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Medication adherence, health-seeking behavior, and quality of life among informal caregivers of diabetic patients in Can Tho City, Vietnam

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ABSTRACT

Objectives: *The primary objective of this study was to examine medication adherence, health-seeking behavior, and quality of life among informal caregivers of diabetic patients in Can Tho City, Vietnam, and to explore relationships among these variables.* ***Methods:*** *A cross-sectional descriptive-correlational design was conducted among 270 informal caregivers recruited by purposive sampling at Can Tho University of Medicine and Pharmacy Hospital. Research instrument: Morisky Medication Adherence Scale, adapted Barriers to Care Evaluation, and World Health Organization Quality of Life - Brief Version. Data were analyzed using descriptive statistics, Pearson correlation, multiple regression, and path analysis.* ***Results:*** *Findings revealed that caregivers reported low levels of medication adherence (48.15%), low barriers to health-seeking behavior (55.19%), and moderate quality of life (47.8%). Significant positive correlation was found between medication adherence and quality of life ($r = 0.55$, $p < 0.001$), while health-seeking barriers were negatively associated with quality of life ($r = -0.29$, $p < 0.001$). Path analysis confirmed that medication adherence partially mediated the relationship between health-seeking behavior and quality of life with a significant direct effect ($\beta = -0.154$, $p < 0.05$), indirect effect ($\beta = -0.137$, $p < 0.001$), and total effect ($\beta = -0.291$, $p < 0.001$).* ***Conclusions:*** *Nursing professionals and health educators should implement targeted interventions that enhance medication adherence and reduce barriers to health-seeking behavior among caregivers.*

Keywords: *medication adherence, health-seeking behavior, quality of life, informal caregivers, diabetes.*

INTRODUCTION

Diabetes mellitus is a growing global health concern, affecting about 589 million adults in 2024, and projected to reach 853 million by 2050. It caused 3.4 million deaths and incurred USD 1.015 trillion in healthcare costs worldwide. In Vietnam, approximately 2.5 million adults live with diabetes, half undiagnosed, leading to preventable complications and heavy healthcare burdens [1]. Rapid demographic and lifestyle changes have further strained healthcare systems and families. The Vietnamese health sector continues to face difficulties in providing adequate long-term diabetes care, while high out-of-pocket costs

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increase household financial pressure[2,3]. Consequently, both patients and families struggle to manage diabetes effectively.

Informal caregivers - family members, partners, friends, or neighbors who provide unpaid care - play a crucial role in diabetes management. They support medication adherence, coordinate medical visits, and encourage self-care behaviors. Intensive caregiving demands often lead to exhaustion, emotional strain, financial hardship, and social isolation [4, 5, 6]. In Vietnam, studies in Northern and Thai Binh provinces reported caregiver burdens related to emotional stress, lack of diabetes knowledge, and insufficient support [7, 8].

Medication adherence, defined as the extent to which patients or caregivers follow prescribed treatment regimens, is essential for glycemic control and preventing complications. Global adherence rates vary and are influenced by socioeconomic conditions, health literacy, and healthcare access. Huang et al. (2021) emphasized that adherence improves glycemic control and reduces complications, thereby indirectly alleviating caregiver burden [9]. Similarly, Vega-Silva et al. (2023) found that higher adherence among patients with type 2 diabetes correlated with improved caregiver physical and emotional well-being [10]. In low- and middle-income countries, barriers such as limited resources and financial constraints hinder consistent adherence [11, 12].

Health-seeking behavior - the actions individuals take to seek consultations, tests, or treatments - is critical for timely diabetes management [13]. Informal caregivers often facilitate this process by arranging appointments, obtaining medications, and communicating with healthcare providers. However, cultural norms, economic limitations, and systemic barriers strongly shape their caregiving practices [14, 15]. In many developing settings, such barriers increase caregiver stress and reduce their ability to provide consistent support, highlighting the need for caregiver-focused health policies[16].

At present, studies on the quality of life of caregivers of diabetic patients, as well as on medication adherence and barriers to health-seeking behavior among caregivers, remain quite limited in Vietnam. Therefore, we conducted this study. This study was conducted to (1) assess medication adherence, health-seeking behavior, and quality of life, and (2) determine their interrelationships among informal caregivers of diabetic patients in Can Tho City.

