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ORIGINAL RESEARCH

Perceived Obstacles to Diabetes Care and Self-Management and Their Sociodemographic Correlates Among Adults in Central Java, Indonesia

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Abstract

Background: Effective diabetes management requires sustained commitment and heightened awareness. Individuals with diabetes often face multiple obstacles that affect daily functioning and long-term health outcomes. However, evidence describing specific obstacles among people with diabetes in Indonesia, particularly in Central Java, remains limited.
Purpose: This study aimed to examine the levels and domains of perceived diabetes-related obstacles among adults living with diabetes and to assess their associations with sociodemographic characteristics.
Methods: A cross-sectional study was conducted among individuals with diabetes attending public health centres in Semarang, Central Java, Indonesia. Participants were consecutively recruited if they were aged ≥18 years, had a confirmed diagnosis of diabetes, and had no known cognitive impairment. Individuals who were acutely ill were excluded. Data were collected using the 57-item Bahasa Indonesia version of the Diabetic Obstacle Questionnaire (DOQ), which covers eight domains of diabetes-related challenges. Bivariate analysis and multiple linear regression were conducted to examine the associations between obstacle scores and selected sociodemographic characteristics.
Results: A total of 237 participants were included (mean age = 61.96 years), the majority of whom were female, with a mean diabetes duration of 8.16 ± 7.39 years. The highest perceived obstacles were observed in the diagnosis domain (-21.36 ± 33.39). Bivariate analysis showed that education level (p = 0.002) and diabetes duration (p = 0.045) were significantly associated with obstacles related to knowledge and beliefs, whereas random blood glucose level was associated with obstacles to advice and support (p = 0.029). Multivariable analysis further identified education level, employment status, diabetes duration, and glycaemic control as significant predictors across selected domains.
Conclusion: Although perceived barriers to diabetes management were generally low, challenges persist in the domains of diagnosis, knowledge, and support. These findings highlight the influence of sociodemographic and clinical factors, as well as sociocultural context, in shaping diabetes-related obstacles. Culturally responsive, person-centred interventions are needed to improve self-management and health outcomes.

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1. Introduction

Diabetes mellitus is a chronic metabolic disorder that can significantly affect the physiological, psychological, and social life of affected individuals. People living with diabetes often face various obstacles that can disrupt their daily routines, interpersonal relationships, and personal beliefs (Dubreucq et al., 2023; Inga-Britt & Kerstin, 2018; Nikpour et al., 2022; Whittemore et al., 2019). The disease is closely linked to specific lifestyle behaviours, such as diet,

physical activity, sedentary behaviour, sleep, and stress, which can lead to its development through various metabolic pathways (Spruijt-Metz et al., 2014). Living with diabetes often requires sustained behavioural changes that may conflict with personal preferences, social norms, daily routines, and treatment requirements (Ribu et al., 2019). Therefore, managing diabetes effectively requires ongoing changes in behaviour, pharmacological adherence, and regular self-monitoring, which demand a long-term commitment and heightened awareness.

Since diabetes can develop gradually and may remain asymptomatic for years, individuals might struggle to fully understand their diagnosis and its long-term effects (Ramachandran, 2014). This limited understanding can make it hard for them to follow recommended self-care practices. Research has identified a wide range of perceived obstacles, including medication non-adherence, limited knowledge of diabetes, lack of motivation to exercise, inadequate support from family and peers, strained relationships with health professionals, and coexisting psychological distress (Bhagavathula et al., 2018; Bíró et al., 2025; Mwila et al., 2019; Whittemore et al., 2019). Moreover, Muz et al. (2021a) reported medication-related issues as the largest obstacles, while others highlighted coping difficulties as the primary concern (Arslan et al., 2020). These variations suggest that perceived obstacles are context-dependent and influenced by sociocultural and structural conditions.

