

## **Type 2 Diabetes Mellitus in Vietnam: Epidemiology, Risk Factors, Complications, Nursing Implications and Health-System Challenges - A Comprehensive Review**

**Thi-Van Pham<sup>1\*</sup>, Thi-Cham Bui<sup>1</sup>**

<sup>1</sup>Phenikaa School of Medicine and Pharmacy, Phenikaa University, Hanoi, Vietnam.

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### **ABSTRACT**

**Background :** Type 2 diabetes mellitus (T2DM) is an expanding public health problem in Vietnam, driven by population ageing, urbanization, nutritional transition, physical inactivity, obesity, hypertension and limited early detection. Nurses play a central role in diabetes prevention, patient education, self-management support, screening for complications and continuity of care.

**Methods:** This comprehensive review synthesized evidence on T2DM in Vietnam from international databases and authoritative reports. PubMed, Scopus, Web of Science, Google Scholar, WHO, GBD, IDF, PLOS, BMC and Lancet-related sources were searched for Vietnam-specific studies and relevant global evidence published mainly from 2010 to 2026. Evidence was grouped into epidemiology, risk factors, complications, diabetes self-management, nursing care and health-system gaps.

**Results:** National data show a marked increase in diabetes and impaired fasting glycaemia in Vietnam. WHO/MOH STEPS 2021 reported raised blood glucose or current diabetes medication use in 7.1% of adults aged 18-69 years, with a higher rate among adults aged 50-69 years. However, only about one third of affected adults had been previously diagnosed and less than one fourth were being managed at a health facility. Vietnamese studies consistently identify older age, urban residence, obesity, abdominal adiposity, hypertension, dyslipidaemia, physical inactivity, unhealthy diet and family history as major risk factors. Complications such as retinopathy, nephropathy, neuropathy, cardiovascular disease, diabetic foot problems, psychological distress and impaired quality of life are increasingly reported.

**Conclusions:** T2DM in Vietnam represents a growing burden requiring integrated prevention, early detection, chronic disease management and nursing-led self-management support. Strengthening diabetes care at the primary health-care level and expanding nurse-led education may improve glycaemic control, complication prevention and quality of life.

**KEYWORDS:** Type 2 diabetes mellitus, Vietnam, nursing care, self-management, complications, noncommunicable diseases.

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### **INTRODUCTION**

Type 2 diabetes mellitus (T2DM) is one of the most important noncommunicable diseases worldwide. It is associated with long-term metabolic dysfunction and contributes to cardiovascular disease, kidney failure, neuropathy, retinopathy, diabetic foot ulcers, disability and premature mortality (1-4). In low- and middle-income countries, the burden of T2DM is increasing rapidly because of urbanization, sedentary lifestyles, unhealthy dietary patterns, population ageing and limited access to early diagnosis and long-term care (5-8).

Vietnam has undergone rapid demographic, nutritional and epidemiological transitions. These changes have shifted the national disease burden from infectious diseases toward chronic noncommunicable diseases, including diabetes, hypertension, cardiovascular diseases and chronic respiratory diseases (9-12). Earlier systematic evidence showed that national T2DM prevalence increased from 2.7% in 2002 to 5.4% in 2012, while regional studies reported wide variation across urban and rural settings (13). More recent WHO/MOH STEPS 2021 data showed that 7.1% of adults aged 18-69 years had raised blood glucose or were currently receiving medication for diabetes, while 11.0% had impaired fasting glycaemia (14). These findings indicate that diabetes prevention and management have become urgent priorities for Vietnam.

A key challenge is the gap between disease burden and effective care. STEPS 2021 showed that only 34.9% of adults with raised blood glucose or current diabetes medication use had been previously diagnosed, and only 23.3% were being treated or managed at a health facility (14). This suggests that many people with T2DM remain undiagnosed or insufficiently managed. Such gaps increase the risk of preventable complications and long-term health-care costs.

In this context, nursing has an essential role. Nurses are often the first and most frequent point of contact for patients with chronic diseases. Nursing interventions include diabetes education, medication adherence counselling, diet and physical activity guidance, blood glucose monitoring, foot-care instruction, complication screening, psychological support and family engagement (15-18).