METHODS

Participants: Informal caregivers of diabetic patients at Can Tho University of Medicine and Pharmacy Hospital

Inclusion criteria: The informal caregivers of diabetic patients who met the following criteria: Aged 18 years or older; Identified as the primary caregiver who regularly assists the diabetic patient with medication, clinic visits, or daily care; Provides care without financial compensation. The caregivers understand the research objectives and are willing to participate in the study.

Exclusion criteria: Caregivers who lack cognitive or physical capacity to participate in the interview. Caregivers of diabetic patients in critical condition at the interview time.

Location and duration of the study: Caregivers were recruited from the Outpatient Department and Internal Medicine Department of Can Tho University of Medicine and Pharmacy Hospital from June 2025 to September 2025.

Research design: This study utilized a cross-sectional descriptive-correlational design.

Sample size: The sample size was calculated using G*Power 3.1.9.7 for a linear multiple regression analysis with two predictors: medication adherence and health-seeking behavior, examining their effects on quality of life. Assuming a small effect size ($f^2 = 0.08$), 80% power, and a significance level of $\alpha = 0.05$, the minimum required sample size was 235 participants. To account for potential attrition, the sample size was increased by 15% [17], resulting in a final target of 270 participants.

Sampling: This study utilized purposive sampling to recruit 270 informal caregivers of patients with diabetes who met predefined inclusion criteria. The researchers approached potential participants at a convenient time and invited them to complete a hard-copy self-administered questionnaire. During the data collection process, participants were provided with clarifications and responses to any questions they had regarding the study.

Research instruments: A structured questionnaire was used to collect data, consisting of four sections adapted from standardized and validated instruments. Prior to data collection, a pilot test was conducted with 30 caregivers to assess the clarity, cultural relevance, and reliability of the instruments; necessary revisions were made accordingly.

Demographic information: This section included variables such as age, sex, education, marital status, and employment status, used to describe participants' characteristics.

Medication adherence: Medication adherence was assessed using the 8-item Morisky Medication Adherence Scale (MMAS-8) developed by Morisky et al. (2008). Each item was rated dichotomously (Yes = 0, No = 1), yielding a total score ranging from 0 to 8. Scores were categorized as low (<6), medium (6 –< 8), and high (8) adherence. The original MMAS-8 demonstrated good internal consistency (Cronbach's $\alpha = 0.83$) and predictive validity[18]. The Vietnamese version of MMAS-8 was adapted for caregivers to assess their perceived adherence of patients under their careIn this study, the adapted caregiver version showed acceptable reliability (Cronbach's $\alpha = 0.77$). The scale was used with the author's permission.

Health-seeking behavior: was measured using a 15-item instrument developed for this study, based on Andersen's Behavioral Model (1968) [19] and adapted from the Barriers to Care Evaluation (BACE) Scale developed by Clement et al. (2012) [20]. Each item was rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The total score ranged from 15 to 75, with higher scores indicating greater barriers to health-seeking behavior, categorized as low (15–34), moderate (35–54), and high (55–75) levels of barriers. The instrument demonstrated strong internal consistency (Cronbach's $\alpha = 0.84$) and good construct validity as confirmed by exploratory factor analysis (three factors explaining 64.3% of total variance).

Quality of life: was assessed using the World Health Organization Quality of Life–BREF (WHOQOL-BREF) developed by the World Health Organization (2010)[21]. This instrument consists of 24 items covering four domains: physical health, psychological health, social relationships, and environmental health, rated on a 5-point Likert scale. The total score ranges from 24 to 120, with higher scores reflecting better quality of life and classified as low (< 72),

moderate (72 –< 96), and high (≥ 96) levels of quality of life. The Vietnamese version validated by Nguyen Buu Tan (2023) showed excellent internal consistency (Cronbach's α = 0.92), which was consistent with the reliability found in this study [22].