In Indonesia, diabetes is a major and growing public health issue. The country's diverse ethnicities, cultures, and religions influence how individuals perceive illness, engage with treatment, and practice self-care. A study in Sulawesi found that some people see diabetes as a personal failure or source of shame, which can lead to reduced communication about the condition and lower engagement with health services (Pamungkas et al., 2020). Other studies in various Indonesian regions have found different factors influencing diabetes self-management, including trust in health care recommendations (Ligita et al., 2019), educational attainment, income level, depressive symptoms, and diabetes knowledge (Sukarno et al., 2024). However, the existing evidence on diabetes care largely comes from regions outside Java Island, despite Java being Indonesia's most densely populated region. The cultural norms, eating habits, and social structures in Central Java may uniquely affect how obstacles to diabetes care are perceived and negotiated.

Moreover, previous research in Indonesia has largely examined single factors that influence self-management or specific behaviours. Few studies have assessed various perceived obstacles across different domains or how these relate to key sociodemographic characteristics. In Indonesian society, gender roles can impact health-seeking behaviour, caregiving responsibilities, and food management at home (Cameron, 2023; Daulay, 2017), while other factors, such as socioeconomic status, may affect time availability, financial resources, stress exposure, and access to healthcare (Andini & Siregar, 2024; Gadsden et al., 2022; Mani et al., 2018). Exploring these variables across the eight domains of the Diabetes Obstacles Questionnaire (DOQ) helps us understand how structural and social backgrounds shape perceived barriers to diabetes care.

Therefore, this study addresses both empirical and conceptual gaps by examining the perceived obstacles to diabetes among adults in Central Java and assessing their association with sociodemographic characteristics. By analyzing these associations, the research contributes to a better understanding of diabetes self-management in Indonesia, particularly in Central Java. This understanding can help create interventions that are culturally responsive and person-centered, and that go beyond medical treatments to address the realities of living with diabetes.

2. Methods

2.1. Research design

This study used a cross-sectional design to investigate obstacles faced by individuals living with diabetes in managing their care, and to evaluate the relationship between sociodemographic characteristics and these obstacles. This approach was chosen to provide a snapshot of the study population and to examine the distribution of key variables without manipulating the study environment (Wang & Cheng, 2020; Xueying et al., 2025). Therefore, it is important to note that this design allows for assessment of association, but does not establish causality.

2.2. Setting and samples

This cross-sectional study was conducted among individuals with diabetes registered at eight public health centres (PHCs) in Semarang, Central Java Province, Indonesia, which has a high

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prevalence of diabetes. This ensured sufficient participant availability and reflected primary care settings where diabetes management is most actively delivered.

Participants included adults aged 18 and older who had been diagnosed with diabetes at any stage and had no known cognitive issues affecting thinking and memory. Individuals who were seriously ill at the time of data collection were excluded. Eligible participants were consecutively recruited from individuals attending the Chronic Disease Management Program, known in Indonesia as *Program Pengelolaan Penyakit Kronis (Prolanis),* during the study period until the required sample size was reached to minimize selective enrollment. All eligible individuals attending the program were invited to participate, and no proportional or fixed quota allocation was applied across PHCs; therefore, the number of participants per facility reflected routine patient attendance patterns. While selection bias could not be entirely ruled out, recruitment across eight PHCs rather than a single center increased heterogeneity. The distribution of participants across PHCs is presented in Table 1 (see Results section).

Sample size was calculated using www.calculator.net (Maple Tech. International LLC, 2025). A minimum of 204 participants was required to achieve a 95% confidence level with a ±5% margin of error, based on a population of 430 individuals with diabetes recorded in the PHCs.

2.3. Measurement and data collection

The primary instrument used in this study was the Diabetes Obstacles Questionnaire (DOQ). The original 77-item DOQ was developed in the UK to assess challenges experienced by people with type 2 diabetes (T2D) (Hearnshaw et al., 2007) and has since been adapted and validated across Europe, with Cronbach's alpha greater than 0.75, and a Kaiser–Meyer–Olkin value greater than 0.75 for each sub-scale (Pilv et al., 2016). For this study, a 57-item culturally adapted Indonesian version was used, with evidence of construct validity (based on factor analysis) and face validity, as well as high internal consistency reliability (Cronbach's alpha ranging from 0.817 to 0.994) (Kusumaningrum & Handayani, 2024). The instrument covers eight domains: medication (5 items), self-monitoring (5 items), knowledge and beliefs (9 items), diagnosis (4 items), relationships with healthcare professionals (9 items), lifestyle changes (14 items), coping (6 items), and advice and support (5 items). Items were rated on a five-point Likert scale, ranging from 'strongly disagree' (-2) to 'strongly agree' (+2). The questionnaire does not provide an overall score across all domains; instead, it reports average scores for each domain (Hearnshaw et al., 2007). Each section's score is calculated by summing the responses and then adjusting it based on the number of questions in that section. The resulting scores range from -100 to +100. A score closer to -100 indicates that respondents perceive fewer obstacles or challenges, whereas a score closer to +100 suggests a greater perception of obstacles (Arslan et al., 2020; Muz et al., 2021).

