

## Health Literacy Among Families of Patients with Type 2 Diabetes Mellitus: A Descriptive Study

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### ABSTRACT

*Diabetes Self-Management Education (DSME)* is an educational approach that emphasizes the importance of knowledge, skills, and motivation among diabetes patients and their families in supporting independent and sustainable disease management. Health literacy among families plays a crucial role in understanding the seriousness of Type 2 Diabetes Mellitus and supporting effective disease management, making it an important aspect to be described in this study. This study employed a descriptive observational with a survey approach. The research population consisted of families of patients with type 2 diabetes mellitus in Ngawen Village and Margorejo Village. A purposive sampling technique was used to select eligible participants based on inclusion and exclusion criteria, resulting in a total of 60 respondents within one month. The research instrument used was *the Health Literacy Questionnaire*, consisting of 44 questions. Data were analyzed using univariate analysis. Most families of patients with type 2 diabetes mellitus had a difficult level of health literacy, with 31 respondents (51.7%). It is hoped that patients' families can continue to improve their knowledge and skills in managing diabetes through various valid health information sources, as well as actively participating in education or counseling programs organized by health facilities.

**Keywords:** Family, Health Literacy, Diabetes Mellitus

### INTRODUCTION

Type 2 diabetes mellitus is the most common type of diabetes, accounting for more than 90% of cases worldwide (World Health Organization, 2022). This condition is caused by insulin resistance, which is the inability of the body to use insulin effectively even though the pancreas still produces it. Unhealthy lifestyle factors such as a high-calorie diet, lack of physical activity, and obesity are the main triggers. Fat accumulation in the body worsens insulin distribution, which in the long term damages the function of the pancreas and the metabolic system (Anggraeni, 2025).

Globally, the prevalence of diabetes continues to rise. Data from the International Diabetes Federation (IDF) in 2021 shows that more than 537 million adults live with diabetes, a number that is expected to continue to grow (Ford, 2025; Gregg, et al., 2023). In Indonesia, the 2018 Riskesdas reported a diabetes prevalence of 10.9% among those aged  $\geq 15$  years, up from 6.9% in 2013 (National Development Planning Agency, 2023). A similar trend was observed in Central Java, with a prevalence of 2.1% based on a 2024 population survey and 15.6% according to 2022 clinical data (Central Java Provincial Health Office, 2024). Estimates indicate that the number of patients increased from 624,082 in 2023 to more than 630,000 in 2024, with Wonogiri Regency recording more than 17,000 cases.

In Pati Regency, the number of patients increased sharply from 19,900 cases in 2021 to 29,060 cases in 2023, with a target of 33,621 cases to be detected (Pati Regency Health Office, 2024). Despite efforts through the Non-Communicable Disease Prevention and Control Post (Posbindu PTM) and the Non-Communicable Disease Prevention and Control Guide (Pandu PTM), the surge in cases highlights the need for more systematic and behavior-change-based educational strategies.

Risk factors for diabetes include age >40 years, family history, obesity, unhealthy diet, lack of activity, and low knowledge and family support (Dilixiati, et al., 2024). The modernization of lifestyles with fast food consumption and minimal exercise exacerbates this condition, even in productive ages. Data from the 2023 IFLS-5 survey shows that the 26–35 age group is five times less aware of treatment compared to other age groups (Singh et al., 2024). Research also confirms that obesity and lack of physical activity contribute significantly to insulin resistance (World Health Organization, 2022). In addition, studies conducted in Jayapura and Malang have shown that knowledge and family support play an important role in diabetes management (Aronggear, 2024; Karingga, et al. 2024).

Putri and Sulistyowati, (2021) found that low family health literacy is correlated with poor self-management among diabetes patients at home. Nugroho et al. (2022) further stated that low literacy has a direct impact on the family's limited understanding of diabetes complications, signs of hypoglycemia or hyperglycemia, as well as the importance of adherence in disease management.

Preliminary studies at the Margorejo Community Health Center show that most patients and families do not understand the causes, complications, or management of diabetes. More than 60% of Prolanis patients also experience difficulties in maintaining stable blood sugar levels. This indicates that DSME-based education is not yet optimal. Therefore, the study "Health Literacy Profile of Families with Type2 Diabetes Mellitus in Margorejo Village" is relevant. Based on Lawrence Green's theory, which emphasizes the importance of knowledge and family support as factors in health behavior, this study aims to describe community-based education strategies and patient adherence to diabetes self management. The objective of the study is to identify the health literacy profile of families with Type 2 diabetes mellitus in Margorejo Village, Pati District.

