Nursing Science Journal (NSJ)
Volume 7, Nomor 1, Juni 2026
Hal 113-123

p-ISSN: 2722-4988
e-ISSN : 2722-5054

PENGETAHUAN, SIKAP, DAN PRAKTIK TENTANG MANAJEMEN DIRI DIABETES PADA PASIEN DIABETES MELITUS TIPE 2

Bayu Nirwana[1*], Novian Mahayu Adiutama[2], Wardah Fauziah[3], Minanton[4], Dewi Rahayuningsih[5], Nuridha Fauziyah[6]
[1,2,3,4,6]Program Studi Keperawatan, Jurusan Kesehatan, Politeknik Negeri Subang
[5]Program Studi Magister Kebidanan, Fakultas Kedokteran, Universitas Padjadjaran
*E-mail: byunirwana@gmail.com

ABSTRAK

Latar Belakang: Pengetahuan, sikap, dan praktik (*Knowledge, Attitude, and Practice/KAP*) merupakan komponen penting dalam keberhasilan manajemen diri pasien Diabetes Melitus Tipe 2 (DMT2). Namun, kemampuan KAP yang belum optimal masih menjadi kendala dalam pengelolaan penyakit dan pencapaian luaran kesehatan yang lebih baik. **Tujuan:** Menilai tingkat pengetahuan, sikap, dan praktik manajemen diri pada pasien DMT2 serta menganalisis hubungan di antara ketiga variabel tersebut. **Metode:** Penelitian kuantitatif dengan desain deskriptif korelasional dan pendekatan *cross-sectional* dilakukan pada 150 pasien DMT2 di fasilitas pelayanan kesehatan primer di Jawa Barat, Indonesia. Sampel dipilih menggunakan teknik *consecutive sampling*. Data dikumpulkan menggunakan kuesioner KAP yang telah tervalidasi, meliputi 20 item pengetahuan, 10 item sikap, dan 15 item praktik. Analisis data menggunakan statistik deskriptif, uji korelasi Spearman, dan regresi linear berganda. **Hasil:** Sebanyak 64,0% responden memiliki pengetahuan yang baik, 58,7% menunjukkan sikap positif, dan 54,7% memiliki praktik manajemen diri yang baik. Terdapat hubungan positif yang signifikan antara pengetahuan dan sikap ($r=0,432$; $p<0,001$), pengetahuan dan praktik ($r=0,518$; $p<0,001$), serta sikap dan praktik ($r=0,476$; $p<0,001$). Analisis regresi menunjukkan bahwa pengetahuan merupakan prediktor terkuat praktik manajemen diri ($\beta=0,412$; $p<0,001$), diikuti oleh sikap, tingkat pendidikan, dan lama menderita diabetes. **Kesimpulan:** Pengetahuan, sikap, dan praktik saling berhubungan secara signifikan pada pasien DMT2. Edukasi diabetes yang komprehensif, dukungan perilaku, dan pemberdayaan pasien diperlukan untuk meningkatkan kemampuan manajemen diri serta memperbaiki luaran kesehatan jangka panjang.

Kata Kunci: Diabetes Melitus Tipe 2; Pengetahuan; Sikap; Praktik; Manajemen Diri.

ABSTRACT

***Background**: Knowledge, Attitude, and Practice (KAP) are essential components of successful self-management among patients with Type 2 Diabetes Mellitus (T2DM). However, inadequate levels of KAP remain a major challenge in effective disease management and the achievement of better health outcomes.* ***Objective**: This study aimed to assess the levels of knowledge, attitude, and self-management practices among patients with T2DM and to examine the relationships among these three variables.* ***Methods**: A quantitative study employing a descriptive correlational design with a cross-sectional approach was conducted among 150 patients with T2DM attending primary healthcare facilities in West Java, Indonesia. Participants were recruited using a consecutive sampling technique. Data were collected using a validated KAP questionnaire consisting of 20 knowledge items, 10 attitude items, and 15 practice items. Data were analyzed using descriptive*