In addition to the DOQ, a structured questionnaire was used to collect the participants' sociodemographic and clinical characteristics. The sociodemographic variables included gender, age, education level, employment status, marital status, and monthly income. The clinical characteristics included the random blood glucose level, the number of daily blood glucose checks, and the duration of diabetes.

Participants registered as members of the *Prolanis* program at the selected PHCs were approached, as *Prolanis* constitutes a structured primary-care platform for diabetes management in Indonesia. Individuals enrolled in *Prolanis* undergo regular monitoring and follow-up, making them an appropriate and accessible population for assessing perceived diabetes-related obstacles within an ongoing care context. The research team and enumerators with a nursing background, all of whom had received prior training in study procedures, questionnaire administration, and ethical considerations, conducted data collection using a structured, self-administered questionnaire. The questionnaire included sections on participants' sociodemographic and clinical characteristics, as well as diabetes-related obstacles. For participants who had difficulty completing the questionnaire independently, trained research enumerators conducted face-to-face interviews to ensure the clarity, completeness, and accuracy of responses, without providing verbal or non-verbal cues that could influence participants' answers. Furthermore, the same structured questionnaire format was used for both modes of administration to maintain consistency, and no probing or prompting beyond the provided written response options was allowed. Data collection took place from June to September 2023.

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2.4. Data analysis

Statistical analysis was performed using STATA SE 13.1 and Excel. Sociodemographic characteristics were analysed descriptively (frequency, percentage, mean, standard deviation) and presented in tables. Normality and homogeneity of variances were assessed using a combination of graphical methods (histograms and Q-Q plots) and Skewness and kurtosis statistics ($p < 0.001$). Visual inspection of the histograms indicated that the diabetes obstacles domains were approximately normally distributed, following a bell-shaped curve. Although the skewness–kurtosis test indicated statistical deviation from normality, visual inspection of Q–Q plots suggested only mild deviation. Given the sample size and the approximately normal distribution observed in graphical assessments, linear regression was considered robust to mild deviations from normality.

Bivariate analyses were conducted to examine the associations between perceived obstacle scores across eight domains and the sociodemographic and clinical variables. Spearman's rank correlation coefficient was used to assess the relationship between continuous or ordinal variables (age, duration of diabetes, and random blood glucose level) and obstacle scores. The Mann-Whitney U test was used to compare obstacle scores between two independent groups for categorical variables (gender, education level, employment status, income, and marital status). All statistical tests were two-tailed, and a p-value of <0.05 was considered statistically significant. Multiple linear regression was performed to evaluate independent predictors of obstacle scores across domains. Variables with $p < 0.10$ in bivariate analysis were included in the models.

2.5. Ethical considerations

Ethical approval for this study was obtained from the Health Research Ethics Committee of the Faculty of Medicine, Universitas Diponegoro (No. 320/EC/KEPK/FK-UNDIP/VII/2023). Written informed consent was obtained from all participants after the study procedures were fully explained. Participants were informed of the voluntary nature of their participation and their right to withdraw from the study at any time without consequences for their access to healthcare services. Confidentiality and anonymity were strictly maintained by using coded identifiers and restricting data access to the research team only.