Data analysis: Data were analyzed using Jamovi version 2.3.28, consistent with the cross-sectional descriptive-correlational design. Significance was set at $p < 0.05$. Descriptive statistics summarized demographic variables and main constructs. Pearson's r tested correlations among medication adherence, health-seeking behavior, and quality of life. Multiple linear regression identified predictors of quality of life, while mediation analysis examined the indirect effect of health-seeking behavior between medication adherence and QoL using bootstrapping (5,000 samples). Data met the assumptions of normality, linearity, and homoscedasticity, with skewness and kurtosis values within ± 2, supporting the use of parametric and regression-based analyses.

Ethics considerations: The study was conducted in accordance with ethical principles. It received approval from the Institutional Ethics Review Committee of Trinity University of Asia and the Ethics Committee on Biomedical Research of Can Tho University of Medicine and Pharmacy. Written informed consent was obtained from all participants before data collection.

RESULTS

Caregivers were predominantly female (66.3%) with a mean age of 55.48 ± 5.64 years. Most had junior high school education or lower (79.26%), were married (88.15%), and engaged in farming (40.37%), or informal occupations (42.22%).

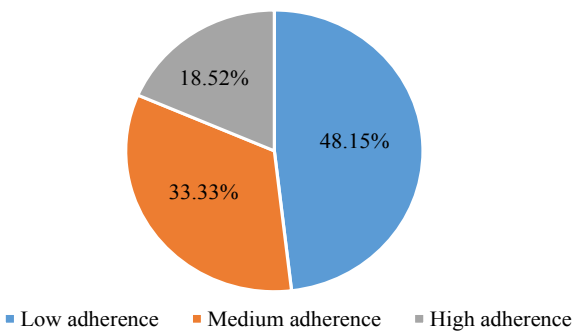

Figure 1. Level of medication adherence of caregivers of diabetic patients

Figure 1 shows that nearly half of the caregivers (48.15%) fall into the low adherence category, one-third (33.33%) demonstrate medium adherence, and only 18.52% reach high adherence.

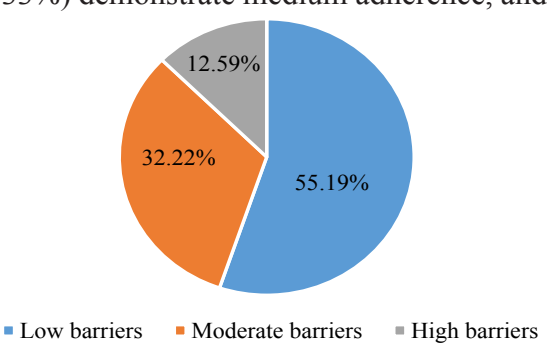

Figure 2. Level of health-seeking barriers of caregivers of diabetic patients

Figure 2 shows that majority of caregivers reported low barriers (55.19%), 32.22% experienced moderate barriers, and 12.59% encountered high barriers.

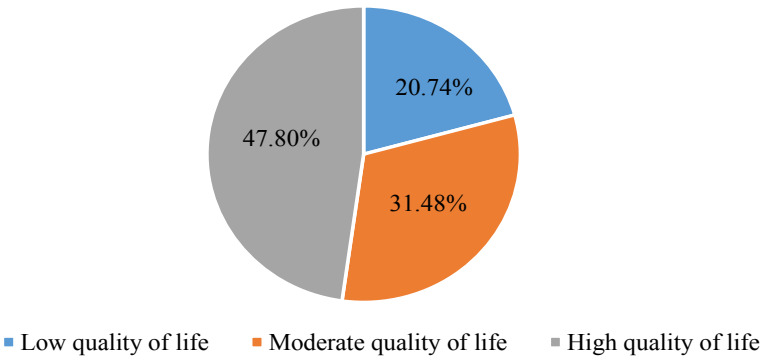

Figure 3. Level of quality of life among caregivers of diabetic patients

Figure 3 shows that nearly half of the caregivers (47.80%) reported a high quality of life, about one-third (31.48%) had a moderate quality of life, and 20.74% experienced a low quality of life.