## Type 2 Diabetes Mellitus in Vietnam: Epidemiology, Risk Factors, Complications, Nursing Implications and Health-System Challenges - A Comprehensive Review

Evidence from Vietnam also shows that self-management, diabetes knowledge, family support and health-care provider support are important factors influencing diabetes outcomes (19-22). Therefore, this review aims to synthesize current evidence on T2DM in Vietnam and discuss implications for nursing practice, education and health-system strengthening.

### MATERIALS

This review used published studies and official reports related to T2DM in Vietnam. The core evidence sources included national surveys, systematic reviews, cross-sectional studies, hospital-based studies, economic analyses and studies on diabetes self-management and quality of life. Priority was given to publications indexed or traceable through PubMed, Scopus, Web of Science, Google Scholar, WHO, IDF, GBD, PLOS, BMC, BMJ and Lancet-related sources. This review focused on five domains: epidemiological trends of T2DM and raised blood glucose in Vietnam, major risk factors among Vietnamese adults, clinical complications and quality-of-life impacts, diabetes self-management and nursing-related interventions, and health-system challenges with implications for nursing care.

### METHODS

A structured narrative review approach was applied (Figure 1). The following search terms were used alone and in combination: “type 2 diabetes Vietnam”, “diabetes prevalence Vietnam”, “diabetes complications Vietnam”, “diabetes self-management Vietnam”, “diabetes nursing Vietnam”, “raised blood glucose Vietnam”, “STEPS Vietnam 2021”, “diabetes hypertension Vietnam”, “diabetic retinopathy Vietnam”, “diabetic neuropathy Vietnam”, “diabetic nephropathy Vietnam” and “quality of life diabetes Vietnam”. Studies were included if they reported data on Vietnam or Vietnamese populations, addressed T2DM prevalence, risk factors, complications, care, cost, quality of life, or self-management, were published as peer-reviewed articles, systematic reviews, national reports, or authoritative global health reports, and were mainly published from 2010 onwards, while older landmark studies were also included where relevant. Studies were excluded if they were case reports, opinion papers without empirical data, non-human studies, or publications not directly relevant to T2DM in Vietnam.

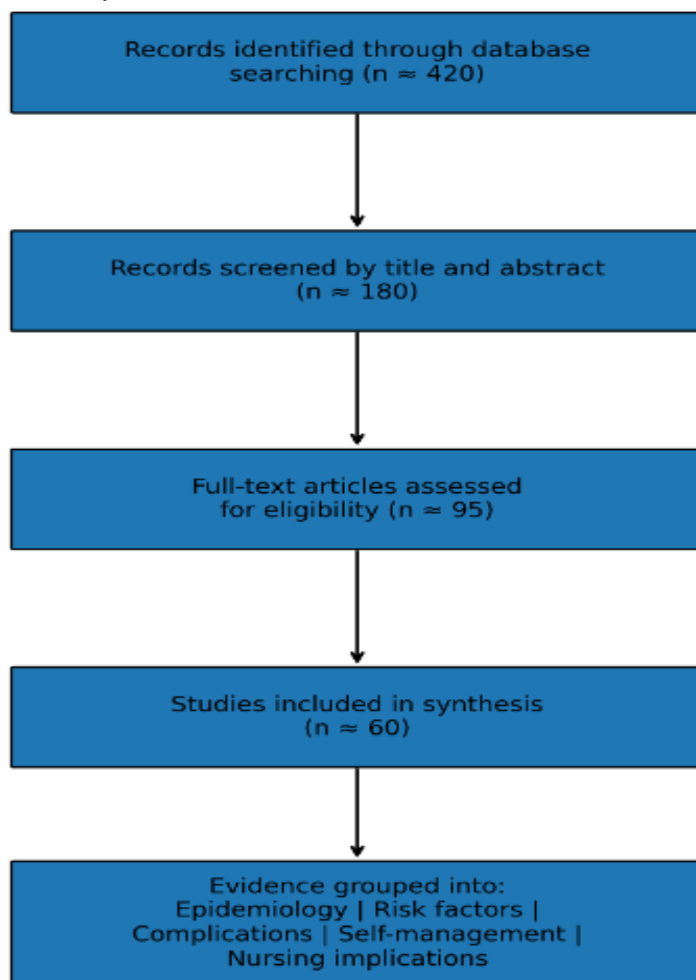


Figure 1. Flow diagram of the review process

# Type 2 Diabetes Mellitus in Vietnam: Epidemiology, Risk Factors, Complications, Nursing Implications and Health-System Challenges - A Comprehensive Review