statistics, Spearman's rank correlation test, and multiple linear regression analysis. ***Results****: Of the participants, 64.0% demonstrated good knowledge, 58.7% had positive attitudes, and 54.7% exhibited good diabetes self-management practices. Significant positive correlations were found between knowledge and attitude ($r = 0.432$, $p < 0.001$), knowledge and practice ($r = 0.518$, $p < 0.001$), and attitude and practice ($r = 0.476$, $p < 0.001$). Multiple linear regression analysis revealed that knowledge was the strongest predictor of diabetes self-management practices ($\beta = 0.412$, $p < 0.001$), followed by attitude, educational level, and duration of diabetes.* ***Conclusion****: Knowledge, attitude, and practice were significantly associated among patients with T2DM. Comprehensive diabetes education, behavioral support, and patient empowerment are essential to improve self-management capabilities and achieve better long-term health outcomes.*

Keywords*: Type 2 Diabetes Mellitus; Knowledge; Attitude; Practice; Self-Management.*

Background

Type 2 Diabetes Mellitus (T2DM) is one of the most prevalent chronic diseases worldwide and continues to pose a substantial challenge to healthcare systems due to its long-term complications, impact on quality of life, and increasing economic burden (Hossain et al., 2024). Effective diabetes management requires not only pharmacological treatment but also active patient participation in self-care activities, including dietary regulation, physical activity, medication adherence, blood glucose monitoring, and complication prevention (Młynarska et al., 2025). Consequently, adequate knowledge, positive attitudes, and appropriate practices (KAP) are considered fundamental components of successful diabetes self-management (Wang et al., 2024). Evidence suggests that patients with better diabetes-related knowledge and positive attitudes are more likely to engage in recommended self-care behaviors and achieve favorable clinical outcomes (Johnson et al., 2025).

The global burden of diabetes has increased dramatically over recent decades. According to the International Diabetes Federation (IDF) Diabetes Atlas, approximately 589 million adults aged 20–79 years were living with diabetes worldwide in 2024, and this number is projected to reach 853 million by 2050 if current trends persist (Genitsaridi et al., 2026). Indonesia is among the countries with the highest diabetes burden in the Western Pacific Region, with an estimated 20.4 million adults living with diabetes (Minister of Health of the Republic of Indonesia, 2025). Despite significant advances in diabetes treatment and the widespread implementation of Diabetes Self-Management Education (DSME), suboptimal glycemic control and diabetes-related complications remain prevalent. This condition indicates that many patients continue to experience difficulties in translating health information into effective self-management behaviors (Ernawati et al., 2021).

Several studies have examined the relationship between KAP and diabetes management outcomes. Previous findings consistently demonstrated that higher levels of diabetes knowledge are associated with more

favorable attitudes and improved self-management practices (Pi et al., 2024; Wang et al., 2024). Furthermore, educational interventions have been shown to improve patients' knowledge, self-efficacy, and adherence to recommended diabetes care behaviors (Powers et al., 2020). Nevertheless, the determinants of KAP remain inconsistent across different populations. Factors such as educational level, duration of illness, socioeconomic status, health literacy, access to healthcare services, and family support have been reported to influence diabetes-related knowledge and self-management behaviors, although their relative contributions vary considerably between settings (Johnson et al., 2025; Pi et al., 2024; Wang et al., 2024).

Although previous studies have examined knowledge, attitude, or diabetes self-management practices individually, comprehensive investigations assessing these three domains simultaneously remain limited, particularly in Indonesia. Moreover, most existing studies have primarily focused on describing KAP levels without identifying the relative contribution of knowledge, attitude, and sociodemographic factors in predicting self-management practices. Given the differences in sociocultural characteristics, health literacy, and healthcare accessibility across populations, findings from other countries may not be directly applicable to the Indonesian context. Therefore, this study aimed not only to assess the levels of knowledge, attitude, and practice regarding diabetes self-management among patients with Type 2 Diabetes Mellitus in West Java, Indonesia, but also to examine the interrelationships among these domains and identify significant predictors of self-management practice. The findings are expected to provide evidence for developing more targeted nursing education and self-management interventions in primary healthcare settings.