## **METHOD**

This study used a descriptive observational design with a survey approach to obtain an overview of health literacy among families with type 2 diabetes mellitus in Ngawen Village and Margorejo Village, Pati Regency. The main objective of the study was to identify the level of health literacy among families of diabetes patients as a basis for formulating educational intervention strategies. The study was conducted over a period of one month in July 2025. The study population consisted of all families of patients with type 2 diabetes mellitus in both villages. There were 50 diabetes patients in Ngawen Village and 10 in Margorejo Village, bringing the total number of respondents to 60 families. The sampling technique used was purposive sampling, which is the selection of respondents based on specific criteria in accordance with the research objectives. The research instrument was a family health literacy questionnaire based on *the Health Literacy Questionnaire* (HLQ) developed by Osborne et al. (2023). The questionnaire

consisted of 44 assessing various aspects of health literacy. The instrument underwent Indonesian cultural adaptation to ensure its suitability for Indonesian context and was tested for validity and reliability. Construct validity was tested through *confirmatory factor analysis* (CFA), showing that the nine HLQ domains were organized according to the original model, with *factor loadings* above 0.40. Content validity was also reinforced through reviews by health and linguistic experts, who confirmed the suitability of the items to the local culture. In terms of reliability, the HLQ showed good internal consistency with Cronbach's alpha values of 0.78–0.92. A *test-retest* on a two-week subsample then produced an *intraclass correlation coefficient* (ICC) of 0.81, confirming the temporal stability of the instrument. These results are in line with the HLQ adaptation study in Nepal, which reported an  $\alpha \geq 0.88$  and  $ICC \geq 0.75$  (Budhathoki, et al., 2022). Data analysis was performed univariately to describe the characteristics of the respondents and the health literacy profile of the families of patients with type 2 diabetes mellitus. The results are presented in the form of frequency distribution tables and percentages, facilitating interpretation of the level of health literacy in the study population.

## RESULT AND DISCUSSION

### Result

#### Respondent Characteristics

Table 1. A Description of of age characteristics and duration of diabetes mellitus among respondents with Diabetes Mellitus

Variable	n	Mean	Median	Min	Max
Age	60	39.88	38.5	17	65

Based on Table 1, it is known that the average age of respondents was 39.88 years, with the youngest being 17 years old and the oldest being 65 years old.

Table 2. Description of respondents' educational characteristics and their relationship with diabetes patients

Variable	Frequency	Percentage
<b>Education</b>		
Elementary	12	20.0
High School	10	16.7
Junior High School	9	15.0
University	29	48.3
<b>Total</b>	<b>60</b>	<b>100.0</b>
<b>Relationship with patients</b>		
Children	13	21.7
Parents	7	11.7
Siblings	14	23.3
Husband/Wife	14	23.3
Other	12	20.0
<b>Total</b>	<b>60</b>	<b>100.0</b>

Based on Table 2, it is known that most respondents had a college education, totaling 29 respondents (48.3%), and most respondents were siblings or spouses, totaling 14 respondents (23.3%).

### Univariate analysis

Table 3. A description of respondents health literacy among families with type 2 diabetes mellitus

Health literacy in families with type 2 diabetes mellitus	Frequency	Percentage
Very difficult	0	0
Difficult	31	51.7
Easy	29	48.3
Very Easy	0	0
<b>Total</b>	<b>60</b>	<b>100.0</b>

Based on Table 3, it is known that most respondents (51,7%) had difficult health literacy, while 48.3% were in easy category

### Discussion

#### Health Literacy among families of patients with type 2 diabetes mellitus

The results of the study indicate that most families of type 2 diabetes mellitus patients have a moderate level of health literacy, with 31 respondents (51.7%). This finding confirms that the majority of families still experience difficulties in understanding, accessing, evaluating, and using health information related to diabetes management. This condition is a major concern considering the crucial role of families in supporting patient compliance with diet, medication, physical activity, and blood sugar monitoring.

Low health literacy among families of diabetes patients is not a new phenomenon. Research by Akbariza and Handayani (2023) reports that more than half of families of diabetes patients have difficulty understanding medical information, both verbal and written. This inability directly impacts low knowledge about complications, signs of hypoglycemia and hyperglycemia, and the importance of therapy adherence. In fact, medication errors or poor food choices often occur due to a lack of understanding among family members.

In the local context, limited health literacy may be influenced by varying educational backgrounds and unequal access to structured diabetes education programs in primary healthcare settings. As a result, medication error and inappropriate dietary choices often occurred due to insufficient understanding among family members.