## RESULTS AND DISCUSSION

### EPIDEMIOLOGICAL BURDEN OF T2DM IN VIETNAM

The prevalence of T2DM in Vietnam has increased substantially over recent decades. Nguyen et al. reported that national prevalence estimates increased from 2.7% in 2002 to 5.4% in 2012 (13) (Table 1). WHO/MOH STEPS 2021 showed that 7.1% of adults aged 18-69 years had raised blood glucose or were currently on medication for diabetes, while impaired fasting glycaemia was reported in 11.0% of adults (14). The rate was markedly higher among older adults, reaching 13.4% in the 50-69 age group (14) (Figure 2). This pattern is consistent with Vietnam's demographic ageing and lifestyle transition. Urbanization, reduced physical activity, increased consumption of energy-dense foods and rising obesity have contributed to metabolic disease. Importantly, national data suggest a substantial undiagnosed burden.

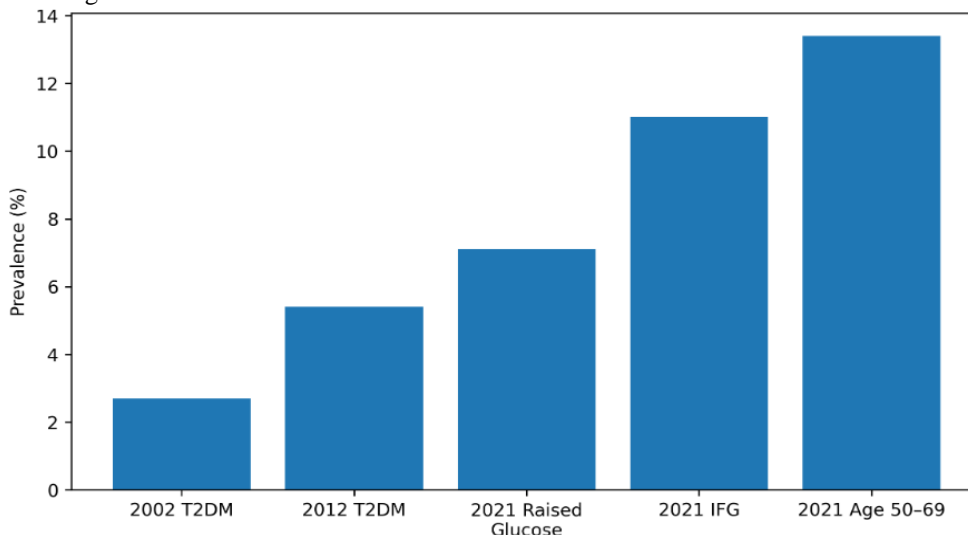


Figure 2. Trends in type 2 diabetes prevalence and glycaemic abnormalities in Vietnam (2002-2021).

Data from Figure 2 illustrates the increasing burden of T2DM and dysglycaemia in Vietnam, showing a steady rise in diabetes prevalence from 2.7% in 2002 to 5.4% in 2012, with WHO/MOH STEPS 2021 reporting 7.1% raised blood glucose prevalence and 11.0% impaired fasting glycaemia in adults aged 18–69 years. The burden was particularly high in adults aged 50–69 years (13.4%) (13,14). In STEPS 2021, only 34.9% of people with raised blood glucose or current diabetes medication use had been previously diagnosed, and only 23.3% were treated or managed at a health facility (14). This diagnostic and treatment gap is a major concern for nursing and primary health care (Figure 3).

