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The Relationship Between Educational Level and Dengue Fever (DBD) Prevention Behavior Among the Community in a Densely Populated Residential Area in Medan Amplas Subdistrict

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ABSTRACT

Dengue Hemorrhagic Fever (DHF) remains a significant public health problem in Indonesia, particularly in the densely populated residential areas of Medan Amplas Subdistrict, Medan City. This quantitative analytical study using a cross-sectional approach aims to analyze the relationship between educational level and DHF prevention behaviors among residents in densely populated residential areas. A total of 120 respondents were proportionally selected from the Harjosari I, Harjosari II, and Timbang Deli neighborhoods, where data were collected using a structured questionnaire regarding educational level and 3M Plus prevention measures. The results showed that although the majority of respondents had a secondary to higher education background (high school: 46.67% and college/university: 29.17%), most respondents (51.67%) still exhibited DF prevention behaviors in the "poor" category. Bivariate analysis confirmed a statistically significant association between educational level and dengue prevention behaviors (p = 0.000; OR = 13.24). In conclusion, respondents with a low educational level are 13.2 times more likely to exhibit poor dengue prevention behaviors compared to those with a higher educational level; therefore, more adaptive health education strategies based on community literacy.

Introduction

Dengue hemorrhagic fever (DHF) remains one of the health problems plaguing the Indonesian population. According to a 2024 report from the Indonesian Ministry of Health, there were 114,720 cases of DHF in 2023 with 894 deaths, and by the 43rd week of 2024, the number had risen to 210,644 cases with 1,239 fatalities spread across 259 regencies and cities. The Medan Amplas subdistrict is one of the most densely populated areas in the city of Medan, with a population of 133,639 as of 2024. A report from the Amplas Community Health Center (UPT Puskesmas Amplas) notes that dengue fever cases have continued to occur consecutively from 2024 through June 2026.

The conditions of densely populated residential areas, coupled with challenges in managing water storage and waste, create microhabitats that are highly conducive to the breeding of Aedes aegypti mosquitoes. Preventing dengue fever requires consistent clean and healthy living habits, such as draining standing water through the "3M Plus" campaign. The success of these efforts depends heavily on the active involvement of the community at the household level.

Education is one of the predisposing factors that facilitates an individual's ability to understand health information and take appropriate preventive measures. Several previous studies have shown a strong correlation between educational level and dengue fever prevention efforts. This study aims to analyze the relationship between educational level and dengue fever prevention behaviors among residents in a densely populated residential area in Medan Amplas Subdistrict, Medan City.

Methods

This study was designed as a quantitative analytical study using a cross-sectional approach. The study was conducted in the service area of the Amplas Community Health Center (UPT Puskesmas Amplas), which covers three target neighborhoods: Harjosari I, Harjosari II, and Timbang Deli. The study sample consisted of 120 respondents, selected proportionally based on a summary of secondary case data on dengue fever patients from the Amplas Community Health Center (UPT Puskesmas Amplas) for the period 2024–June 2026. The sample distribution consisted of Harjosari I (51 respondents / 42.50%), Harjosari II (36 respondents / 30.00%), and Timbang Deli (33 respondents / 27.50%). Primary data collection was conducted using a hybrid method, involving the administration of structured questionnaires to visitors at health facilities and direct door-to-door outreach.

The study variables consisted of:

- Variables Independent: Level of formal education, categorized as Low Education (Never Attended School/ Elementary School Graduates and Junior High School Graduates) and High Education (High School Graduates and College Graduates).
- Dependent Variables: Dengue prevention behaviors measured using 10 indicators of the 3M Plus campaign and categorized based on a mean cut-off value (23.125) into Poor Behavior (<23.125) and Good Behavior (≥23.125).

Data processing was conducted through the stages of editing, coding, tabulation, and data analysis:

- Univariate Analysis: To describe the frequency distribution and percentages of demographic characteristics, educational levels, and preventive behaviors.
- Bivariate Analysis: To test the relationship between educational level and dengue prevention behaviors using the Chi-Square (X^2) test with a significance level of $p < 0.05$ and calculation of the odds ratio (OR).

Population and Sample

The study sample consisted of 120 respondents from the three target neighborhoods, selected proportionally based on the distribution of secondary dengue fever cases: 51 respondents (42.50%) from Harjosari I, 36 respondents (30.00%) from Harjosari II, and 33 respondents (27.50%) from Timbang Deli. Primary data collection was conducted using a hybrid approach, which involved administering questionnaires at health facilities and conducting direct door-to-door visits.

Variables and Instruments

1) Educational Level (Independent): Categorized into Low Education (Never Attended School/Elementary School Graduate & Junior High School Graduate) and High Education (High School Graduate & College Graduate).
2) Dengue Prevention Behavior (Dependent): Measured using 10 indicator questions from the 3M Plus campaign. Based on the mean cut-off (23.125), behavior is categorized into Poor (< 23.125) and Good (≥23.125).

Data Analysis

Data processing included editing, coding, tabulation, and univariate and bivariate statistical analysis. Univariate analysis was used to calculate percentages (P) using the formula:

$$P = (f / N) \times 100\% \quad (1)$$

Bivariate analysis using the Chi-Square (χ^2) test at alpha = 0.05 was conducted to evaluate the relationship between educational level and preventive behaviors, supplemented by the calculation of the Odds Ratio (OR) as a risk estimate:

$$OR = (a \times d) / (b \times c) \quad (2)$$

Results and Discussions

Description of the Demographic Characteristics of the Study Subjects

The questionnaire data collection successfully gathered complete primary information from the entire sample (n = 120) without any missing data. Based on the distribution of residential areas, the largest proportion of respondents came from Harjosari I Village, totaling 51 people (42.50%), followed by Harjosari II Village with 36 people (30.00%), and Timbang Deli Village with 33 people (27.50%). In terms of age groups, the majority of respondents were in the productive age range of 25–40 years, totaling 48 people (40.00%), the age group > 40 years, with 44 people (36.67%), and the < 25 years age group, with 28 people (23.33%).