Methods

Research design

This study employed a quantitative descriptive correlational design using a cross-sectional approach to assess the knowledge, attitude, and practice regarding diabetes self-management among patients with Type 2 Diabetes Mellitus.

Setting and sample

The study was conducted between January and March 2026 at several primary healthcare facilities in West Java, Indonesia. The target population consisted of adult patients diagnosed with Type 2 Diabetes Mellitus. The inclusion criteria were diagnosed with T2DM for at least six months, aged ≥18 years, able to communicate effectively, anf willing to participate. The exclusion criteria were cognitive impairment and severe complications requiring hospitalization.

The minimum sample size was calculated using G*Power software with a medium effect size (0.30), α=0.05, and power=0.80, resulting in a minimum sample of 138 participants. A

total of 150 respondents were recruited using consecutive sampling.

Instruments and data collection

Data were collected using a structured Knowledge, Attitude, and Practice (KAP) questionnaire adapted from previously validated diabetes self-management instruments (Adiutama & Ellina, 2025). The questionnaire consisted of three domains, namely knowledge, attitude, and practice. The knowledge domain contained 20 items assessing respondents' understanding of diabetes mellitus, including disease management, medication adherence, dietary regulation, physical activity, blood glucose monitoring, and complication prevention. The total knowledge score ranged from 0 to 20, with higher scores indicating better diabetes-related knowledge. Knowledge levels were categorized as poor (<60%), moderate (60–79%), and good (≥80%).

The attitude domain consisted of 10 items measured using a five-point Likert scale ranging from strongly disagree to strongly agree. This domain assessed respondents' perceptions, beliefs, and attitudes toward diabetes self-management. The total attitude score ranged from 10 to 50, with higher scores reflecting more positive attitudes toward diabetes management. The practice domain included 15 items evaluating respondents' self-management behaviors, such as medication adherence, dietary practices, physical activity, blood glucose monitoring, and routine healthcare visits. Responses were recorded using a Likert-type scale, resulting in a total score ranging from 15 to 75, with higher scores indicating better self-management practices (Adiutama & Ellina, 2025).

Prior to data collection, the instrument underwent validity and reliability testing. The content validity index (CVI) was 0.91, indicating excellent content validity. Reliability testing demonstrated satisfactory internal consistency, with Cronbach's alpha coefficients of 0.82 for the knowledge domain, 0.85 for the attitude domain, and 0.88 for the practice domain. Data were collected through face-to-face interviews conducted by trained research assistants after obtaining informed consent from all participants.

Data analysis

Data were analyzed using IBM Statistical Package for the Social Sciences (SPSS) version 26. Descriptive statistics were employed to summarize respondents' demographic characteristics and KAP scores. Continuous variables were presented as means and standard deviations, whereas categorical variables were reported as frequencies and percentages. The relationships among knowledge, attitude, and practice scores were examined using Spearman's rank correlation analysis because the data were not normally distributed. Furthermore, multiple linear regression analysis was performed to identify factors associated with diabetes self-management practices while controlling for potential confounding variables. Statistical significance was determined at a p-value of less than 0.05.

Before performing the multiple linear regression analysis, regression assumptions were assessed. The normality of residuals, multicollinearity, homoscedasticity, and linearity were evaluated using standard diagnostic procedures. The regression analysis was conducted only after these assumptions had been examined to ensure the appropriateness of the model. Residuals were normally distributed (Shapiro–Wilk, p = 0.124). Tolerance values ranged from 0.62 to 0.88 and VIF values from 1.14 to 1.61, indicating no multicollinearity. Scatterplots demonstrated homoscedasticity and linear relationships between predictors and the outcome variable.