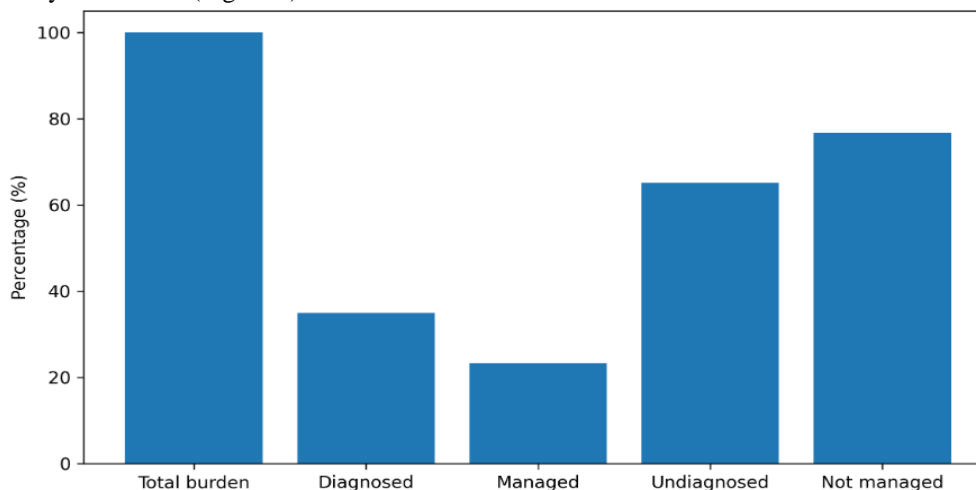


Figure 3. Care cascade of diabetes in Vietnam.

Data from Figure 3 shows the care cascade illustrating substantial gaps in diabetes detection and management in Vietnam. Based on WHO/MOH STEPS 2021, only 34.9% of adults with raised blood glucose or current diabetes medication use had been previously diagnosed, and only 23.3% were receiving management at a health facility. This indicates that 65.1% remained undiagnosed and 76.7% were not connected to formal health-care management, highlighting critical barriers in early detection, continuity of care and chronic disease management (14).

## Type 2 Diabetes Mellitus in Vietnam: Epidemiology, Risk Factors, Complications, Nursing Implications and Health-System Challenges - A Comprehensive Review

**Table 1 Key epidemiological evidence on diabetes and raised blood glucose in Vietnam**

Population / setting	Key finding	Implication	Citation
Vietnamese adults	T2DM prevalence increased from 2.7% in 2002 to 5.4% in 2012	Rapid epidemiological transition	(13)
Adults 18-69 years	Raised blood glucose or current diabetes medication: 7.1%	Current national burden	(14)
Adults 18-69 years	Impaired fasting glycaemia: 11.0%	Large prediabetes-risk population	(14)
Adults 50-69 years	Raised blood glucose or medication: 13.4%	Ageing increases diabetes burden	(14)
Adults with raised glucose/medication	Previously diagnosed: 34.9%; treated at facility: 23.3%	Major detection and care gap	(14)

Table 1 shows that the burden of diabetes in Vietnam has increased substantially over time. The systematic review by Nguyen et al. reported that national T2DM prevalence increased from 2.7% in 2002 to 5.4% in 2012, indicating a rapid epidemiological transition in the country (13). More recent WHO/MOH STEPS 2021 data further confirmed this trend, showing that 7.1% of adults aged 18-69 years had raised blood glucose or were currently using diabetes medication, while 11.0% had impaired fasting glycaemia (14). The burden was particularly high among older adults, with 13.4% of those aged 50-69 years affected (14). Importantly, the same survey showed a major care gap: only 34.9% of affected adults had been previously diagnosed and only 23.3% were being treated or managed at a health facility (14). These findings suggest that Vietnam faces not only an increasing diabetes burden but also substantial challenges in early detection, continuity of care and long-term disease management.

### RISK FACTORS

Vietnamese studies identify older age, urban residence, high body mass index, abdominal adiposity, hypertension, sedentary behaviour, physical inactivity and family history as important risk factors for T2DM (13,23-26). A systematic review found that older age, urban residence, body fat, abdominal fat, physical inactivity, sedentary lifestyle, genetic factors and hypertension were major determinants (13). Rural studies also show that hypertension and obesity-related measures predict hyperglycaemia (27).

