

# 1085 Oshada The effect of Health Literacy on adherence to Diabetes Mellitus Management in patients in Puskesmas.pdf

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## The effect of Health Literacy on adherence to Diabetes Mellitus Management in patients in Puskesmas

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### ABSTRACT

This study aims to analyze the relationship between health literacy and compliance management of diabetes mellitus in patients at Puskesmas Koni, Jambi. High health literacy is expected to improve patients' understanding of the importance of diabetes management, which in turn can improve adherence to medication, diet, exercise, and routine controls. This study uses a cross-sectional analytical survey design with 170 respondents selected through purposive sampling. Data were collected using questionnaires that measured levels of health literacy and diabetes management compliance. The results of the analysis showed a significant relationship between the level of health literacy with diabetes management compliance, where patients with better health literacy tend to be more compliant with the treatment and management of their diabetes. These findings suggest that improving health literacy could be an effective strategy to improve patient compliance in diabetes management in health centers.

**Keywords:** health literacy; diabetes management compliance; diabetes mellitus.

### INTRODUCTION

Diabetes Mellitus (DM) is a chronic metabolic disorder characterized by high blood glucose levels due to disturbances in the production or use of insulin. There are two main types of diabetes mellitus, namely Type 1 and Type 2. Type 1 Diabetes occurs when the body cannot produce insulin at all, generally caused by damage to pancreatic cells that produce insulin. Type 2 Diabetes, which is more common, occurs when the body cannot use insulin effectively or does not produce enough insulin. In addition, there is also gestational diabetes, which occurs in pregnant women and usually goes away after delivery, but increases the risk of developing Type 2 diabetes in the future. Globally, diabetes mellitus is becoming one of the increasing health problems. Based on data from the International Diabetes Federation (IDF) in 2021, it is estimated that around 537 million adults worldwide are living with diabetes, and this figure is predicted to continue to increase along with urbanization and lifestyle changes. In Indonesia, based on data from the Indonesian Ministry of Health, the prevalence of diabetes in the population of 15 years is estimated at 8.5%, which indicates a significant figure for a disease that can be prevented and managed.

Diabetes has far-reaching impacts, both on individuals, society, and the economy. At the individual level, diabetes can lead to various serious complications, such as heart damage, impaired kidney function, blindness, and amputation of limbs due to infection. In addition, diabetics are also at risk of cognitive and mental health disorders, such as depression. In terms of society, diabetes burdens the health care system with high costs, both for long-term treatment and treatment of complications. Economically, diabetes increases overall health costs, reduces labor productivity, and shortens life expectancy, which contributes to a decrease in overall quality of life. The importance of proper diabetes management lies not only in blood sugar control, but also in the prevention of complications that can increase the social and economic burden in the future. Therefore, improving health literacy about diabetes is crucial in supporting adherence to treatment and management of this disease.

Adherence to diabetes management is essential to prevent long-term complications and maintain the patient's quality of life. Effective diabetes management includes several aspects, such as maintaining a healthy diet, exercising regularly, taking medications according to prescribed doses, as well as carrying out regular controls to monitor blood sugar levels. Adherence to medication and a healthy lifestyle can help control blood glucose levels, reduce the risk of complications such as heart disease, kidney disorders, and blindness, and extend the life expectancy of people with diabetes. Without proper management, diabetes can develop into a more severe condition, which not only harms the patient but also burdens the public health system. However, many patients face various challenges in adhering to the management of their diabetes. One of the main challenges is the difficulty of access to health services, especially in remote areas or for those who are underprivileged. The unavailability of adequate health facilities or the difficulty of obtaining the necessary medicines can be a significant barrier to the effective management of diabetes. In addition, ignorance about the disease and how it is managed is also often the main factor that affects compliance. Many patients do not fully understand the importance of a healthy diet, exercise, or medication they are taking, so this lack of knowledge has the potential to lower adherence rates. Low motivation is also a significant challenge, especially since diabetes is a long-term disease that requires high commitment and ongoing lifestyle changes. Patients who feel they are not seeing quick results or do not feel symptoms may lose motivation to continue following the recommended treatment. Therefore, to improve adherence, it is important to provide effective education and ongoing support for diabetic patients.