Research ethics

The authors declare that this study adhered to the ethical principles of human research, including voluntary participation, informed consent, confidentiality, anonymity, beneficence, and respect for participants' rights. All respondents were informed about the purpose of the study and provided their consent prior to participation. Since the study involved a minimal-risk cross-sectional survey using anonymous questionnaires without any clinical intervention, biological sample collection, or manipulation of participants, formal ethical approval was not required under the applicable institutional guidelines. However, all ethical principles governing research involving human participants were strictly observed throughout the study.

Result

A total of 150 patients with Type 2 Diabetes Mellitus participated in this study. The mean age of respondents was 58.3 years (SD = 9.4), with the majority being female (54.7%). Most participants had completed senior high school education (35.3%), while only 17.3% had attained higher education. The demographic characteristics of respondents are presented in Table 1.

Table 1. Demographic Characteristics of Respondents (n = 150)

Characteristics	Frequency	Percentage
Male	68	45.3
Female	82	54.7
Age 40–49 years	25	16.7
Age 50–59 years	54	36.0
Age 60–69 years	48	32.0
Age ≥70 years	23	15.3
Elementary School	31	20.7
Junior High School	40	26.7
Senior High School	53	35.3
College	26	17.3

Assessment of knowledge, attitude, and practice revealed that the majority of respondents demonstrated good levels across all domains. Approximately 64.0% of participants had good knowledge regarding diabetes self-management, while 58.7% exhibited positive attitudes toward disease management. Similarly, 54.7% reported good self-management practices. Nevertheless, a considerable proportion of respondents remained within the moderate and poor categories, indicating ongoing challenges in achieving optimal diabetes self-care. The distribution of KAP levels is presented in Table 2

Table 2. Distribution of Knowledge, Attitude, and Practice Levels

Variable	Good n (%)	Moderate n (%)	Poor n (%)
Knowledge	96 (64.0)	42 (28.0)	12 (8.0)
Attitude	88 (58.7)	48 (32.0)	14 (9.3)
Practice	82 (54.7)	50 (33.3)	18 (12.0)

Correlation analysis demonstrated significant positive relationships among all KAP domains. Knowledge showed a moderate positive correlation with attitude ($r = 0.432$, $p < 0.001$) and practice ($r = 0.518$, $p < 0.001$). In addition, attitude was positively associated with practice ($r = 0.476$, $p < 0.001$). These findings suggest that greater diabetes-related knowledge tends to be accompanied by more favorable attitudes and improved self-management behaviors (Table 3).

Table 3. Correlation Between Knowledge, Attitude, and Practice

Variables	r	p-value
Knowledge–Attitude	0.432	<0.001
Knowledge–Practice	0.518	<0.001
Attitude–Practice	0.476	<0.001

Multiple linear regression analysis revealed that knowledge was the strongest predictor of self-management practice ($\beta = 0.412$, $p < 0.001$), followed by attitude ($\beta = 0.285$, $p = 0.002$), educational level ($\beta = 0.176$, $p = 0.014$), and duration of diabetes ($\beta = 0.158$, $p = 0.027$). These findings indicate that both cognitive and psychosocial factors contribute significantly to diabetes self-management behaviors (Table 4).

Table 4. Predictors of Self-Management Practice

Variable	β	p-value
Knowledge Score	0.412	<0.001
Attitude Score	0.285	0.002
Educational Level	0.176	0.014
Duration of DM	0.158	0.027

Discussion

This study found that most participants demonstrated good knowledge, positive attitudes, and relatively adequate self-management practices regarding Type 2 Diabetes Mellitus (T2DM). Nevertheless, a considerable proportion of respondents remained within the moderate and poor categories, indicating that gaps in diabetes self-management persist despite ongoing educational efforts. These findings suggest that access to information alone may not be sufficient to ensure optimal self-care behaviors among patients with T2DM. The persistence of suboptimal KAP levels may reflect broader challenges related to health literacy, socioeconomic conditions, healthcare accessibility, and individual motivation, all of which have been recognized as important determinants of chronic disease management (Afni, 2021; Poureslami et al., 2016).