Vietnam faces a double nutritional burden. While undernutrition has historically been a concern, overweight, obesity and central adiposity are rising, especially in urban areas (28-30). This is important because Asian populations may develop T2DM at lower BMI thresholds than Western populations (31). Therefore, waist circumference and waist-to-hip ratio may be especially useful in Vietnamese diabetes screening.

**Table 2 Major risk factors for T2DM in Vietnam**

Risk factor	Evidence pattern	Nursing relevance	Citation
Older age	Strong and consistent association	Prioritize screening in adults $\geq 40$ years	(13,23,30)
Urban residence	Higher prevalence in urban studies	Urban lifestyle counselling	(13,23,24)
Overweight/obesity	Increasingly associated with T2DM	Weight management education	(13,23,30)
Abdominal adiposity	Important even with normal BMI	Waist measurement in nursing assessment	(13,30,31)
Hypertension	Frequently comorbid with T2DM	Integrated BP and glucose monitoring	(13,23,26,30)
Physical inactivity	Common behavioural risk	Exercise counselling	(13,24)
Unhealthy diet	Nutrition transition, high-energy diet	Meal planning education	(28-31)
Family history	Genetic and household lifestyle risk	Family-based prevention	(13,30)

Table 2 summarizes the main risk factors associated with T2DM in Vietnam. Older age remains one of the most consistent determinants, reflecting the cumulative effects of insulin resistance, metabolic decline and long-term exposure to unhealthy lifestyles (13,23,30). Urban residence is also frequently associated with higher diabetes prevalence, probably because of sedentary occupations, reduced physical activity and increased consumption of energy-dense foods (13,23,24). Overweight, obesity and abdominal adiposity are particularly important because Asian populations may develop T2DM at lower BMI levels than Western populations; therefore, waist circumference and central obesity should be considered in routine nursing assessment (30,31). Hypertension is another major comorbidity and risk factor, supporting the need for integrated blood pressure and glucose monitoring in diabetes prevention and management (13,23,26,30). Behavioural factors, including physical inactivity and unhealthy diet, further indicate that nursing interventions should focus on lifestyle counselling, weight management, meal planning and family-based

## Type 2 Diabetes Mellitus in Vietnam: Epidemiology, Risk Factors, Complications, Nursing Implications and Health-System Challenges - A Comprehensive Review

prevention. Family history also remains relevant, suggesting that diabetes education should target not only individual patients but also household members with shared genetic and lifestyle risks (13,30).

### COMPLICATIONS AND CLINICAL OUTCOMES

T2DM complications are increasingly reported in Vietnam. Microvascular complications include diabetic retinopathy, nephropathy and neuropathy, while macrovascular complications include cardiovascular disease and stroke (32-36). Bui et al. reported that microvascular complications were common among Vietnamese patients with T2DM and were associated with poor control of risk factors (32). Minh et al. found a high rate of lower-extremity nerve conduction abnormalities among Vietnamese patients with T2DM, suggesting the importance of neuropathy screening (33). Studies also show that diabetic complications reduce health-related quality of life and increase psychological distress (37-39).

Diabetic foot disease is particularly important for nursing practice. Foot ulcers are preventable through early risk identification, daily foot inspection, patient education, footwear counselling and prompt referral. Nurses should assess skin integrity, peripheral sensation, peripheral pulses, footwear, history of ulcers and self-care capacity. In hospitals, foot-care education should be included in discharge planning.