Table 1. Correlation analysis between medication adherence and quality of life among caregivers of diabetic patients

Variables		Medication adherence
Quality of life	Pearson's r	0.55
	p-value	< 0.001*
Physical health	Pearson's r	0.57
	p-value	< 0.001*
Psychological	Pearson's r	0.22
	p-value	< 0.001*
Social relationships	Pearson's r	0.50
	p-value	< 0.001*
Environment	Pearson's r	0.60
	p-value	< 0.001*

*Note. * $p < 0.001$. Interpretation: $r \geq 0.70$: Very strong; 0.40 - 0.69: Strong; 0.30 - 0.39: Moderation; 0.20 - 0.29: Weak; 0.01 – 0.19: No or Negligible relationship.*

Table 1 presents the correlation between medication adherence and overall quality of life was strong (r = 0.55). Among the domains, the strongest correlation was with the environment (r = 0.60), followed by physical health (r = 0.57) and social relationships (r = 0.50), all classified as strong. The weakest correlation was with psychological well-being (r = 0.22). All the relationships were statistically significant with $p < 0.001$.

Table 2. Correlation analysis between health-seeking behavior and quality of life among caregivers of diabetic patients

Variables		Quality of life	Physical health	Psychological health	Social relationship	Environment
Health-seeking behavior	Pearson's r	-0.29	-0.32	-0.40	-0.16	-0.16
	p-value	< 0.001**	< 0.001**	< 0.001**	< 0.001**	< 0.001**
Attitudinal and perceptual barriers	Pearson's r	-0.14	-0.15	-0.19	-0.1	-0.08
	p-value	0.018*	0.013*	0.002*	0.113	0.177
Logistical and instrumental barriers	Pearson's r	-0.25	-0.27	-0.27	-0.13	-0.2
	p-value	< 0.001**	< 0.001**	< 0.001**	< 0.029*	0.001**
Psychological and emotional barriers	Pearson's r	-0.28	-0.31	-0.47	-0.15	-0.09
	p-value	< 0.001**	< 0.001**	< 0.001**	0.013*	0.147

*Note. *p < 0.05; **p < 0.001. Interpretation: r ≥ 0.70: Very strong; 0.40 - 0.69: Strong; 0.30 - 0.39: Moderation; 0.20 - 0.29: Weak; 0.01 – 0.19: No or Negligible relationship.*

Table 2 shows that quality of life has a weak negative correlation with health-seeking behavior (r = –0.29, p < 0.001). Attitudinal and perceptual barriers correlate weakly (r = –0.14, p = 0.018), and psychological and emotional barriers show a notable inverse association (r = –0.28, p < 0.001). Across domains, psychological health is most affected, with strong negative correlations for psychological and emotional barriers (r = –0.47, p < 0.001) and for health-seeking behavior (r = –0.40, p < 0.001). In contrast, weaker or non-significant relationships are observed in social relationships and environment, such as attitudinal barriers with environment (r = –0.08, p = 0.177).

Table 3. Path analysis of health-seeking behavior, medication adherence and quality of life among caregivers of diabetic patients

Type	Effect	Estimate	SE	95% C.I.		β	z	p
				Lower	Upper			
Indirect	Health-seeking behavior ⇒ Medication adherence ⇒ Quality of life	-0.2520	0.0602	-0.3700	-0.1341	-0.137	-4.19	<0.001**
Component	Health-seeking behavior ⇒ Medication adherence	-0.0465	0.0100	-0.0661	-0.0269	-0.272	-4.65	<0.001**
	Medication adherence ⇒ Quality of life	5.4211	0.5622	4.3192	6.5230	0.503	9.64	<0.001**
Direct	Health-seeking behavior ⇒ Quality of life	-0.2833	0.0960	-0.4714	-0.0951	-0.154	-2.95	0.003*
Total	Health-seeking behavior ⇒ Quality of life	-0.5353	0.1073	-0.7456	-0.3250	-0.291	-4.99	<0.001**
R^2=0.32; 95% CI [−0.37, −0.13]								

*Note. *p< 0.05; **p < 0.001*

Table 3 presents the results of the path analysis examining the direct and indirect effects of health-seeking behavior on caregivers' quality of life through medication adherence. The findings revealed a significant indirect effect ($\beta = -0.137$, $p < 0.001$, 95% CI [−0.37, −0.13]) - medication adherence partially mediated the relationship between health-seeking behavior and quality of life. Health-seeking behavior negatively predicted medication adherence ($\beta = -0.272$, $p < 0.001$), while medication adherence positively influenced quality of life ($\beta = 0.503$, $p < 0.001$). The direct effect of health-seeking behavior on quality of life remained significant ($\beta = -0.154$, $p = 0.003$), confirming a partial mediation model with an explained variance of 32% ($R^2 = 0.32$).

