionnaire. Meanwhile, the quality of life of adolescent and adult patients aged 16 years or older was assessed using the EQ-5D-5L questionnaire. The results of this study are shown through two aspects, namely VAS (health score) and health quality. The health profile assessment of respondents was carried out through five dimensions, namely walking ability, routine activities, self-care, discomfort/pain, and depression/anxiety/sadness. The results of the study regarding the quality of life of respondents can be seen in **Table 2** and **Table 3**.

According to **Table 2**, the walking ability of pediatric patients in both hospitals is at level 1. In other words, 100% of the children patients exhibited no issues in walking. However, 66.7% of adult DHF patients at PKU Muhammadiyah Hospital, Yogyakarta, experienced difficulties with walking, and 50% of adult DHF patients at PKU Muhammadiyah Hospital Bantul also faced similar challenges.

Table 2. Quality of life of pediatric DHF patients in both hospitals from January to August 2023

Dimension		Inpatient Aged 1 –16 years old					
		PKU Muhammadiyah Yogyakarta n= 3 (%)			PKU Muhammadiyah Bantul n=4 (%)		
		DF n=3	DHF n=0	DSS n=0	DF n=4	DHF n=0	DSS n=0
Walking ability	Level 1	100	-	-	100	-	-
	Level 2	-	-	-	-	-	-
	Level 3	-	-	-	-		
Self-care	Level 1	-	-	-	-	-	-
	Level 2	100	-	-	50		
	Level 3	-	-	-	50		
Routines	Level 1	-	-	-	75	-	-
	Level 2	100	-	-	-		
	Level 3	-			25		
Pain/discomfort	Level 1	100	-	-	25	-	-
	Level 2	-	-	-	75		
	Level 3	-	-	-	-		
Anxiety/depression/ sadness	Level 1	-	-	-	25	-	-
	Level 2	100	-	-	75		
	Level 3	-	-	-	-		
VAS score (Mean ± SD)		72.33 ± 10.78	-	-	74.25 ± 6.50	-	-

Notes: Level 1 = 1 (no issue); Level 2 = 2 (few issues); Level 3 = 3 (many issues)

All pediatric DF patients at PKU Muhammadiyah Hospital in Yogyakarta city experienced slight problems in performing self-care, while only a portion of pediatric DF patients at PKU Muhammadiyah Hospital in Bantul experienced difficulties in performing self-care. Meanwhile, only a few adult DF patients at PKU Muhammadiyah Hospital in Yogyakarta city (14.3%) experienced many problems (level 5) in performing self-care. In addition, 50% of adult DHF patients at PKU Muhammadiyah Hospital in Bantul experienced many problems in performing self-care. According to research data, a quarter (25%) of pediatric DF patients at Muhammadiyah Hospital in Bantul felt they had many problems in carrying out routines. Meanwhile, 71.4% of adult DF patients at PKU Muhammadiyah Hospital in Yogyakarta city experienced problems in carrying out routines, 50% of DF patients and 100% of adult DHF patients in Bantul experienced few issues in carrying out routines.

A few (14.3%) adult DF patients at PKU Muhammadiyah Hospital, Yogyakarta felt discomfort or pain at level 3, 4, and 5. Pain/discomfort at level 2 was observed among the majority (57.1%) of adult DF patients at PKU Muhammadiyah Hospital, Yogyakarta. Most pediatric DF patients (75%) at PKU Muhammadiyah Hospital, Bantul reported discomfort at level 2. Discomfort at level 3 was found in adult DHF patients at both hospitals with percentages of 66.7% and 100%, respectively. A small proportion (14.3%) of adult DF patients at PKU Muhammadiyah Hospital, Yogyakarta reported anxiety/depression at level 5. Pediatric DF patients at both hospitals experienced anxiety/depression/sadness at level 2 at both hospitals with percentages of 100% and 75%, respectively. Anxiety/depression/sadness at level 3 was also observed among 28.6% of adult DF patients at PKU Muhammadiyah Hospital, Yogyakarta and 50% of DF patients at PKU Muhammadiyah Hospital in Bantul. In addition, 100% of adult DHF patients in Bantul stated that they experienced depression/anxiety/sadness at level 3.