**Table 3 Major diabetes-related complications reported in Vietnam**

Complication	Evidence from Vietnam	Nursing implication	Citation
Retinopathy	Reported in hospital-based studies	Encourage annual eye examination	(32,34)
Nephropathy / kidney disease	Associated with poor glycaemic and BP control	Monitor urine albumin, eGFR, BP	(32,35,36)
Peripheral neuropathy	High nerve conduction abnormalities reported	Foot screening and sensory assessment	(33,34)
Cardiovascular disease	Strongly linked with diabetes and hypertension	Integrated cardiovascular risk reduction	(34-36)
Diabetic foot ulcer	High cost and severe clinical burden	Foot-care education and early referral	(36)
Depression/distress	Diabetes distress reported in Vietnam	Psychosocial screening and counselling	(22,37-39)
Reduced quality of life	Complications worsen HRQoL	Holistic nursing care	(37-39)

Table 3 highlights the major diabetes-related complications reported among patients with T2DM in Vietnam. Microvascular complications, including retinopathy, nephropathy and peripheral neuropathy, are frequently observed in hospital-based studies and are associated with poor glycaemic control, hypertension and inadequate long-term monitoring (32-35). Peripheral neuropathy is particularly important for nursing practice because it increases the risk of foot injury, ulceration and delayed wound detection; therefore, routine sensory assessment and foot screening should be integrated into diabetes care (33,34). Macrovascular complications, especially cardiovascular disease, are strongly linked with diabetes, hypertension and other metabolic risk factors, supporting the need for combined glucose and blood-pressure management (34-36). In addition, diabetic complications have been shown to reduce health-related quality of life and contribute to psychological distress among Vietnamese patients, indicating that nursing care should include not only biomedical monitoring but also psychosocial assessment, education and holistic support (22,37-39).

### DIABETES SELF-MANAGEMENT AND NURSING CARE

Self-management is central to T2DM control. It includes medication adherence, healthy diet, physical activity, blood glucose monitoring, foot care, problem solving and regular follow-up (40-43). Vietnamese studies have shown that diabetes knowledge, family support, health-care provider support and belief in treatment influence self-management behaviours (19-22). Dao-Tran et al. validated the Vietnamese version of the Diabetes Self-Management Instrument, providing an important tool for nursing research and clinical assessment (19). Thi et al. found that diabetes self-management among Vietnamese patients was influenced by knowledge and social support (21).

Nurse-led education has strong potential in Vietnam because nurses frequently interact with patients in outpatient clinics, inpatient wards and community health settings. Nursing interventions should not only deliver information but also build practical skills. Effective diabetes education should include culturally appropriate dietary counselling, medication-taking routines, physical activity plans, recognition of hypoglycaemia and hyperglycaemia, foot-care demonstration and follow-up support.

## Type 2 Diabetes Mellitus in Vietnam: Epidemiology, Risk Factors, Complications, Nursing Implications and Health-System Challenges - A Comprehensive Review

**Table 4 Nursing interventions for T2DM management in Vietnam**

Nursing intervention	Core activities	Expected outcome	Citation
Diabetes self-management education	Teach diet, medication, exercise, glucose monitoring	Improved self-care behaviour	(18,40-43)
Medication adherence counselling	Explain medication purpose, timing and side effects	Better adherence	(18,20,21,41)
Foot-care education	Daily inspection, hygiene, footwear, early reporting	Reduced ulcer risk	(18,32,33,36)
Blood pressure and glucose monitoring	Regular measurement and documentation	Earlier detection of poor control	(15,17,35,48)
Family-based counselling	Involve family in diet and medication support	Improved home care	(20,21,22)
Lifestyle modification support	Weight control, physical activity, smoking cessation	Reduced cardiometabolic risk	(15,18,54-56)
Psychological support	Screen distress, encourage coping strategies	Improved quality of life	(22,37-39)
Digital or phone-based follow-up	Reminder, coaching, remote education	Improved continuity of care	(44,45)