Based on gender, the study participants were predominantly women/housewives, totaling 89 people (74.17%), while male respondents numbered 31 people (25.83%). Most respondents had lived in the densely populated residential area for more than 10 years, totaling 84 people (70.00%). The complete distribution is presented in Table 1.

Table 1. Distribution per Category

Characteristics	Category	Frequency (f)	Percentage (%)
Residential Area	Harjosari I	51	42.5
	Harjosari II	36	30
	Timbang	33	27.5
Age Group	<25 years	28	23.33
	25-40 years	48	40
	>40 years	44	36.67
Gender	Male	31	25.83
	Female	89	74.17
Length of Residence in a Densely Populated Area	<5 years	19	15.83
	5-10 years	17	14.17
	>10 years	84	70

Univariate Analysis: Educational Level and Dengue Prevention Behavior

The results of the univariate analysis of the formal education level variable show that the largest proportion of respondents were high school graduates, totaling 56 people (46.67%), followed by college graduates, totaling 35 people (29.17%). Cumulatively, 75.84% of respondents fell into the higher education category (high school and college), while the remaining 24.16% were classified as having a low level of education (elementary school graduates or those who did not attend school: 15 people / 12.50%; and junior high school graduates: 14 people / 11.67%). The frequency distribution of educational levels is shown in Figure 1.

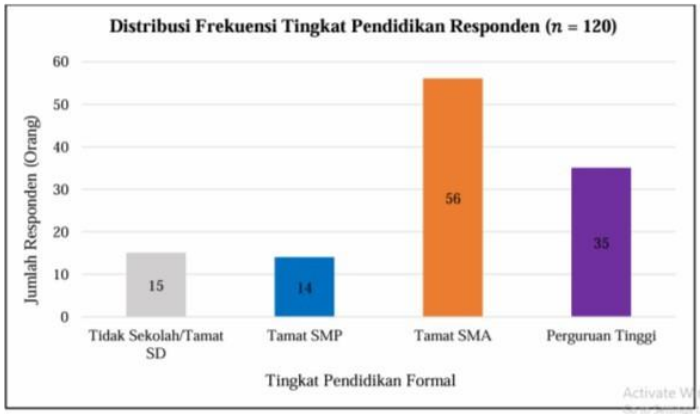


Figure 1. Distribution Diagram of Respondents' Educational Levels (n = 120)

Meanwhile, the measurement of the dengue prevention behavior variable using the 10 indicators of the 3M Plus campaign, with a cutoff mean of 23.125, categorized the respondents' behavior into two levels. The analysis revealed that 62 respondents (51.67%) exhibited preventive behaviors in the "poor" category (< 23.125), while 58 respondents (48.33%) fell into the "good" category (>= 23.125). The distribution of data on preventive behaviors is presented in Figure 2.

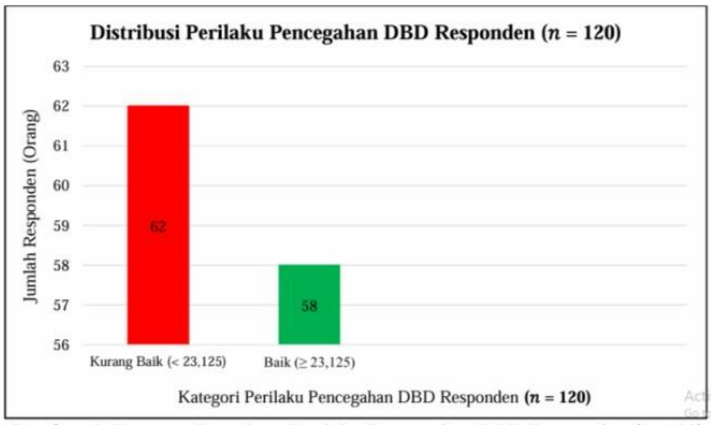


Figure 2. Distribution Diagram of Respondents' Dengue Prevention Behaviors (n=120)

Bivariate Analysis: Relationship Between Educational Level and Dengue Prevention Behavior

Cross-tabulation and hypothesis testing using the Chi-Square (χ^2) test were conducted to examine the relationship between educational level and dengue prevention behavior. The results of the bivariate analysis showed that in the group of respondents with a low level of education (n = 29), the majority—26 people (89.66%)—exhibited poor dengue prevention behaviors, while only 3 people (10.34%) exhibited good behaviors. In contrast, in the group with a high level of education (n = 91), the majority of respondents— 55 people (60.44%) exhibited good preventive behaviors, while 36 people (39.56%) fell into the "poor" category.

Statistical testing yielded a p-value of 0.000 ($p < 0.05$), which statistically proves a significant association between educational level and dengue fever prevention behaviors. Risk level analysis yielded an Odds Ratio (OR = 13.24), indicating that respondents with a low level of education are 13.24 times more likely to exhibit poor dengue prevention behavior compared to those with a high level of education. Details of the cross-tabulation are presented in Figure 3.



Figure 3. Diagram of the Relationship Between Education and Dengue Prevention Behavior (n = 120)

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Author Contribution Statement

The author performed all aspects of this study.

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