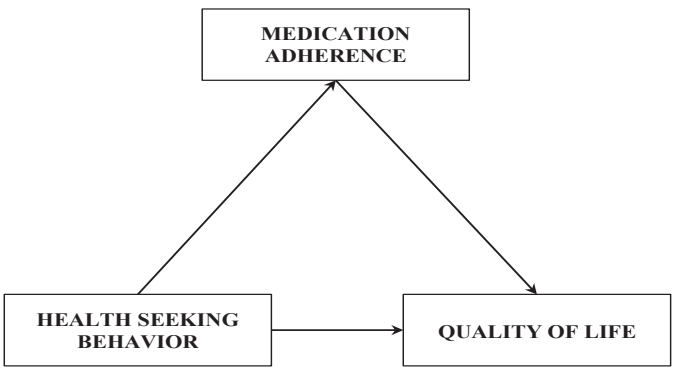

Figure 4. Path analysis model on the quality of life among caregivers of diabetic patients

The figure illustrates a dynamic and interrelated relationship in which medication adherence serves as a partial mediator between health-seeking behavior and the quality of life of informal caregivers of diabetic patients.

DISCUSSION

Medication adherence: Nearly half of the caregivers (48.15%) demonstrated low medication adherence, reflecting difficulties in maintaining consistent treatment routines. This finding aligned with Muñoz-Contreras et al. (2022), who emphasized the significant influence of caregivers on medication management among patients with chronic illnesses [23]. Similarly, the review by Granata et al. (2020) highlighted that evidence on caregivers' adherence behaviors remains limited [24]. Low adherence levels might stem from psychological strain and the dual responsibilities of caregiving, as reported by Setyoadi et al. (2024) and Chardon et al. (2022) [25, 26]. These findings underscore the importance of caregiver-focused interventions such as medication education, regular counseling, and digital support.

Health-seeking behavior: The results showed that the majority of caregivers of diabetic patients (55.19%) experienced low barriers in seeking healthcare services, while 32.22% reported moderate barriers and 12.59% faced high barriers. This indicated relatively good healthcare accessibility among most caregivers, though a notable proportion still encountered certain difficulties. According to Nguyen et al. (2021), informal caregivers in rural Vietnam possed a basic understanding of type 2 diabetes, which facilitated proactive care-seeking behavior. However, limited disease-specific knowledge and inadequate problem-solving skills remain significant

challenges that may hinder healthcare utilization [8].

Similarly, Wantonoro, Astuti, and Hidayati (2023) identified emotional burden, insufficient professional support, and financial constraints as major barriers in diabetes caregiving, which might explain the 12.59% of caregivers with high barriers in this study [27]. Moreover, caregivers' emotional competence had been found to enhance their coping ability and healthcare engagement, as reported by Zan, Zhang, and Li (2024) [28]. Overall, these findings highlighted the need for targeted health education and psychosocial support programs to reduce barriers and improve care quality among caregivers of diabetic patients.

Quality of life: Nearly half of caregivers who reported a high quality of life indicated that many had developed adaptive coping mechanisms, social support resources, or resilience in their caregiving roles. However, the 20.74 % who were rated as having a low quality of life highlighted a subset of caregivers under significant strain. These findings aligned with Zan et al. (2024), who found that caregivers with higher emotional competence tended to exhibit better quality of life and better coping with stress [28]. Moreover, in light of the relatively low barrier scores reported earlier, it could be interpreted that although barriers existed, many caregivers were able to maintain a decent quality of life through personal coping strategies or external support networks.