3. Results

3.1 Participant characteristics *and distribution across PHCs*

Participants were recruited from eight PHCs in Semarang, with varying numbers across facilities reflecting routine attendance patterns (Table 1). The number of participants recruited from each PHC ranged from 19 to 55, and recruitment rates ranged from 38.60% to 90.10%. The highest recruitment rate was observed in PHC 1, while the lowest was in PHC 6, indicating variability in participant enrollment across facilities.

Table 1. Distribution of study participants across public health centres (PHCs)

PHC	Total Registered Diabetes Patients	Number of Participants Recruited	Percentage (%)
PHC 1	61	55	90.10
PHC 2	50	32	64.00
PHC 3	52	29	55.77
PHC 4	66	32	48.48
PHC 5	54	22	40.74
PHC 6	57	22	38.60
PHC 7	48	26	54.17
PHC 8	42	19	45.24

Of the 245 participants who voluntarily joined the study, 8 were excluded due to incomplete data, leaving 237 complete questionnaires for the final analysis (completion rate = 96.73%). The mean age of participants was 61.97 years (SD = 8.43), and the majority were female (75.95%). Nearly two-thirds of participants had low educational attainment (no formal education or basic schooling), and most reported monthly incomes below the regional minimum wage.

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The mean random blood glucose level was 147.08 mg/dL (SD = 59.94), and the mean duration of diabetes was 8.16 years (SD = 7.39). Nearly all participants reported checking their blood glucose less than once per day. Detailed characteristics are presented in Table 2.

Table 2. Sociodemographic and clinical characteristics of participants (n = 237)

Characteristics	Frequency (%)	Percentage (%)	Mean ± SD (Min–Max)
Gender			
Male	57	24.05	
Female	180	75.95	
Age (years)			61.97 ± 8.43 (35–90)
Education Level			
No basic education	50	21.10	
Basic education	105	44.30	
Upper secondary school	57	24.05	
Diploma or above	25	10.55	
Employment Status			
Unemployed	178	75.11	
Employed	59	24.89	
Marital Status			
Single	39	16.46	
Married	198	83.54	
Monthly Income			
< Regional minimum wage	209	88.19	
> Regional minimum wage	28	11.81	
Random Blood Glucose Levels (mg/dL)			147.08 ± 59.94 (53–376.5)
Number of daily blood glucose level checks			
< 1 time	236	99.58	
1 time or more	1	0.42	
Diabetes Duration (years)			8.16 ± 7.39 (0.3–50)

3.2 Obstacles reported by individuals with diabetes

As shown in Table 3, mean domain scores from the DOQ indicated that the diagnosis domain had the highest perceived obstacles (-21.36 ± 33.39). Other domains showed comparatively lower obstacles, including knowledge and beliefs (-25.20 ± 31.95), self-monitoring (-29.28 ± 30.87), coping with diabetes (-30.13 ± 24.88), lifestyle changes (-30.15 ± 25.98), medication (-32.91 ± 30.11), relationships with healthcare professionals (-35.10 ± 23.59), and advice and support (-42.24 ± 24.25).

Table 3. Domain scores of the Diabetes Obstacles Questionnaire (DOQ) (n = 237)

DOQ Domain Scores	Min	Max	Mean ± SD
Obstacles to medication	-100	60	-32.91 ± 30.11
Obstacles in self-monitoring	-100	100	-29.28 ± 30.87
Obstacles to knowledge and beliefs	-100	61.11	-25.20 ± 31.95
Obstacles to diagnosis	-100	100	-21.36 ± 33.39
Obstacles in relationships with healthcare professionals	-100	100	-35.10 ± 23.59
Obstacles to lifestyle changes	-94.44	55.56	-30.15 ± 25.98
Obstacles to coping with diabetes	-91.67	66.67	-30.13 ± 24.88
Obstacles to advice and support	-100	50	-42.24 ± 24.25

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3.3 Bivariate associations between participant characteristics and obstacle domains

Table 4 presents the bivariate associations between sociodemographic characteristics and clinical variables and the eight domains of perceived diabetes-related obstacles. Overall, most sociodemographic variables were not significantly associated with obstacle scores across domains ($p > 0.05$). However, education level ($p = 0.002$) and diabetes duration ($p = 0.045$) were significantly associated with obstacles related to knowledge and beliefs. In addition, random blood glucose level was significantly associated with obstacles to advice and support ($p = 0.029$). No significant associations were observed for the remaining domains.