Child respondents from PKU Muhammadiyah Hospital in Yogyakarta reported a mean VAS Score of 72.33±10.78, lower than that found in child patients in Bantul with a mean score of 74.25±6.50. On the other hand, adult DF patients from PKU Muhammadiyah Hospital in Yogyakarta showed a mean VAS score of 67.14±14.39, higher than that observed among the DHF adult patients from Bantul with a mean VAS score of 63.33±7.63. Meanwhile, the DF adult patients from PKU Muhammadiyah Hospital in Bantul indicated a mean VAS score of 65.00 ± 7.07, lower than that reported by their DHF patients with a mean VAS score of 80.00 ± 0.00. This finding may be due to several factors that enhance quality of life, including nutritional fulfillment and nursing care patterns (Sumaryati *et al.*, 2019). The results of this study indicate

that dengue patients, both at PKU Muhammadiyah Hospital in Bantul and Yogyakarta, have good health scores. These results are in line with previous research at PKU Muhamadiyah Hospital Bantul which revealed that the Hospital has a good health score (Ratnawiningsih *et al.,* 2022).

Table 3. Quality of life of adult DHF patients in both hospitals from January to August 2023

Dimension		Inpatient Aged ≥17 – ≥65 years old					
		PKU Muhammadiyah Kota Yogyakarta n=10(%)			PKU Muhammadiyah Bantul n=3(%)		
		DF n=7	DHF n=3	DSS n=0	DF n=2	DHF n=1	DSS n=0
Walking ability	Level 1	42.9	-	-	50	100	-
	Level 2	42.9	33.3	-	-	-	-
	Level 3	14.3	66.7	-	50	-	-
	Level 4	-	-	-	-	-	-
	Level 5	-	-	-	-	-	-
Self-care	Level 1	-	-	-	-	-	-
	Level 2	42.9	66.7	-	50	100	-
	Level 3	14.3	-	-	-	-	-
	Level 4	28.6	33.3	-	50	-	-
	Level 5	14.3	-	-	-	-	-
Routines	Level 1	14.3	-	-	-	-	-
	Level 2	71.4	66.7	-	50	-	-
	Level 3	-	33.3	-	50	100	-
	Level 4	-	-	-	-	-	-
	Level 5	14.3	-	-	-	-	-
Pain/discomfort	Level 1	-	-	-	-	-	-
	Level 2	57.1	33.3	-	50	-	-
	Level 3	14.3	66.7	-	-	100	-
	Level 4	14.3	-	-	50	-	-
	Level 5	14.3	-	-	-	-	-
Anxiety/depression/ sadness	Level 1	28.6	66.7	-	50	-	-
	Level 2	28.6	33.3	-	-	-	-
	Level 3	28.6	-	-	50	100	-
	Level 4	-	-	-	-	-	-
	Level 5	14.3	-	-	-	-	-
VAS Score (Mean ± SD)		67.14 ± 14.39	63.33 ± 7.63	-	65.00 ± 7.07	80.00 ± 0.00	-

Notes: Level 1 = 1 (no issue); Level 2 = 2 (few issues); Level 3 = 3 (some issues); Level 4 = 4 (many issues); Level 5 = 5 (a lot of issues)

The medical costs collected in this study were direct medical costs in the form of pharmaceutical costs (medicines and medical devices), doctor's services, nurse's services, pharmacist's services, nutritionist's services, laboratory costs, inpatient costs, and administrative costs. More complete data related to the medical costs of dengue patients who

were hospitalized at PKU Muhammadiyah Hospital in Yogyakarta can be seen in **Table 4**, while complete data related to the medical costs incurred by dengue patients at PKU Bantul Hospital can be seen in **Table 5**.

According to **Table 4**, dengue medical costs were paid by two methods, namely general payment (without insurance) and payments with insurance (*BPJS*). **Table 4** contains the total medical costs of DF patients which were paid without insurance. The highest inpatient cost for patients without insurance was IDR 2,175,000 (patients hospitalized in a VIP room). On the other hand, the highest inpatient cost for DF patients with *BPJS* insurance (class III-inpatient room) was IDR 1,556,873 for laboratory costs.