Nonetheless, the 20.74 % of caregivers with low quality of life deserved special attention. For this group, psychological counseling, financial assistance, caregiver support groups, and strengthening community-based support are considered critical interventions to enhance well-being and sustain caregiving for diabetic patients.

Correlation between medication adherence and the quality of life: Medication adherence was strongly correlated with caregivers' quality of life ($r = 0.55$, $p < 0.001$). Higher adherence was associated with better physical health ($r = 0.57$) and greater satisfaction with environmental conditions ($r = 0.60$), suggesting that consistent medication management alleviates physical strain and improves living conditions. Psychological well-being showed only a weak correlation ($r = 0.22$), indicating that emotional challenges may persist despite improved adherence [6, 29]. Evidence suggested that family and social support played a vital role in enhancing medication adherence among adults with type 2 diabetes, thereby alleviating caregiver burden

Correlation between health-seeking behavior and quality of life: A weak to moderate negative correlation was found between caregivers' health-seeking behavior and their overall quality of life ($r = –0.29$, $p < 0.001$), most evident within the domain of psychological health ($r = –0.40$, $p < 0.001$). This indicate that caregivers who faced greater barriers in accessing healthcare tended to have lower quality of life. Specific barriers, such as psychological and emotional barriers ($r = –0.28$, $p < 0.001$) and logistical and instrumental barriers ($r = –0.25$, $p < 0.001$), also showed significant negative correlations with caregivers' quality of life. These findings were consistent with previous studies showing that caregiver burden is inversely related to quality of life - meaning that as the burden increases, life quality decreases [6, 29].

These findings reinforced the importance of reducing psychological and logistical barriers that prevented caregivers from effectively accessing and maintaining health care. Interventions that provide emotional support, counseling, and practical assistance can play a crucial role in enhancing both mental health and quality of life among caregivers of patients with type 2 diabetes.

Relationships among health-seeking behavior, medication adherence, and quality of life: The result indicated that medication adherence partially mediated the link between health-seeking behavior and caregivers' quality of life. Caregivers who faced fewer barriers to healthcare tended to maintain better adherence, which contributed to improved well-being. This finding aligned with Muñoz-Contreras et al. (2022), who reported that caregivers' involvement significantly enhances adherence and patient outcomes [23]. Similarly, recent reviews highlighted that adherence was influenced by access, affordability, and system-level barriers [30]. In Vietnam, where family members are primary caregivers, reducing healthcare barriers and strengthening adherence support through education and system reforms are essential for improving caregivers' quality of life.

STRENGTHS AND LIMITATIONS

This study was delimited to informal caregivers, excluding nurses, physicians, and paid healthcare providers, to focus on the unique psychosocial and behavioral challenges faced by unpaid family caregivers. Geographically, the study was conducted in one hospital within Can Tho City in the Mekong Delta. This setting provided contextual relevance for exploring caregiver experiences, although the findings might have had limited generalizability to other areas. The study examined only three constructs: medication adherence, health-seeking behavior, and quality of life. Self-reported data and a cross-sectional design were used for feasibility, though these delimitations may restrict causal interpretation and call for future longitudinal research.

CONCLUSION

The study found that nearly half of caregivers (48.15%) demonstrated low medication adherence, while caregivers reported low-to-moderate barriers to health-seeking (overall Mean = 2.28, SD = 1.44), with logistical/instrumental barriers highest (Mean = 2.46). Nearly half reported high quality of life, but 20.74% rated their quality of life as low.

Medication adherence was strongly correlated with caregivers' overall quality of life ($r = 0.55$, $p < 0.001$), notably with physical ($r = 0.57$) and environmental ($r = 0.60$) domains, whereas psychological well-being showed a weak correlation ($r = 0.22$). Health-seeking barriers were negatively associated with quality of life (overall $r = –0.29$; psychological domain $r = –0.40$), indicating that greater barriers relate to poorer caregiver mental health.