Table 4. Bivariate associations between sociodemographic and clinical variables and diabetes obstacle domains (n = 237)

Variables	Medication	Self-Monitoring	Knowledge and Beliefs	Diagnosis	HCP Relationships	Lifestyle Changes	Coping with Diabetes	Advice and Support
Age[a]	0.855	0.342	0.471	0.845	0.594	0.154	0.098	0.755
Gender[b]	0.052	0.674	0.104	0.666	0.190	0.875	0.461	0.859
Education level[b]	0.093	0.756	0.002*	0.592	0.202	0.380	0.934	0.531
Employment status[b]	0.885	0.377	0.062	0.375	0.234	0.734	0.713	0.121
Monthly income[b]	0.994	0.612	0.522	0.226	0.554	0.469	0.065	0.244
Marital status[b]	0.123	0.749	0.152	0.646	0.506	0.688	0.591	0.283
Diabetes duration[a]	0.556	0.330	0.045*	0.630	0.776	0.717	0.057	0.501
Random blood glucose level[a]	0.286	0.391	0.392	0.258	0.997	0.324	0.351	0.029*

Note. Values are two-tailed *p*-values.
[a] Spearman's rho; [b] Mann–Whitney U test; *$p < 0.05$.

3.4 Multivariable analysis of predictors of diabetes-related obstacles

Table 5 presents the results of the multiple linear regression analyses examining predictors of perceived diabetes-related obstacles across domains. For medication-related obstacles, the overall model was not statistically significant ($p = 0.155$), and none of the included predictors showed significant associations, although education level approached significance ($p = 0.084$). For the knowledge and beliefs domain, the model showed limited explanatory power (Adjusted $R^2 = 0.077$) and was not statistically significant ($p = 0.105$). Within this model, variables of education level (B = - 3.656, $p = 0.003$), employment status (B = -1.919, $p = 0.024$), and diabetes duration (B = -0.123, $p = 0.021$) were significantly associated with obstacle scores, indicating that these factors significantly influenced perceived challenges in this domain. However, these findings should be interpreted with caution, given the non-significant overall model.

In the domain of relationships with healthcare professionals, education level was the only significant predictor (B = -2.883, $p = 0.043$), although the overall model was not statistically significant ($p = 0.157$). No significant predictors were identified for obstacles related to diagnosis or lifestyle changes. Furthermore, in the model for coping with diabetes, the overall model approached statistical significance ($p = 0.066$), although none of the predictors were statistically significant; diabetes duration showed a borderline association ($p = 0.078$).

Notably, the model for obstacles associated with advice and support was statistically significant ($p = 0.003$), and explained 4.6% of the variance in obstacle scores. Employment status (B = -0.908, $p = 0.017$), monthly income (B = 1.068, $p = 0.036$), and random blood glucose level (B = 0.007, $p = 0.010$) were identified as significant predictors. No significant associations were observed between any sociodemographic or clinical variables and obstacles in the self-monitoring domain; therefore, this domain was not included in the multivariate analysis.

Overall, multivariable analyses indicate that while most variables were not consistently associated with perceived obstacles across all domains, specific factors, such as education level, employment status, diabetes duration, and glycaemic control, were associated with perceived barriers in selected domains, particularly knowledge and beliefs, and advice and support.

Table 5. Multiple linear regression analyses of predictors of perceived diabetes-related obstacles across domains (n = 237)