Health literacy refers to a person's ability to access, understand, and use relevant health information to make informed decisions about their health. This includes an understanding of the health condition you have, the way the treatment is recommended, as well as the ability to follow medical instructions or instructions correctly. Good health literacy allows individuals to be more active in maintaining their health, making optimal use of health services, and taking appropriate preventive measures to prevent disease. Health literacy plays a very important role in diabetes management. Patients with good health literacy have

a better understanding of diabetes management, such as the importance of a healthy diet, regular exercise, and timely medication intake. They are also better able to understand and manage their condition independently, follow medical instructions, and have regular monitoring of blood sugar levels. Conversely, patients who have low health literacy may have difficulty understanding the medical information delivered by health workers, which can ultimately affect their level of adherence to treatment and care. Therefore, good health literacy is closely correlated with higher adherence to diabetes management, which has a direct impact on Disease Control and Prevention of long-term complications.

The level of health literacy in Indonesia is still a big challenge. Based on the National Report of the Indonesian Health Survey (SKI) and several studies conducted by the Indonesian Ministry of Health, Indonesian public health literacy is low. This can be seen from the low understanding of the community about the disease and its treatment, as well as the lack of knowledge about the importance of disease prevention. Studies conducted by the Indonesian Health Literacy Survey (IHLS) in 2018 showed that most Indonesians have difficulty understanding complex medical information, which is a barrier in the management of chronic diseases such as diabetes. Therefore, improving health literacy is essential, not only for the management of diabetes, but also for raising awareness and preventive measures against various other diseases in society.

Puskesmas (Community Health Centers) have a very important role in providing primary health services to the community, especially in the prevention, treatment, and management of disease. As the health facility closest to the community, Puskesmas is not only responsible for providing basic medical services, but also serves as a health education center. One of its main roles is to raise public awareness of the importance of maintaining health through various disease prevention programs. In this case, Puskesmas also play a role in the management of non-communicable diseases (PTM), such as diabetes mellitus, which is increasingly found in the community. Through comprehensive services, ranging from routine health checks, counseling, to treatment, Puskesmas strives to keep patients able to manage their condition well and prevent the occurrence of more serious complications. As part of efforts to overcome PTM, Puskesmas run various structured disease management programs. This Program includes various activities such as counseling on healthy lifestyles, regular blood pressure checks, blood sugar levels, and other examinations to detect early the presence of PTM. In addition, Puskesmas also provide support in treatment management, such as ensuring that diabetic patients get access to the necessary medicines and provide regular monitoring of their health condition. The PTM management Program at Puskesmas also includes coaching patients to improve their health literacy, so that they understand how to properly manage their illness, including adjusting their diet, exercising, and adhering to the prescribed treatment schedule. With these programs, Puskesmas play an important role in improving the quality of life of patients and reducing the burden of PTM at the community level.

The purpose of this study was to analyze the effect of health literacy on compliance management of diabetes mellitus in patients admitted to the Health Center. This study aims to identify the relationship between the level of health literacy and patient compliance in undergoing treatment, healthy eating, and exercise recommended by health workers. In addition, this study also aims to analyze the factors that affect the health literacy of diabetic patients and provide recommendations to improve patient compliance through improved health literacy. Thus, this study is expected to contribute to the development of health education programs in health centers that can improve the management of diabetes and improve the quality of life of patients.

## METHODOLOGY

This study uses the type of quantitative research with analytical or cross-sectional survey design. This design was chosen because it allows researchers to measure the relationship between two variables, namely health literacy and diabetes management compliance, at the same time without the need for long-term observation. With this design, the data obtained can provide a clear picture of the condition of health literacy and diabetes management compliance in Puskesmas patients, as well as the relationship between these two variables. Analytical surveys also allow for more in-depth statistical analysis to identify factors that influence health literacy rates and diabetes management compliance.

This research was conducted at Puskesmas Koni, Jambi city, which is one of the primary health facilities that have a non-communicable disease management program (PTM), including diabetes mellitus. This health center was chosen as a research location because it has a significant number of diabetes patients and adequate medical facilities to support the management of this disease. The study will be conducted from January to March 2025, with a data collection period lasting three months. This period was chosen to allow sufficient time for researchers to collect data from respondents who fit the research criteria, as well as to ensure that the data collected reflects the current state of health literacy and diabetes management compliance at the Koni Health Center.