Table 4. Dengue medical costs at PKU Muhammadiyah Hospital in Yogyakarta from January to August 2023

Cost component	Class	Medical costs (IDR)					
		No insurance (n=3)			*BPJS* (n=10)		
		DF n=2	DHF n=1	DSS n=0	DF n=8	DHF n=2	DSS n=0
Pharmaceutical cost	VIP	722,950	1,856,500	-	-	-	-
	I	-	-	-	333,650	-	-
	II	-	-	-	235,650	-	-
	III	-	-	-	481,774	274,250	-
Treatment cost	VIP	1,154,250	1,550,000	-	-	-	-
	I	-	-	-	931,313	-	-
	II	-	-	-	647,000	-	-
	III	-	-	-	848,188	628,625	-
Laboratory cost	VIP	729,250	1,017,000	-	-	-	-
	I	-	-	-	502,245	-	-
	II	-	-	-	595,745	-	-
	III	-	-	-	1,556,873	1,294,995	-
Inpatient cost	VIP	2,175,000	2,400,000	-	-	-	-
	I	-	-	-	600,000	-	-
	II	-	-	-	450,000	-	-
	III	-	-	-	685,000	540,000	-
Administrative cost	VIP	138,000	158,000	-	-	-	-
	I	-	-	-	122,500	-	-
	II	-	-	-	88,750	-	-
	III	-	-	-	86,500	81,500	-
Total medical cost	VIP	4,919,450	6,981,500	-	-	-	-
	I	-	-	-	2,489,708	-	-
	II	-	-	-	2,017,145	-	-
	III	-	-	-	3,659,585	2,819,370	-
Average		**4,919,450**	**6,981,500**	**-**	**2,722,146**	**2,891,370**	**-**

The highest average medical expenses paid by DHF patients without insurance were IDR 2,400,000 (VIP class), while the highest cost paid by DHF patients with BPJS insurance was of laboratory

cost, which was IDR 1,294,995 (class III). Based on the information collected, the National Health Insurance covers approximately one-quarter of the medical expenses of dengue patients (for the national scale it is 25%; for Yogyakarta 26%). In 2017, the medical expenses paid by the JKN company (for BPJS insurance) were USD 95.03 USD nationally and USD 0.386 in the Yogyakarta city area (Wilastonegoro *et al.*, 2020).

Table 5. Dengue medical costs at PKU Muhammadiyah Hospital in Bantul from January to August 2023

Cost component	Class	Medical costs (IDR)					
		No insurance n=0			*BPJS* n=7		
		DF n=0	DHF n=0	DSS n=0	DF n=6	DHF n=1	DSS n=0
Pharmaceutical cost	VIP	-	-	-	697,500	-	-
	I	-	-	-	510,000	-	-
	II	-	-	-	215,000	-	-
	III	-	-	-	320,650	997,700	-
Treatment cost	VIP	-	-	-	1,048,000	-	-
	I	-	-	-	796,500	-	-
	II	-	-	-	853,500	-	-
	III	-	-	-	858,000	962,500	-
Laboratory cost	VIP	-	-	-	732,833	-	-
	I	-	-	-	750,000	-	-
	II	-	-	-	198,000	-	-
	III	-	-	-	698,000	876,500	-
Inpatient cost	VIP	-	-	-	1,343,333	-	-
	I	-	-	-	700,000	-	-
	II	-	-	-	500,000	-	-
	III	-	-	-	315,000	1,800,000	-
Administrative cost	VIP	-	-	-	132,667	-	-
	I	-	-	-	80,000	-	-
	II	-	-	-	76,000	-	-
	III	-	-	-	80,000	161,000	-
Total medical cost	VIP	-	-	-	3,954,332	-	-
	I	-	-	-	2,836,500	-	-
	II	-	-	-	1,842,500	-	-
	III	-	-	-	2,271,650	4,797,700	-
Average medical costs		**-**	**-**	**-**	**2,726,245.5**	**4,797,700**	**-**

Table 5 suggests that patients at PKU Muhammadiyah Hospital in Bantul mostly utilized BPJS insurance payments. The highest medical cost observed among DHF patients who used BPJS insurance services for class I, II, III, and VIP was IDR 4,797,700, while among DF patients it was IDR 3,954,332. The average medical costs incurred by DF and DHF patients at PKU Muhammadiyah Hospital in Yogyakarta using BPJS insurance were IDR 2,722,146 and IDR 2,891,370. On the other hand, the average medical

costs paid by DF and DHF patients at PKU Muhammadiyah Hospital Bantul were IDR 2,726,245 and IDR 4,797,700. The findings of the study indicate that DHF patients pay higher medical costs than DF patients, both in terms of administrative costs, pharmacy, laboratory, inpatient care, and treatment costs. In addition, DHF patient care is also longer than DF patients. This is not in line with previous studies, which showed that DSS/DSS patients have the highest medical costs because DSS/DSS patients have worse conditions than DHF patients and because DSS/DSS patients require more intensive treatment to prevent dengue infection (Ratnawiningsih *et al.*, 2022). In this study, we observed no dengue patients with DSS condition, so this study was limited to patients with two types of dengue (DF and DHF).