Variables	B	SE	t	*p*	95% CI		Adj. R^2
					Lower	Upper	
Obstacles to medication (*p* = 0.155)							
Gender	0.243	0.258	0.943	0.346	-0.265	0.751	0.010
Education level	1.126	0.650	1.733	0.084	-0.154	2.407	
Marital status	-0.683	0.530	-1.289	0.199	-1.728	0.361	
Obstacles to self-monitoring				N/A			
Obstacles to knowledge and beliefs (*p* = 0.105)							
Gender	0.795	0.476	1.668	0.097	-0.144	1.733	0.077
Education level	-3.656	1.206	-3.032	0.003	-6.031	-1.281	
Employment status	-1.919	0.843	-2.277	0.024	-3.580	-0.259	
Marital status	-1.140	0.981	-1.162	0.246	-3.073	0.793	
Diabetes duration	-0.123	0.053	-2.317	0.021	-0.227	-0.018	
Obstacles to diagnosis (*p* = 0.117)							
Monthly income	0.844	0.537	1.572	0.117	-0.214	1.902	0.006
Obstacles to relationships with healthcare professionals (*p* = 0.157)							
Gender	0.439	0.561	0.783	0.434	-0.666	1.544	
Education level	-2.883	1.420	-2.031	0.043	-5.680	-0.086	0.009
Employment status	-0.788	0.987	-0.798	0.426	-2.733	1.158	
Obstacles to lifestyle changes (*p* = 0.163)							
Age	-0.051	0.036	-1.400	0.163	-0.122	0.021	0.004
Obstacles to coping with diabetes (p = 0.066)							
Age	-0.020	0.024	-0.832	0.406	-0.068	0.028	0.018
Monthly income	0.765	0.598	1.279	0.202	-0.413	1.942	
Diabetes duration	-0.052	0.030	-1.773	0.078	-0.111	0.006	
Obstacles to advice and support (*p* = 0.003)							
Employment status	-0.908	0.378	-2.403	0.017	-1.653	-0.163	0.046
Monthly income	1.068	0.507	2.109	0.036	0.070	2.066	
Random blood glucose level	0.007	0.003	2.583	0.010	0.002	0.012	

Note. B = unstandardized coefficient; SE = standard error; t= t value; *p*-value < 0.05; CI = confidence interval; Adj R^2 = adjusted R^2

3.5 *Domain-specific findings*

Overall, most participants in this study selected "strongly disagree" or "disagree," suggesting that many did not perceive major barriers. However, notable challenges were identified across several domains (see Supplementary Figures S1–S8). In the medication domain, while a few participants reported difficulties accessing or using medication, 60 participants reported feeling resentful about taking medication, and 67 participants perceived insulin as complicating their lives. In the self-monitoring domain, fewer than one-third of participants found it uncomfortable, unhelpful, or frustrating. In the knowledge and beliefs domain, most participants felt informed, although one-third lacked awareness of the consequences of diabetes and the necessary treatments.

Moreover, in the diagnosis domain, more than two-fifths of participants reported feelings of guilt upon diagnosis, and over one-third did not view diabetes as a serious condition. In the domain of relationships with healthcare professionals, although most interactions were positive,

two-fifths of participants reported receiving inadequate information about treatment alternatives. In the lifestyle changes domain, up to one-third of participants reported difficulties with social life, diet, personal relationships, and family dynamics, making it the most consistently challenging domain. In the coping domain, nearly half of the participants reported making sacrifices in managing diabetes, and 87 participants felt family members were burdened by their condition. Finally, in the advice and support domain, fewer than one-fifth of participants reported substantial barriers. Taken together, lifestyle modification emerged as the most consistently reported challenge, although obstacles were identified across all domains.

4. Discussion

This study provides a detailed overview of the perceived obstacles faced by individuals living with diabetes in Central Java, Indonesia, across the eight domains of the DOQ. Although the diagnosis, knowledge and beliefs, and self-monitoring domains emerged as the most prominent concerns, the predominance of 'strongly disagree' and 'disagree' responses across domains suggests that many participants did not perceive substantial barriers to managing their diabetes. This finding may reflect adaptive coping over time, familiarity with treatment routine, or the influence of ongoing support through primary health care services, particularly within programs such as *Prolanis*. However, a closer examination of domain-specific responses revealed several notable challenges warranting further consideration, highlighting that even when overall barriers appear low, specific aspects of living with diabetes remain problematic.

The prominence of diagnostic-related obstacles suggests that challenges may arise early in the illness trajectory, particularly in understanding and accepting the condition. Many participants in this study reported feelings of guilt upon diagnosis and often underestimated the severity of their disease. Difficulty understanding or accepting a diagnosis may hinder adherence to medication and the adoption of healthy lifestyle behaviours. This response may be influenced by societal stigma, internalized feelings of blame, or the normalisation of diabetes due to its high prevalence (Speight et al., 2024).