Mediation analysis indicated that medication adherence partially mediates the relationship between health-seeking behavior and caregivers' quality of life: caregivers facing fewer barriers tended to maintain better adherence, which contributed to improved well-being. Based directly on the study's discussion, recommended interventions are caregiver-focused medication education, regular counseling, and digital adherence support; health education, skill training, and psychosocial

support; psychological counseling, financial assistance, caregiver support groups, and strengthening community-based support; and system-level reforms to improve access, affordability, and adherence support. These measures are particularly relevant in family-centered care contexts such as Vietnam.

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CONFLICT OF INTEREST

The authors declare no conflict of interest related to this study.

REFERENCES

1. International Diabetes Federation. IDF Diabetes Atlas, 11th edition: Country data – Vietnam. International Diabetes Federation; 2024. Available from: https://diabetesatlas.org/data-by-location/country/viet-nam

2. BMC Public Health. Challenges in diabetes management in Vietnam: Long-term care and healthcare system perspectives. 2023. Available from: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-023-17522-6

3. Le VT, Nguyen HT, Tran DM. Economic burden of diabetes in Vietnam: Direct medical costs and implications for health policy. ScienceDirect; 2020. Available from: https://www.sciencedirect.com/science/article/pii/S0168822719314391

4. Seng JJB, et al. Role of caregivers in remote management of patients with type 2 diabetes mellitus: Systematic review of literature. JMIR Diabetes. 2023;8(1):e46988. doi:10.2196/46988

5. Kolarić, V., Rahelić, V., & Šakić, Z. The quality of life of caregivers of people with type 2 diabetes estimated using the WHOQOL-BREF questionnaire. Diabetology. 2023;4(4), 430–439. https://doi.org/10.3390/diabetology4040037

6. Kristianingrum N, Sari DP, Kurniawati H. Relationship between caregiver burden and quality of life among caregivers of patients with chronic illness. BMC Nurs. 2021;20(1):181. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC8129740/

7. Bui TT, Nguyen HT, Tran DM. Caregiver burden among informal caregivers of individuals with type 2 diabetes in rural Northern Vietnam: A cross-sectional study. 2024. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC11142696

8. Nguyen TTH, Nguyen TP, Le AT, Tran BX. Perceived knowledge on type 2 diabetes of informal caregivers in rural communities of Thai Binh, Vietnam: Implications for health education. J Educ Health Promot. 2021;10(1):328. Available from: https://www.researchgate.net/publication/355741796

9. Huang, J., Ding, S., Xiong, S., & Liu, Z. (2021). Medication adherence and associated factors in patients with type 2 diabetes: A structural equation model. Frontiers in Public Health. 2021;9, 730845. https://doi.org/10.3389/fpubh.2021.730845

10. Vega-Silva, E. L., Barrón-Ortiz, J., Aguilar-Mercado, V. V., Salas-Partida, R. E., & Moreno-Tamayo, K. Quality of life and caregiver burden in caregivers with patients with complications from type 2 diabetes mellitus. Revista Médica del Instituto Mexicano del Seguro Social. 2023;61(4), 440–448. https://doi.org/10.5281/zenodo.8200209

11. Khoiry, Q. A., Chan, H. K., & Mohamed Shah, N. Self-reported medication adherence instruments and their applicability in low- and middle-income countries (LMICs): A systematic review. Frontiers in Public Health. 2023;11, 1104510. https://www.frontiersin.org/articles/10.3389/fpubh.2023.1104510/full

12. Wilder, M. E., Kulkarni, S., Kaur, S., et al. The impact of social determinants of health on medication adherence. Journal of Managed Care & Specialty Pharmacy. 2021;27(4), 473–482. https://pmc.ncbi.nlm.nih.gov/articles/PMC8131473/

13. Vaishnavi, B., et al. Health-seeking behavior of patients with diabetes mellitus: A community-based cross-sectional study. Journal of Current Research in Scientific Medicine. 2021;7(1),33–38. https://journals.lww.com/jcsm/fulltext/2021/07010/health_seeking_behavior_of_patients_with_diabetes.7.aspx

14. Hogan, U., Bingley, A., Morbey, H., & Walshe, C. The experience of informal caregivers in providing patient care in hospitals in low- and middle-income countries: A qualitative meta-synthesis. Journal of Health Services Research & Policy. 2022;27(4), 321–329. https://doi.org/10.1177/13558196221101968