The present study identified a significant positive relationship between knowledge and attitude. This finding supports the Knowledge-Attitude-Practice (KAP) framework, which proposes that knowledge serves as the cognitive foundation upon which attitudes and beliefs are formed, ultimately influencing

health-related behaviors (Marouzi et al., 2026; Xiong et al., 2020).

Patients who possess a better understanding of diabetes complications, treatment regimens, and lifestyle recommendations may be more likely to perceive the importance of disease management and develop positive attitudes toward self-care. Similar findings have been reported in previous studies conducted in Ethiopia and Saudi Arabia, where higher knowledge scores were consistently associated with more favorable attitudes toward diabetes management (Almousa et al., 2023; Wolde et al., 2025). These findings reinforce the importance of continuous diabetes education as a fundamental component of chronic disease management programs.

Knowledge was also found to be significantly associated with self-management practices and emerged as the strongest predictor of practice behavior. This result is consistent with previous evidence demonstrating that patients with greater diabetes-related knowledge are more likely to adhere to medication regimens, maintain healthy dietary habits, engage in regular physical activity, and perform routine blood glucose monitoring (Y.-C. Chen et al., 2025; Damayanti et al., 2023; Reyes et al., 2017).

However, the moderate magnitude of the correlation observed in this study suggests that knowledge alone does not fully explain behavioral adherence. A substantial body of literature indicates that many patients possess adequate knowledge but fail to translate that knowledge into consistent self-management behaviors (S. Chen et al., 2025). This phenomenon highlights the limitations of information-based interventions and suggests that behavioral change is influenced by additional factors such as self-efficacy, perceived barriers, emotional well-being, family support, and environmental conditions. Therefore, educational interventions that focus solely on knowledge transfer may be insufficient to produce sustained behavioral change.

The significant relationship between attitude and practice observed in this study further emphasizes the importance of psychosocial factors in diabetes self-management. According to the Health Belief Model and Social Cognitive Theory, individuals are more likely to adopt health-promoting behaviors when they perceive benefits from those behaviors and believe they can perform them successfully (Amanda Kartika Azzahra & Luqman Effendi, 2026). Patients who hold positive attitudes toward diabetes management may demonstrate greater motivation, confidence, and commitment to recommended self-care activities. Conversely, negative attitudes, feelings of hopelessness, or perceived treatment burden may reduce adherence and compromise disease control (Rondhianto et al., 2024). These findings suggest that nursing interventions should address not only cognitive aspects of diabetes

education but also emotional and motivational dimensions that influence patient behavior.

Educational attainment was identified as a significant predictor of self-management practice. This finding is consistent with previous studies reporting that higher educational levels are associated with better health literacy and greater capacity to understand and utilize health information effectively (Sung & Lee, 2025). Individuals with higher education may have stronger problem-solving skills, improved access to health information, and greater ability to navigate healthcare systems. However, educational attainment should not be viewed as an isolated determinant of self-management behavior. The association may also reflect broader socioeconomic advantages, including improved access to healthcare resources and social support. Consequently, educational programs should be adapted to the literacy level and cultural context of target populations to ensure equitable access to diabetes self-management support.

The positive association between duration of diabetes and self-management practice observed in this study warrants further consideration. Patients who have lived with diabetes for longer periods may accumulate practical experience in managing their condition and become more familiar with treatment recommendations (Samira Abdul et al., 2024). However, evidence regarding this relationship remains inconsistent. While some studies have reported improved self-management with increasing disease duration, others have identified treatment fatigue and declining adherence among long-term patients (Chan et al., 2024). These inconsistencies suggest that disease duration alone may not determine self-management capacity. Instead, the quality of ongoing education, patient-provider communication, and social support may play more influential roles in sustaining effective self-care behaviors over time.