In the Javanese cultural context, illness is often understood through a combination of biomedical, social, and spiritual frameworks (Febriyanti et al., 2024; Martinez et al., 2026). As a result, individuals may delay taking proactive steps to manage their health. The Javanese concept of *"Nerimo,"* which refers to accepting one's fate with patience (Yunanto, 2023), may shape responses to illness. However, this concept is sometimes misunderstood and may lead to passive acceptance rather than active self-management. Kuswaya and Ma'mun (2020) noted that such interpretations may discourage individuals from taking control of their health. Therefore, diagnosis-related obstacles may reflect not only gaps in knowledge but also culturally mediated processes of meaning-making and acceptance. This is also evident in the fact that many participants reported feeling they had to make personal sacrifices and were worried about placing a burden on their families. These findings highlight the emotional and relational aspects of living with diabetes, showing that the condition affects not only physical health but also personal and family dynamics. These perceptions are consistent with the Burden of Treatment Theory, which suggests that managing chronic illness imposes demands not only on individuals but also on their family members, influencing both emotional health and relational interactions (May et al., 2014). Strengthening early communication, providing culturally sensitive education, and offering psychosocial support are therefore essential for effective diabetes management. Improving understanding of diagnosis can also lead to better self-management practices.

Similarly, obstacles in the knowledge and beliefs domain may be influenced by the coexistence of biomedical information and traditional understandings of health. In Central Java, dietary practices are embedded in cultural identity, with staple foods such as white rice and sweetened beverages forming an integral part of daily consumption and social interaction (Monterrosa et al., 2025; Pribadi et al., 2025). Communal eating practices (e.g., *tumpengan, bancakan*) and norms of hospitality may make dietary modification particularly challenging, as refusing offered food may be perceived as socially inappropriate. These traditions may hinder adherence to dietary restrictions essential for effective diabetes management. Furthermore, among Javanese populations, sociocultural factors, such as the tradition of serving sweet foods during social gatherings, have been associated with the prevalence of diabetes mellitus (Fadhillah, 2024). While these practices hold important cultural values, excessive or frequent consumption of sweet foods can increase the risk of developing diabetes. Consequently, these cultural norms

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may limit individuals' ability to adhere to recommended lifestyle changes, despite their awareness of their importance.

Interestingly, no significant sociodemographic or clinical predictors were identified for obstacles in the self-monitoring domain. This suggests that barriers to self-monitoring may be relatively consistent across groups and less influenced by individual characteristics such as age, gender, or socioeconomic status. While this finding points to potential structural factors, previous research highlights barriers related to self-regulation, access to resources, environmental conditions, and social influences (Carvalho et al., 2024). The relative homogeneity of participants engaged in primary healthcare programmes may also have contributed to this finding, as shared exposure to education and services may reduce variability in perceived barriers.

Multivariate analyses further demonstrated that specific factors, particularly education level, employment status, and diabetes duration, were associated with obstacles in selected domains. For example, education and employment were significantly associated with knowledge and beliefs, suggesting that socioeconomic position may influence individuals' ability to access, interpret, and apply health information. Workplace environments may also facilitate health learning through structured programs, employer-provided insurance plans, or peer support networks (Peñalvo et al., 2021). Additionally, diabetes duration was associated with this domain, reflecting the evolving nature of illness perception as individuals gain experience and adapt their understanding of the disease.

In contrast, obstacles related to advice and support were associated with employment status, income, and glycaemic control, highlighting the role of both socioeconomic resources and clinical status in shaping access to support systems. Although interactions with healthcare professionals were generally positive, a notable proportion of participants reported receiving inadequate information about treatment alternatives, suggesting limited shared decision-making, and had a few barriers to accessing advice and support. Previous studies have identified systemic challenges, including uneven access to healthcare professionals, fragmented care, and persistent cultural barriers, which may exacerbate these obstacles (Putri et al., 2020; Stein et al., 2020).