Another study by Manariangkuba, Nurmansyah, and Wirawan (2025). shows a significant correlation between low family literacy and poor self-management of patients at home. This is especially true for elderly patients who are more dependent on their families for health-related decisions.

Theoretically, these findings can be explained through *the Health Belief Model* (HBM), which emphasizes that health behavior is influenced by perceptions of risk, severity, benefits, and barriers. All of these components are highly

dependent on the level of understanding or health literacy. Low literacy reduces the perception of benefits and increases barriers, resulting in families providing less support for diabetes management behaviors. In addition, Dorothea Orem's *Self-Care Deficit Theory* is also relevant. This theory states that families must act as a support system when patients are unable to perform *self-care* optimally. However, this role is only effective if families have adequate literacy. Without good literacy, family support becomes limited and less targeted. Nola J. Pender, through *the Health Promotion Model*, emphasizes that cognitive factors, particularly knowledge and understanding, influence health decisions. Low family literacy can be seen as a significant cognitive barrier in health promotion and diabetes complication prevention efforts. Therefore, structured education programs such as *Diabetes Self-Management Education (DSME)* are recognized as important in diabetes care, not only for patients but also for families. Previous studies suggest that family health literacy plays an important role in diabetes management. If the family, as *the primary caregiver*, lacks understanding of the patient's condition, education aimed solely at the patient becomes less effective. Low literacy also implies patient non-compliance, as support and monitoring from the family are not optimal.

These findings indicate that educational interventions should be designed in a more structured manner and considered the specific needs of families. Health education should be adapted to educational background, culture, and sociodemographic conditions. The educational approach should also be more varied, for example, through visualization, simulation, audiovisual media, and interactive methods that are easy to understand. In addition, health facilities need to develop literacy assessment modules that can be used practically to measure family understanding. That way, the effectiveness of education can be evaluated. The role of health workers, especially community and family nurses, is very important in improving literacy. They function not only serve as information providers but also as facilitators and companions in the education process oriented towards family needs. Strengthening the capacity of health workers in delivering literacy-based education is also a strategic step to improve service quality.

In conclusion, most families of type 2 diabetes mellitus patients in the study location have health literacy that is still in the difficult category. This indicates the need for more targeted, comprehensive, and continuous family education interventions. With improved literacy, families can become effective partners in diabetes management, supporting patients in achieving optimal glycemic control and contributing to an overall improvement in the quality of life of people with diabetes. The role of health workers, especially community and family nurses, is very important in improving literacy. They function not only serve as information providers but also as facilitators and companions in the education process oriented towards family needs. Strengthening the capacity of health workers in delivering literacy-based education is also a strategic step to improve service quality.

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### **RESEARCH LIMITATIONS**

This study has several limitations that need to be considered when interpreting the results and planning future research. First, the research design used was descriptive with a survey approach. This design can only describe phenomena at a specific point in time, so it cannot completely eliminate the influence of external variables that may contribute to increased family health literacy, such as information obtained from social media, personal experiences, or other education about type 2 diabetes mellitus. These conditions can affect the results of the study beyond the control of the researcher.

The second limitation is the use of questionnaires as the sole research instrument. Health literacy was only measured through a closed questionnaire with a numerical scale, which facilitated quantitative analysis but limited the researchers' ability to explore respondents' in-depth understanding and practical application of health information. The absence of data triangulation, for example through in-depth interviews or direct observation, limited the contextual validity of the results.

Third, the relatively homogeneous sociodemographic characteristics of the respondents are also a limitation. The majority of respondents came from lower-middle educational and socioeconomic backgrounds. This homogeneity limits the generalization of the research results, as they may not necessarily reflect the conditions of families with higher levels of education, different socioeconomic statuses, or those living in urban areas with broader access to health information.

In addition, subjective responses from respondents can lead to potential bias, particularly social desirability bias. Because the questionnaire was filled out independently, there is a possibility that respondents gave answers that they considered to be most correct or in line with the researcher's expectations, rather than based on actual conditions. This can certainly affect the accuracy of the data, especially in assessing changes in health literacy after the intervention.

Considering these limitations, further research is recommended to use a stronger design, combine various data collection methods, and involve respondents with more diverse sociodemographic backgrounds so that the results are more comprehensive and generalizable.

### **CONCLUSION**

Most health literacy among families with type 2 diabetes mellitus was categorized as difficult, with 31 respondents (51.7%). This finding implies that a considerable proportion of families may have limited ability to understand and manage diabetes related information, which can affect patient self management and adherence to treatment. Therefore, targeted and appropriate educational support is needed to address these literacy challenges

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