4. Conclusion

The results showed that the majority of pediatric DF patients in both hospitals reported anxiety and depression, with percentages of 100% (Yogyakarta) and 75% (Bantul), respectively. Meanwhile, most adult DF patients in both hospitals experienced problems in carrying out routines, with percentages of 71.4% (Yogyakarta) and 50% (Bantul), respectively. More than half of adult DHF patients in both hospitals reported pain and discomfort, with percentages of 66.7% (Yogyakarta) and 100% (Bantul), respectively. The highest average medical costs paid by DF and DHF patients at PKU Yogyakarta Hospital were IDR 4,919,450 and IDR 6,981,500. These patients paid without insurance. On the other hand, DF and DHF patients at PKU Hospital chose to pay with *BPJS* insurance, with the highest average medical costs of IDR 2,726,245.5 (for DF patients) and IDR 4,797,700 (for DHF patients) to cover for laboratory costs.

References

Amini, N. H., Hartoyo, E., & Rahmiati. (2019). Hubungan Hematokrit dan Jumlah Trombosit Terhadap Lama Rawat Inap Pasien DBD Anak Di RSUD Ulin Banjarmasin. *Jurnal Homeostasis*, 2(3), 407–416.

Carrington L.B. & Simmons C.P. (2014). Human to Mosquito Transmission of Dengue Viruses. *Frontiers in Immunology*, 17(5), 1-8. https://doi.org/10.3389/fimmu.2014.00290.

Dinkes DIY. (2021). *Profil Kesehatan D.I. Yogyakarta Tahun 2020*. Dinas Kesehatan Provinsi Daerah Istimewa Yogtakarta. Yogyakarta: Dinas Kesehatan Daerah Istimewa Yogyakarta.

Dwi, R., Dan, W., & Sabir, M. (2011). Karakteristik Penderita Demam Berdarah Dengue (DBD) di Rumah Sakit Wahidin Sudirohusodo Makassar Periode Januari-Desember 2010. *Inspirasi,* 1(14), 1-24.

Halasa, Y. A., Shepard, D. S., & Zeng, W. (2012). Economic cost of dengue in Puerto Rico. *American Journal of Tropical Medicine and Hygiene*, *86*(5), 745–752. https://doi.org/10.4269/ajtmh.2012.11-0784

Islammia, D.P.A., Rumana, N. A., Indawati, L., & Dewi, D. R. (2022). Karakteristik Pasien Demam Berdarah Dengue Rawat Inap di Rumah Sakit Umum UKI Tahun 2020. *SEHATMAS: Jurnal Ilmiah Kesehatan Masyarakat*, 1(1), 60–70. https://doi.org/10.55123/sehatmas.v1i1.37

Kemenkes RI. (2013) *Pedoman Penerapan Kajian Farmakoekonomi. Direktorat Jenderal Bina Kefarmasian dan Alat Kesehatan*. Jakarta: Kementerian Kesehatan Republik Indonesia.

Kemenkes RI (2020). *Pedoman Nasional Pelayanan Kedokteran Tata Laksana Infeksi Dengue pada Pasien Dewasa*. Jakarta: Kementerian Kesehatan Republik Indonesia.

Kemenkes RI (2021). *Informasi Singkat DBD 2021* Germas. Jakarta: Kementerian Kesehatan Republik Indonesia.

Kemenkes RI (2023). *Informasi Dengue 2023*. Jakarta: Kementerian Kesehatan Republik Indonesia.

Lee, J. S., Mogasale, V., Lim, J. K., Carabali, M., Sirivichayakul, C., Anh, D. D., Lee, K. S., Thiem, V. D., Limkittikul, K., Tho, L. H., Velez, I. D., Osorio, J. E., Chanthavanich, P., da Silva, L. J., & Maskery, B. A. (2015). A multi-country study of the household willingness-to-pay for dengue vaccines: Household surveys in Vietnam, Thailand, and Colombia. *PLoS Neglected Tropical Diseases*, *9*(6), 1–15. https://doi.org/10.1371/journal.pntd.0003810

Martelli, C. M. T., Nascimento, N. E., Suaya, J. A., Siqueira, J. B., Souza, W. V., Turchi, M. D., Guilarde, A. O., Peres, J. B., & Shepard, D. S. (2011). Quality of life among adults with confirmed dengue in Brazil. *American Journal of Tropical Medicine and Hygiene*, *85*(4), 732–738. https://doi.org/10.4269/ajtmh.2011.11-0067

Nadjib, M. (2019). The Economic Burden of *Dengue* in Indonesia. *International Pest Control*, *61*(2), 90–91. https://doi.org/10.1371/journal.pntd.0007038

Prasetyani, D. R. (2015). Faktor-Faktor Yang berhubungan Dengan Kejadian Demam Berdarah Dengue. *Majority.*, *4*(7).