Previous research also indicates that, despite participation in workplace wellness programs, individuals may continue to experience the effects of diabetes in occupational settings, including stress-related challenges (McCarthy et al., 2021). Moreover, dietary adherence often remains difficult even among employed individuals, highlighting the persistent influence of family expectations and household food environments on daily self-management practices (Woodward et al., 2024). These findings align with recommendations that social and family support are therefore critical in shaping self-management behaviours (Chan et al., 2020; Stenberg & Hjelm, 2024).

Despite these associations, the overall low explanatory power of the models suggests that perceived obstacles are not strongly determined by sociodemographic characteristics alone. Instead, they are likely shaped by a complex interplay of cultural norms, social expectations, health system factors, and individual experiences. In the Javanese context, values such as social harmony, respect, and collective practices may subtly influence health behaviours and perceptions in ways that conventional demographic variables do not fully capture.

Overall, these findings show that although general barriers may appear limited, meaningful obstacles persist across the emotional, cognitive, and behavioural domains of diabetes management. This underscores the importance of adopting culturally responsive approaches to diabetes care. Addressing these challenges requires a person-centred, culturally sensitive approach that integrates psychosocial support, patient education, and shared decision-making within primary health care settings. This study also highlights how people negotiate health care services alongside their cultural practices. In this context, diabetes self-management involves not only behavioural change but also the negotiation of cultural identity and social belonging.

5. Implications and limitations

The findings of this study carry significant implications for nursing practice. Nurses play a vital role in overcoming initial barriers, particularly by enhancing patients' understanding and acceptance of a diabetes diagnosis through structured education and counselling. The influence of various sociodemographic factors underscores the need for tailored, literacy-sensitive interventions that incorporate culturally responsive care and address locally embedded beliefs and practices influencing self-management. Additionally, nurses should focus on strengthening

care coordination and support systems at both the individual and system levels. Overall, these findings advocate for the expansion of nursing roles toward a more holistic, person-centred, and culturally grounded approach to diabetes care.

This study had several limitations. First, the final sample size was smaller than anticipated, which may limit generalisability. Second, the study did not distinguish between type 1 and type 2 diabetes, as Indonesian health records often do not differentiate between the two, despite their differing management strategies. Third, non-participation due to disinterest or discomfort may have introduced selection bias. Furthermore, because participants were recruited from PHCs with a high prevalence of diabetes and were enrolled in *Prolanis*, the findings may not be generalisable to individuals with diabetes who are not engaged in structured primary care programs or who receive care in lower-volume facilities. Despite these limitations, this study provides one of the most comprehensive assessments of the obstacles faced by people living with diabetes in Indonesia, particularly in primary health care settings where nurses play a central role in diabetes management and patient education. By integrating psychosocial assessment, education, and supportive counselling into routine diabetes care, nurses can contribute to more holistic, sustainable, and effective care for individuals living with diabetes.

6. Conclusion

In conclusion, this study shows that although many individuals in Central Java do not perceive substantial barriers to diabetes management, specific challenges persist in the domains related to diagnosis, knowledge, and support. These obstacles are shaped not only by individual and clinical factors but also by broader sociocultural contexts. Addressing these dimensions is essential to developing more effective, person-centred, and culturally grounded diabetes management strategies. Future research should explore self-management strategies, such as digital health interventions, peer support groups, and workplace programs, and examine how family dynamics and cultural practices affect self-management behaviours.

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Author contributions

NSDK initiated the conceptualisation, methodology, project administration, data collection, data analysis, and writing—original draft, review, and editing. FH contributed to data collection and analysis, provided important intellectual content, and provided feedback during manuscript drafting. ZRC, NSN, EBU, MAP, and KL have all played vital roles in the comprehensive process of data collection, data processing, and manuscript development.

Conflict of interest

No conflict of interest declared.

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Declaration of generative AI in scientific writing

Generative artificial intelligence tools, including Grammarly and ChatGPT, were employed during the preparation of this manuscript to enhance language, correct grammar, and organise ideas effectively. The authors thoroughly reviewed and revised the outputs, thereby taking full responsibility for the manuscript's accuracy and integrity.

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