From a nursing perspective, the findings of this study have important implications for clinical practice. The results indicate that improving diabetes outcomes requires more than simply increasing patient knowledge. Nurses should adopt comprehensive self-management support strategies that integrate patient education, motivational interviewing, goal-setting approaches, family involvement, and individualized counseling. Such interventions may enhance self-efficacy and facilitate the translation of knowledge into sustainable health behaviors. Furthermore, routine assessment of patients' knowledge, attitudes, and self-management practices may help identify individuals at risk for poor diabetes control and enable the provision of targeted interventions.

Several limitations should be acknowledged when interpreting the findings of this study. First, the cross-sectional design precludes the establishment of causal relationships among knowledge, attitude, and self-management practice. Second, the use of self-reported questionnaires may have

introduced information bias, including recall bias and social desirability bias, which could have resulted in overestimation of self-management behaviors. Third, participants were recruited using consecutive sampling from primary healthcare facilities in West Java, which may have introduced selection bias and limited the representativeness of the study population. In addition, although multiple regression analysis was performed to adjust for several variables, residual confounding from unmeasured factors such as income level, health literacy, family support, psychological status, or access to healthcare services cannot be completely excluded.

Furthermore, because the study was conducted exclusively in West Java, the findings may not be fully generalizable to patients with Type 2 Diabetes Mellitus in other regions of Indonesia or different healthcare settings. Future multicenter longitudinal studies involving more diverse populations are recommended to improve external validity and strengthen causal inference.

Conclusion

Patients with Type 2 Diabetes Mellitus demonstrated generally favorable levels of knowledge, attitude, and practice regarding diabetes self-management. Significant positive relationships were observed among KAP domains. Knowledge was identified as the strongest predictor of self-management practice.

Healthcare professionals, particularly nurses, should develop comprehensive educational programs aimed at improving patient knowledge and fostering positive attitudes toward diabetes management. Future studies should employ longitudinal designs to explore causal relationships among KAP variables and evaluate the effectiveness of educational interventions.

Acknowledgment

The authors would like to thank all participants who contributed to this study and the healthcare professionals who facilitated data collection. Appreciation is also extended to Politeknik Negeri Subang for their academic support.

References

Adiutama, N. M., & Ellina, A. D. (2025). *Metodologi Penelitian Kuantitatif dalam Ilmu Keprawatan*. POLSUB PRESS.

Afni, N. (2021). The Role of Health Literacy in Chronic Disease Management: Challenges, Interventions, and Policies. *Journal of Health Literacy and Qualitative Research*, *1*(2), 57–68. https://doi.org/10.61194/jhlqr.v1i2.526

Almousa, A. Y., Hakami, O. A., Qutob, R. A., Alghamdi, A. H., Alaryni, A. A., Alammari, Y. M., Al Harbi, K. M., Alyousef, M. A., Amlih, M. F., Althnayan, M. A., & Almutairi, M. B. (2023). Knowledge, Attitude, and Practice Toward Diabetes Mellitus and Their Association With Socioeconomic Status Among Patients With Type 2 Diabetes Mellitus in Saudi Arabia. *Cureus*. https://doi.org/10.7759/cureus.39641

Amanda Kartika Azzahra & Luqman Effendi. (2026). Determinan Perilaku Penyalahgunaan Napza Teori Health

Belief Model: Studi Literatur 2015-2025. *Vitamin : Jurnal Ilmu Kesehatan Umum*, *4*(1), 14–24. https://doi.org/10.61132/vitamin.v4i1.2018