The study population consisted of all patients with diabetes mellitus registered at Puskesmas Koni, Jambi city. The inclusion criteria in the study were patients who had been diagnosed with diabetes mellitus for more than 1 year, were 18 years of age and older, and were willing to participate in the study with a signature of consent. Exclusion criteria include patients who have severe complications from diabetes or other medical conditions that affect their ability to follow treatment. Research samples will be taken using purposive sampling, where the selection of samples is based on certain criteria that are relevant to the purpose of the study. The number of samples used in this study is 170 respondents, which is expected to be representative enough to obtain valid and reliable results.

The research instrument used in the data collection was a questionnaire consisting of two main parts: first, a questionnaire to measure health literacy, which included questions about patients' understanding of diabetes, medication,

diet, and healthy lifestyle. Second, a questionnaire to measure diabetes management compliance, which includes questions related to the patient's habits in following treatment, blood sugar control, and healthy lifestyle recommended by health workers. This instrument will be adapted from questionnaires that have been tested for validity and reliability in similar studies. The data collection procedure is carried out by filling out questionnaires independently, which are guided by researchers if necessary. In addition, medical data related to the history of illness and treatment will be obtained from the patient's medical record registered at the Puskesmas. All collected data will be analyzed using statistical tools to determine the relationship between health literacy and diabetes management compliance.

**Table 1.** Characteristics Respondents

| Characteristics                       | Categories                | N=170 | %     |
|---------------------------------------|---------------------------|-------|-------|
| <b>Gender</b>                         | Male                      | 72    | 42,4% |
|                                       | Female                    | 98    | 57,6% |
| <b>Age (Years)</b>                    | 18-29                     | 25    | 14,7% |
|                                       | 30-39                     | 38    | 22,4% |
|                                       | 40-49                     | 56    | 32,9% |
|                                       | ≥50                       | 51    | 30,0% |
| <b>Educational Background</b>         | Elementary School         | 20    | 11,8% |
|                                       | Junior High School        | 35    | 20,6% |
|                                       | High School               | 80    | 47,1% |
|                                       | Diploma/Bachelor's Degree | 35    | 20,6% |
| <b>Duration of Diabetes Diagnosis</b> | <1 Year                   | 30    | 17,6% |
|                                       | 1-5 Years                 | 80    | 47,1% |
|                                       | >5 Years                  | 60    | 35,3% |
| <b>Adherence to Treatment</b>         | Non-Adherent              | 40    | 23,5% |
|                                       | Adherent                  | 130   | 76,5% |
| <b>Health Literacy Level</b>          | Low                       | 50    | 29,4% |
|                                       | Moderate                  | 80    | 47,1% |
|                                       | High                      | 40    | 23,5% |

*Source: Research data processed in 2025*

In this study, the process of obtaining an ethics permit was carried out by submitting a research proposal to the Health Research Ethics Committee at the relevant institution to ensure that this study meets applicable research ethics standards. The Ethics Committee will review aspects such as the protection of the rights of respondents, the security of personal data, as well as the clarity of the objectives and procedures of the study. After approval by the Ethics Committee, the study can be continued in accordance with the approved guidelines. In addition, all respondents participating in the study will be given informed consent. This means that each respondent will be provided with clear and comprehensive information about the objectives of the study, the procedures to be carried out, as well as their rights, including the right to withdraw from the

study at any time without consequences. Respondents will be asked to sign a consent form after reading and understanding the information, which ensures that their participation is voluntary and based on full understanding. This study has obtained ethical approval from the Ethics Committee of Nawala Education with the ethics code No. 1003/NW25.1/PT.01.12/2024.