Ramadani, F., Azizah, N., Ayu, S. M., & Lubis, T. T. (2023). Hubungan Karakteristik Penderita Demam Berdarah Dengue di Rumah Sakit Haji Medan Periode Januari-Juni 2022. *Jurnal Kedokteran dan Kesehatan-Fakultas Kedokteran Universitas Islam Sumatera Utara*, *22*(2), 189-195. https://doi.org/10.30743/ibnusina.v22i2.498

Ratnawiningsih, H., Perwitasari, D. A., Supadmi, W., & Faridah, I. N. (2022). Kualitas Hidup dan Biaya Sakit Pasien Dengue di Rumah Sakit PKU Muhammadiyah Bantul Yogyakarta. *Majalah Farmaseutik*, *18*(1), 1-7. https://doi.org/10.22146/farmaseutik.v18i1.70539

Rohman, H., & Susilowati, E. (2020). Analisis Perbedaan Biaya Pasien Demam Berdarah Dengue dengan dan Tanpa Clinical Pathway di Rumah Sakit Condong Catur. *Prosiding: Seminar Manajemen Informasi Kesehatan Nasional dan Call for Paper*, 47–53.

Sari, A., Yuni Lestari, N., & Aryani Perwitasari, D. (2015). Validasi ST European Quality OF Life-5 Dimensions (EQ-5D) Versi Indonesia Pada Pasien Hipertensi Di Puskesmas Kotagede II Yogyakarta. *Pharmaciana*, *5*(2). https://doi.org/10.12928/pharmaciana.v5i2.2483

Sihite, E. W., Mahendradata, Y., & Baskoro, T. (2017). Beban Biaya Penyakit Demam Berdarah *Dengue* di Rumah Sakit dan Puskesmas Cost Burden of *Dengue* Hemorrhagic Fever in Hospitals and Public Health Centers. *Berita Kedokteran Masyarakat (BKM Journal of Community Medicine and Public Health*, *33*(7), 375–364. https://doi.org/10.22146/bkm.13699

Sumaryati, M., Rosmiati, & Wasilah. (2019). Studi Kasus pada Pasien Demam Berdarah Dengue. *Jurnal Ilmiah Kesehatan Sandi Husada*, *10*(2), 51-56. https://doi.org/10.35816/jiskh.v10i2.106

van Reenen, M., Janssen, B., Oppe, M., Kreimeier, S., Greiner, W., Stolk, E., Secnik Boye, K., Herdman, M., Kennedy-Martin, M., Kennedy-Martin, T., & Slaap, B. (2015). *CHANGES INCLUDED in this update of the EQ-5D-Y User Guide Table of contents: Vol. 2.1* (2nd ed.). EuroQol Research Foundation. Available from www.euroqol.org

van Reenen, M. V., Janssen, B., Stolk, E., Boye, K. S., Herdman, M., Kennedy-Martin, M., Kennedy-Martin, T., & Slaap, B. (2019). *EQ-5D User Guide Basic Information on How to Use the EQ-5D-5L Instrument Version 3.0*. The Netherland: EueoQol Research Foundation, 36.

WHO. (2011). *Comprehensive Guidelines for Prevention and Control of Dengue and Dengue Hemorrhagic Fever*. World Health Organization Regional Office for South-East Asia.

WHO. (2023). *Dengue and Severe Dengue*. World Health Organization.

Wilastonegoro, N. N., Kharisma, D. D., Laksono, I. S., Halasa-Rappel, Y. A., Brady, O. J., & Shepard, D. S. (2020). Cost of Dengue Illness in Indonesia Across Hospital, Ambulatory, and not Medically Attended Settings. *American Journal of Tropical Medicine and Hygiene*, *103*(5), 2029–2039. https://doi.org/10.4269/ajtmh.19-0855