15. Meyrowitsch, D. W., Nielsen, J., Bygbjerg, I. C., Søndergaard, J., Thi, D. K., Huyen, D. B. T., Gammeltoft, T., & Duc, T. N. Unmet needs for informal care among people with type 2 diabetes in rural communities in Vietnam. Public Health in Practice. 2023;5, 100364. https://doi.org/10.1016/j.puhip.2023.100364

16. Beach, B., Bélanger-Hardy, L., Harding, S., Rodrigues Perracini, M., Garcia, L., Tripathi, I., Gillis, M., & Dow, B. Caring for the caregiver: Why policy must shift from addressing needs to enabling caregivers to flourish. Frontiers in Public Health. 2022;10. https://doi.org/10.3389/fpubh.2022.997981

17. Polit DF, Beck CT. Nursing Research: Generating and assessing evidence for nursing practice (11th ed.) 2021. Wolters Kluwer.

18. Morisky D, Ang A, Krousel-Wood M, Ward HJ. Morisky medication adherence scale-8. PsycTESTS Dataset. 2008. doi:10.1037/t58716-000

19. Andersen's behavioral model. In: Encyclopedia of Gerontology and Population Aging. Springer. 2021. doi:10.1007/978-3-030-22009-9_300158

20. Clement S, Brohan E, Jeffery D, Henderson C, Hatch SL, Thornicroft G. Development and psychometric properties of the Barriers to Access to Care Evaluation scale (BACE) related to people with mental ill health. BMC Psychiatry. 2012;12(1). doi:10.1186/1471-244x-12-36

21. WHOQOL-BREF. In: Handbook of Disease Burdens and Quality of Life Measures. Springer New York. 2010. doi:10.1007/978-0-387-78665-0_6927

22. Nguyen BT. (2023). Medication adherence, self-care and quality of life among adult diabetic patients in selected community hospital in Ho Chi Minh City,

Vietnam [Doctoral dissertation]. Trinity University of Asia, Philippines.

23. Muñoz-Contreras MC, Segarra I, López-Román FJ, Galera RN, Cerdá B. Role of caregivers on medication adherence management in polymedicated patients with Alzheimer's disease or other types of dementia. Front Public Health. 2022;10:987936. doi:10.3389/fpubh.2022.987936

24. Granata C, Poot E, Dombrowski S. Family involvement in medication adherence: A review of quantitative studies. Skills4Adherence Project Report; 2020. Available from: https://skills4adherence.eu/wp-content/uploads/2020/12/2-Granata-et-al-2020.pdf

25. Setyoadi S, Sari DP, Wahyuni S. The burden of family caregivers for diabetic patients: A descriptive study. J Res Community Nurs Public Health. 2024;3(2):45–52. Available from: https://ebsina.or.id/journals/index.php/JRCNP/article/view/207

26. Chardon ML, Mazzocco K, Lombardo C, Lucchiari C. Barriers to medication adherence in chronic illness: A systematic review of caregiver and patient perspectives. Patient Prefer Adherence. 2022;16:457–470. doi:10.2147/PPA.S35066587

27. Wantonoro W, Astuti EA, Hidayati R. Barriers and facilitators in diabetes caregiving: A qualitative exploration of family caregivers' perspectives. J Patient Exp. 2023;10:23779608231167801. doi:10.1177/23779608231167801

28. Zan X, Zhang Y, Li H. Emotional competence and quality of life among caregivers of older adults with chronic diseases: A cross-sectional study. BMC Public Health. 2024;24(1):17917. doi:10.1186/s12889-024-17917-z

29. Vega-Silva LF, Dapueto JJ, Ferraz L. Quality of life and burden among caregivers of patients with type 2 diabetes mellitus: A cross-sectional study. Prim Care Diabetes. 2023;17(3):287–295. doi:10.1016/j.pcd.2023.06.007

30. Horvat M, Eržen I, Vrbnjak D. Barriers and facilitators to medication adherence among the vulnerable elderly: A focus group study. Healthcare. 2024;12(17). doi:10.3390/healthcare12171723