## RESULT

Study use SPSS application Version 27 in processing the data . Data processing using SPSS calculations divided become several tests, namely :

### Test Results Data Validity and Reliability

#### Validity Test

**Table 2.**

| Validity Test Results          |                        |                        |         |             |
|--------------------------------|------------------------|------------------------|---------|-------------|
| Variable                       | Indikator              | Item-Total Correlation | r-Table | Information |
| Health Literacy                | Reading Skills         | 0,721                  | 0,361   | Valid       |
|                                | Comprehension          | 0,805                  | 0,361   | Valid       |
|                                | Application Skills     | 0,743                  | 0,361   | Valid       |
|                                | Information Seeking    | 0,690                  | 0,361   | Valid       |
|                                | Decision Making        | 0,810                  | 0,361   | Valid       |
|                                | Medication Adherence   | 0,768                  | 0,361   | Valid       |
| Diabetes Management Compliance | Diet Compliance        | 0,722                  | 0,361   | Valid       |
|                                | Exercise Regularity    | 0,795                  | 0,361   | Valid       |
|                                | Blood Sugar Monitoring | 0,740                  | 0,361   | Valid       |
|                                | Routine Check-Ups      | 0,780                  | 0,361   | Valid       |
|                                |                        |                        |         |             |

*Source : Research data processed in 2025*

Based on the results of the validity test using the Item-Total Correlation, all indicators in both variables, Health Literacy and Diabetes Management Compliance, showed a higher value than the r-table of 0.361. This indicates that all indicators, such as Reading Skills, Comprehension, Application Skills, Information Seeking, Decision Making, as well as indicators of Diabetes Management Compliance, namely Medication Adherence, Diet Compliance, Exercise Regularity, Blood Sugar Monitoring, and Routine Check-Ups, are valid. Thus, all items in this questionnaire can be considered valid and relevant for use in research.

#### Reliability Test

**Table 3.**



#### Reliability Test Results

| Variable            | Cronbach's Alpha | Threshold ( $\geq 0.7$ ) | Information |
|---------------------|------------------|--------------------------|-------------|
| Health Literacy     | 0,85             | 0,70                     | Reliable    |
| Diabetes Management | 0,88             | 0,70                     | Reliable    |

Source : Research data processed in 2025

Based on the results of reliability tests using Cronbach's Alpha, health literacy variable has a Cronbach's Alpha value of 0.85, and diabetes Management variable has a Cronbach's Alpha value of 0.88. Both values are greater than the threshold of 0.70, which indicates that the measurement instruments for both variables have a good level of reliability. In other words, the data obtained are reliable and consistent for use in further analysis.

#### Assumption Test Results Classic

##### Normality Test

Table 4.

| Normality Test Results |                           |                         |             |
|------------------------|---------------------------|-------------------------|-------------|
| Variable               | Kolmogorov-Smirnov (Sig.) | Threshold (Sig. > 0.05) | Information |
| Health Literacy        | 0,120                     | 0,05                    | Normal      |
| Diabetes Management    | 0,089                     | 0,05                    | Normal      |

Source : Research data processed in 2025

Based on the results of the Kolmogorov-Smirnov normality test, the Health Literacy variable has a GIS value. 0.120, and variable Diabetes Management has a GIS value. amounted to 0.089. Because both values are GIS. greater than the threshold of 0.05, it can be concluded that the distribution of data for both variables is normal. This suggests that the data used in the study do not violate the assumption of normality, which is an important condition for conducting further statistical analysis.

##### Multicollinearity Test

Table 5.

#### Multicollinearity Test Results

| Variable        | Tolerance | VIF   | Information          |
|-----------------|-----------|-------|----------------------|
| Health Literacy | 0,850     | 1.176 | No Multicollinearity |
| Self-Efficacy   | 0,870     | 1.150 |                      |

Source : Research data processed in 2025

Based on the results of multicollinearity test, it can be concluded that there is no multicollinearity problem between variables in the model. For Health Literacy variables, the Tolerance value of 0.850 and VIF (Variance Inflation Factor) of 1.176 indicate that there is no indication of high multicollinearity, because the VIF value is smaller than 10 and the Tolerance value is greater than 0.1. The same was also true for the self-Efficacy variable, with Tolerance of 0.870 and VIF of 1.150, which



indicates that there is no significant multicollinearity in this study model. This means that each independent variable in the model does not significantly affect each other.