Chan, J. C., Mbanya, J. C., Chantelot, J., Shestakova, M., Ramachandran, A., Ilkova, H., Deplante, L., Rollot, M., Melas-Melt, L., Gagliardino, J. J., & Aschner, P. (2024). Patient-reported outcomes and treatment adherence in type 2 diabetes using natural language processing: Wave 8 of the Observational International Diabetes Management Practices Study. *Journal of Diabetes Investigation*, *15*(9), 1306–1316. https://doi.org/10.1111/jdi.14228

Chen, S., Wang, Y., Liu, W., Zhang, D., Zhu, J., & Liu, G. (2025). Mechanism of health literacy impact on self-management behaviors in patients with chronic disease: A self-efficacy mediated model moderated by disease duration. *Frontiers in Public Health*, *13*, 1673723. https://doi.org/10.3389/fpubh.2025.1673723

Chen, Y.-C., Huang, Y.-H., & Lee, C.-H. (2025). The Relationship Between Diabetes Knowledge and Diabetes Self-Care Behaviors in Relation to Diabetes Distress in Type 2 Diabetes Mellitus: A Cross-Sectional Study in Eastern Taiwan. *Diabetes, Metabolic Syndrome and Obesity*, *Volume 18*, 1431–1443. https://doi.org/10.2147/DMSO.S503754

Damayanti, A. E., Subiyanto, P., & Febriani, D. H. (2023). Hubungan Dukungan Keluarga dengan Perilaku Self-Management Pasien Diabetes Melitus Tipe 2 di Prolanis Puskesmas Depok III. *Jurnal Keperawatan*, *21*(2), 188–200. https://doi.org/10.35874/jkp.v21i2.1295

Ernawati, U., Wihastuti, T. A., & Utami, Y. W. (2021). Effectiveness of Diabetes Self-Management Education (Dsme) in Type 2 Diabetes Mellitus (T2Dm) Patients: Systematic Literature Review. *Journal of Public Health Research*, *10*(2), jphr.2021.2240. https://doi.org/10.4081/jphr.2021.2240

Genitsaridi, I., Salpea, P., Salim, A., Sajjadi, S. F., Tomic, D., James, S., Thirunavukkarasu, S., Issaka, A., Chen, L., Basit, A., Luk, A. O. Y., Ma, R. C. W., Mbanya, J.-C., Ramachandran, A., Wild, S. H., Duncan, B. B., Boyko, E. J., & Magliano, D. J. (2026). 11th edition of the IDF Diabetes Atlas: Global, regional, and national diabetes prevalence estimates for 2024 and projections for 2050. *The Lancet Diabetes & Endocrinology*, *14*(2), 149–156. https://doi.org/10.1016/S2213-8587(25)00299-2

Hossain, Md. J., Al-Mamun, Md., & Islam, Md. R. (2024). Diabetes mellitus, the fastest growing global public health concern: Early detection should be focused. *Health Science Reports*, *7*(3), e2004. https://doi.org/10.1002/hsr2.2004

Johnson, B. B., Jarvis, M. A., & Chipps, J. A. (2025). Self-management knowledge, attitudes and practices among persons with type 2 diabetes in Ghana. *African Journal of Primary Health Care & Family Medicine*, *17*(1), a4696. https://doi.org/10.4102/phcfm.v17i1.4696

Marouzi, P., Mousavi Baigi, S. F., Fereydouni, F., Hemmatian Rabbani, Z., Haghighi, B., & Shariati Moghaddam, R. (2026). Knowledge, Attitude, and Practice Toward Diabetic Retinopathy Among People With Diabetes: A Systematic Review and Meta-Analysis. *Health Science Reports*, *9*(4), e72097. https://doi.org/10.1002/hsr2.72097

Minister of Health of the Republic of Indonesia. (2025). *Indonesia Health Profile 2025*. Minister of Health of the Republic of Indonesia.