Table 4 summarizes key nursing interventions for T2DM management in Vietnam and their expected outcomes. Diabetes self-management education remains the foundation of effective chronic disease management because it improves patients' knowledge, confidence and daily self-care behaviours, including diet control, medication adherence, physical activity and blood glucose monitoring (18,40-43). Medication adherence counselling is particularly important in reducing treatment interruption and improving glycaemic control, especially among patients with limited disease knowledge (20,21,41). Foot-care education is essential for preventing diabetic foot ulcers and reducing the risk of hospitalization and amputation through early identification of skin damage and sensory loss (32,33,36). Regular blood pressure and glucose monitoring also support early detection of poor metabolic control and cardiovascular risk (15,35,48). Family-based counselling has shown positive effects because family support strongly influences dietary habits, treatment adherence and emotional coping in Vietnamese patients (20-22). In addition, lifestyle modification support, including weight management, exercise promotion and smoking cessation, can significantly reduce cardiometabolic risks (54-56). Psychological support is increasingly recognized as an important nursing role because diabetes-related distress and reduced quality of life are common among patients with long-term disease and complications (22,37-39). Finally, digital or phone-based follow-up represents a promising strategy to improve continuity of care, reinforce self-management behaviours and maintain regular communication between nurses and patients, particularly in community and rural settings (44,45).

### HEALTH-SYSTEM CHALLENGES

Vietnam has made progress in noncommunicable disease policies, but diabetes care remains fragmented. The low diagnosis and treatment rates reported in STEPS 2021 indicate that many people with diabetes are not adequately connected to care (14). Primary health-care facilities, including commune health stations, are well positioned for screening and follow-up, but may lack trained staff, diagnostic tools, continuity systems and patient education resources.

A nursing-led chronic care model could help address these gaps. Nurses can support screening, risk stratification, patient education, follow-up reminders, adherence monitoring and referral coordination. To achieve this, nursing curricula and continuing professional development should strengthen competencies in diabetes education, motivational interviewing, nutrition counselling, foot examination and chronic disease case management.

Digital diabetes self-management support is also emerging as a promising model. Recent studies in Vietnamese adults with T2DM suggest that digital or coaching-based interventions may improve knowledge and self-management, although implementation requires attention to access, digital literacy and equity (44). Community-based peer support may also be useful, particularly in rural areas where access to specialist care is limited (45).

### CONCLUSION

T2DM is a growing public health problem in Vietnam. National and regional evidence shows increasing prevalence, a large prediabetes-risk population, low diagnosis rates, low treatment coverage and a rising burden of complications. Major risk factors include older age, urban residence, obesity, abdominal adiposity, hypertension, physical inactivity and unhealthy diet. Complications such as neuropathy, retinopathy, nephropathy, cardiovascular disease, diabetic foot ulcers, psychological distress and reduced quality of life create substantial clinical and economic burdens.

## **Type 2 Diabetes Mellitus in Vietnam: Epidemiology, Risk Factors, Complications, Nursing Implications and Health-System Challenges - A Comprehensive Review**

Nurses have a central role in addressing this burden. Nurse-led diabetes self-management education, foot-care instruction, medication adherence support, lifestyle counselling, complication screening and family-based care should be integrated into routine diabetes services. Strengthening nursing capacity at hospitals and primary health-care facilities may improve early detection, long-term management and quality of life for Vietnamese people living with T2DM.

### **ACKNOWLEDGEMENT**

The author thanks the Phenikaa School of Medicine and Pharmacy, Phenikaa University for academic support during the preparation of this review.