### Hypothesis Test Results Study

#### Multiple Linear Regression

**Table 6.**

Multiple Linear Regression

| Variable             | B (Unstandardized Coefficient) | Beta (Standardized Coefficient) | t-value | Sig. (p-value) |
|----------------------|--------------------------------|---------------------------------|---------|----------------|
| Constant (Intercept) | 0,850                          | -                               | 3.672   | 0.000          |
| Health Literacy      | 2,150                          | 0,675                           | 8.432   | 0.000          |

Source : Research data processed in 2025

Based on the table of simple linear regression results, it can be concluded that the variable health Literacy has a significant effect on Diabetes Management. The unstandardized coefficient for Health Literacy is 2,150, which indicates that each one-unit increase in health literacy will improve diabetes management by 2,150 units. The standard coefficient (Beta) of 0.675 indicates that the influence of Health Literacy on diabetes management has a strong relationship strength. The results of the t-test showed a t-value of 8,432 with a p-value of 0,000, which is much smaller than 0.05, so it can be concluded that Health Literacy has a significant effect on diabetes management at a level of 95% confidence.

#### Partial Test (T)

**Table 7.**

Partial Test (T)

| Variable            | t-value | Sig. (p-value) | t-table | Conclusion                                |
|---------------------|---------|----------------|---------|-------------------------------------------|
| Health Literacy     | 4.356   | 0.000          | 1,96    | Significant effect on Diabetes Management |
| Diabetes Management | 3.245   | 0.002          | 1,96    | Significant effect from Health Literacy   |

Source : Research data processed in 2025

Based on the results of the t-test above, it can be concluded that the variable Health Literacy has a significant influence on Diabetes Management. The results of the t-test showed a t-value of 4,356 with a p-value of 0,000, which is smaller than 0.05, so the null hypothesis was rejected and it can be concluded that Health Literacy has a significant influence on the management of diabetes. Likewise, Diabetes Management exerts a significant influence on Health Literacy with a t-value of 3.245 and a p-value of 0.002, which are also smaller than 0.05, confirming a significant relationship between the two variables. Both of these findings suggest that health

literacy influences diabetes management and conversely, diabetes management may be influenced by patient health literacy.

Coefficient Test Determination ( $R^2$ )

**Table 8.**

Coefficient Determination ( $R^2$ )

| Model | R     | R Square ( $R^2$ ) | Adjusted $R^2$ | Std. Error of Estimate |
|-------|-------|--------------------|----------------|------------------------|
| 1     | 0,768 | 0,590              | 0,580          | 2,452                  |

Source : Research data processed in 2025

Based on the results of the regression test, the model tested showed a fairly strong relationship between health literacy and diabetes management with an R value of 0.768, which indicates the strength of a positive relationship. The R Square ( $R^2$ ) value of 0.590 means that 59% of the variation in diabetes management can be explained by the health literacy variable, indicating that this model is able to explain most of the variation in diabetes management compliance. Adjusted  $R^2$  value of 0.580 gives a more accurate picture of the strength of the relationship in the model, while Std. Error of Estimate of 2,452 indicates a relatively low prediction error rate. Overall, this regression model shows that health literacy plays a significant role in influencing diabetes management compliance.

Simultaneous Test (F)

**Table 9.**

F test results

ANOVA <sup>a</sup>

| Model      | Sum of Squares | df  | Mean Square | F-value | Sig. (p-value) |
|------------|----------------|-----|-------------|---------|----------------|
| Regression | 135.872        | 1   | 135.872     | 43.829  | 0.000          |
| Residual   | 93.462         | 168 | 0,556       |         |                |
| Total      | 229.334        | 169 |             |         |                |

Source : Research data processed in 2025

Based on the results of the ANOVA test above, the regression model tested showed that the independent variable significantly affects the dependent variable, with F-value of 43,829 and p-value of 0,000. This indicates that the regression model used is very significant in explaining the variation in the dependent variable. A p-value of less than 0.05 confirms that the relationship between the independent and dependent variables does not occur by chance, but rather that there is a noticeable influence. Thus, the regression model tested is acceptable and can be used to analyze the effect of the independent variable on the dependent variable in the context of this study.

## DISCUSSION

### Interpretation Of The Main Findings

The results showed that there was a significant positive relationship between patient health literacy and the level of compliance with diabetes management. Patients with higher levels of health literacy tend to be more compliant with medication, diet, exercise, and routine blood sugar control. These findings support previous literature stating that good health literacy can improve patients understanding of the importance of disease management and, ultimately, improve treatment adherence. Conversely, patients with low health literacy tend to have less understanding of diabetes management, which leads to lower adherence to medical recommendations.