Młynarska, E., Czarnik, W., Dzieża, N., Jędraszak, W., Majchrowicz, G., Prusinowski, F., Stabrawa, M., Rysz, J., & Franczyk, B. (2025). Type 2 Diabetes Mellitus: New Pathogenetic Mechanisms, Treatment and the Most Important Complications. *International Journal of Molecular Sciences*, *26*(3), 1094. https://doi.org/10.3390/ijms26031094

Pi, L., He, B., Fei, D., Shi, X., & Zhou, Z. (2024). Diabetes knowledge, attitudes and practices among Chinese primary care physicians: A cross-sectional study. *BMC Primary Care*, *25*(1), 348. https://doi.org/10.1186/s12875-024-02600-4

Poureslami, I., Nimmon, L., Rootman, I., & Fitzgerald, M. J. (2016). Health literacy and chronic disease management: Drawing from expert knowledge to set an agenda. *Health Promotion International*, daw003. https://doi.org/10.1093/heapro/daw003

Powers, M. A., Bardsley, J. K., Cypress, M., Funnell, M. M., Harms, D., Hess-Fischl, A., Hooks, B., Isaacs, D., Mandel, E. D., Maryniuk, M. D., Norton, A., Rinker, J., Siminerio, L. M., & Uelmen, S. (2020). Diabetes Self-management Education and Support in Adults With Type 2 Diabetes: A Consensus Report of the American Diabetes Association, the Association of Diabetes Care & Education Specialists, the Academy of Nutrition and Dietetics, the American Academy of Family Physicians, the American Academy of PAs, the American Association of Nurse Practitioners, and the American Pharmacists Association. *Diabetes Care*, *43*(7), 1636–1649. https://doi.org/10.2337/dci20-0023

Reyes, J., Tripp-Reimer, T., Parker, E., Muller, B., & Laroche, H. (2017). Factors Influencing Diabetes Self-Management Among Medically Underserved Patients With Type II Diabetes. *Global Qualitative Nursing Research*, *4*, 2333393617713097. https://doi.org/10.1177/2333393617713097

Rondhianto, R., Ridla, A. Z., Murtaqib, M., Kushariyadi, K., & Zulfatul A'la, M. (2024). Patient-centered care model based on self-efficacy to improve self-care and quality of life of people with type 2 diabetes mellitus: A PLS-SEM approach. *Belitung Nursing Journal*, *10*(5), 509–522. https://doi.org/10.33546/bnj.3173

Samira Abdul, Ehizogie Paul Adeghe, Bisola Oluwafadekemi Adegoke, Adebukola Adejumoke Adegoke, & Emem Henry Udedeh. (2024). Promoting health and educational equity: Cross-disciplinary strategies for enhancing public health and educational outcomes. *World Journal of Biology Pharmacy and Health Sciences*, *18*(2), 416–433. https://doi.org/10.30574/wjbphs.2024.18.2.0298

Sung, K., & Lee, S. (2025). Social determinants of health and type 2 diabetes in Asia. *Journal of Diabetes Investigation*, *16*(6), 971–983. https://doi.org/10.1111/jdi.70024

Wang, D., Liu, Z., Liu, Y., Zhao, L., Xu, L., He, S., & Duan, B. (2024). Knowledge, attitudes, and practices among patients with diabetes mellitus and hyperuricemia toward disease self-management. *Frontiers in Public Health*, *12*, 1426259. https://doi.org/10.3389/fpubh.2024.1426259

Wolde, W., Demeke, A. D., Atle, D., Girma, D., & Hailu, S. (2025). Knowledge, attitude, and practice towards diabetes mellitus among Chiro town population, Eastern Ethiopia. *BMC Public Health*, *25*(1), 1638. https://doi.org/10.1186/s12889-025-22902-1

Xiong, S., Ding, M., Li, P., Pan, S., Li, G., & He, W. (2020). A health education model based on knowledge, attitude, and practice used as adjunct therapy for metabolic syndrome complicated with acute pancreatitis: A case report. *Journal of International Medical Research*, *48*(5), 0300060520924272. https://doi.org/10.1177/0300060520924272