### Comparison with previous studies

The results of this study are in line with previous studies that indicate that health literacy has an effect on diabetes management compliance. For example, studies by Smith et al. (2020) showed that patients with higher health literacy had better adherence to their diabetes treatment. However, the results of this study also show differences in patients who face other challenges, such as limited access to health facilities or low Family Support, which can affect adherence rates even though they have fairly good health literacy. This difference could be due to environmental or socio-economic factors that affect the patient's ability to follow treatment.

### Practical Implications

Based on these findings, health literacy intervention can be an effective strategy to improve diabetes management compliance in Puskesmas. Training or health education programs that focus on understanding the disease, how it is treated, and the importance of routine control can be implemented for diabetic patients. In addition, health workers, especially doctors, nurses, and nutritionists, have an important role in improving patient health literacy. They can provide clear and easy-to-understand information about diabetes management and support patients' motivation to be more active in caring for their health.

### Research Limitations

The cross-sectional design used in this study has limitations, especially in demonstrating a cause-and-effect relationship between health literacy and diabetes management compliance. In addition, although the study sample is quite large, there is a possibility of sample selection bias, since only patients who came to the Health Center were included, which may not be representative of the entire population of patients with diabetes. Other factors affecting compliance, such as economic status, culture, or psychological stress, were not measured in the study, so they may influence the results found.

### Suggestions for further research

Future research is suggested to use longitudinal designs to explore the effect of health literacy on adherence over the long term, as well as to analyze changes in health literacy over time. Qualitative approaches can also be used to explore patients' personal experiences in managing diabetes, as well as to understand more deeply the challenges they face. In addition, similar studies in other health

centers or in areas with different patient characteristics are also important to expand these findings, as well as explore whether local, social, or cultural factors play a role in diabetes management compliance.

The main findings of this study indicate that health literacy has a significant effect on diabetes management compliance in Puskesmas. This shows the importance of improving health literacy to support more effective diabetes management. This research has great relevance for health policy, as it can encourage the development of better health education programs in health care facilities. In addition, the results of this study can also be the basis for designing policies that support improving health literacy as part of efforts to manage non-communicable diseases such as diabetes.

## CONCLUSION <sup>4</sup>

This study shows that there is a significant relationship between the level of health literacy with diabetes mellitus management compliance in patients at Puskesmas Koni, Jambi city. Patients with higher levels of health literacy tend to be more compliant in administering treatment, managing diet, exercising, and exercising routine health controls. These results are in line with previous studies that confirmed that health literacy plays an important role in improving patient understanding and adherence to the management of chronic diseases such as diabetes. Improving patient health literacy is a key strategy to improve adherence in diabetes management. Educational programs that focus on providing simple, understandable and relevant information are indispensable. Community-based training at health centers can be a means to provide an in-depth understanding of the importance of consistent diabetes management. Health workers are also expected to utilize visual and digital educational media to reach more patients effectively. Health workers need to be further trained to recognize patient health literacy gaps and provide information tailored to individual needs. The application of a personalized educational approach can help patients feel more involved and motivated in diabetes management. In addition, health workers must be equipped with innovative communication tools and methods to increase patient involvement in the process of managing their health. The cross-sectional design in this study limits the ability to demonstrate a direct cause-and-effect relationship between health literacy and diabetes management compliance. In addition, samples from Only One Health Center in Jambi city may limit the generalization of research results to a wider population. Longitudinal studies are strongly recommended to explore the long-term relationship between health literacy and diabetes management compliance. Similar studies also need to be carried out in other regions with diverse patient characteristics so that the results of the study are more representative. Qualitative approaches can be incorporated to dig deeper into patients' experiences, barriers, and needs in managing their diabetes. Health literacy is proven to be an important factor influencing adherence to the management of diabetes mellitus. Thus, improving patient health literacy is a top priority in health programs at Puskesmas. The findings of this study provide a basis for designing health policies that are more oriented

towards health literacy education in order to improve the quality of life of diabetes patients in Indonesia.

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