**CONFLICT OF INTEREST :** None

### **REFERENCES**

- 1) International Diabetes Federation. IDF Diabetes Atlas. 10th ed. Brussels: International Diabetes Federation; 2021.
- 2) International Diabetes Federation. IDF Diabetes Atlas. 11th ed. Brussels: International Diabetes Federation; 2025.
- 3) World Health Organization. Global report on diabetes. Geneva: WHO; 2016.
- 4) World Health Organization. Diabetes fact sheet. Geneva: WHO; 2024.
- 5) Saeedi P, Petersohn I, Salpea P, et al. Global and regional diabetes prevalence estimates. *Diabetes Res Clin Pract.* 2019;157:107843.
- 6) Sun H, Saeedi P, Karuranga S, et al. IDF Diabetes Atlas: Global, regional and country-level diabetes prevalence estimates. *Diabetes Res Clin Pract.* 2022;183:109119.
- 7) NCD Risk Factor Collaboration. Worldwide trends in diabetes since 1980. *Lancet.* 2016;387:1513-1530.
- 8) GBD 2021 Diabetes Collaborators. Global, regional, and national burden of diabetes from 1990 to 2021. *Lancet.* 2023.
- 9) Ministry of Health Viet Nam. National Strategy for Prevention and Control of Noncommunicable Diseases 2015-2025. Hanoi; 2015.
- 10) Ministry of Health Viet Nam. Healthy Viet Nam Programme 2018-2030. Hanoi; 2018.
- 11) World Health Organization Regional Office for the Western Pacific. National survey on the risk factors of noncommunicable diseases in Viet Nam, 2021. Manila: WHO; 2025.
- 12) Ministry of Health Viet Nam. National survey on the risk factors of noncommunicable diseases: Viet Nam 2015. Hanoi; 2016.
- 13) Nguyen CT, Pham NM, Lee AH, Binns CW. Prevalence of and risk factors for type 2 diabetes mellitus in Vietnam: A systematic review. *Asia Pac J Public Health.* 2015;27(6):588-600.
- 14) WHO and Ministry of Health Viet Nam. National survey on the risk factors of noncommunicable diseases in Viet Nam, 2021. Manila: WHO; 2025.
- 15) American Diabetes Association. Standards of Care in Diabetes—2024. *Diabetes Care.* 2024;47(Suppl 1).
- 16) American Diabetes Association. Standards of Care in Diabetes—2025. *Diabetes Care.* 2025.
- 17) Davies MJ, D'Alessio DA, Fradkin J, et al. Management of hyperglycaemia in type 2 diabetes. *Diabetologia.* 2018;61:2461-2498.
- 18) Powers MA, Bardsley JK, Cypress M, et al. Diabetes self-management education and support in adults with type 2 diabetes. *Diabetes Care.* 2020;43:1636-1649.
- 19) Dao-Tran TH, Anderson D, Chang A, Seib C, Hurst C. Vietnamese version of Diabetes Self-Management Instrument. *J Transcult Nurs.* 2017.
- 20) Dao-Tran TH, Anderson D, Chang A, Seib C, Hurst C. Factors associated with self-management among Vietnamese adults with type 2 diabetes. *Nurs Open.* 2018.
- 21) Thi KHP, Tran NQ, Nguyen CT, et al. Diabetes self-management and its associated factors among patients with diabetes in Vietnam. *J Multidiscip Healthc.* 2022.
- 22) Huynh G, Tran TT, Do THT, et al. Diabetes-related distress among people with type 2 diabetes in Vietnam. *Diabetes Metab Syndr Obes.* 2021.
- 23) Pham NM, Eggleston K. Prevalence and determinants of diabetes and prediabetes among Vietnamese adults. *Diabetes Res Clin Pract.* 2016.
- 24) Ton TT, Tran ATN, Do IT, et al. Trends in prediabetes and diabetes prevalence and associated risk factors in Vietnam. *BMC Public Health.* 2020.
- 25) Le NTD, Dinh Pham L, Quang Vo T. Type 2 diabetes in Vietnam: A cross-sectional prevalence-based cost-of-illness study. *Diabetes Metab Syndr Obes.* 2017.

## **Type 2 Diabetes Mellitus in Vietnam: Epidemiology, Risk Factors, Complications, Nursing Implications and Health-System Challenges - A Comprehensive Review**

- 26) Biswas T, Haider MM, Das Gupta R, et al. Type 2 diabetes and hypertension in Vietnam: A systematic review and meta-analysis. *BMJ Open*. 2022;12:e052725.
- 27) Binh TQ, Phuong PT, Nhung BT, et al. Prevalence and correlates of hyperglycemia in a rural population in Vietnam. *Asian Pac J Trop Dis*. 2012.
- 28) Khan NC, Khoi HH. Double burden of malnutrition: The Vietnamese perspective. *Asia Pac J Clin Nutr*. 2008;17 Suppl 1:116-118.
- 29) Le NDS, Hanh TT, Kusama K, et al. Anthropometric characteristics, dietary patterns and risk of type 2 diabetes mellitus in Vietnam. *J Am Coll Nutr*. 2005;24:229-234.
- 30) Phan DH, Do VV, Khuong LQ, et al. Assessment of risk factors associated with type 2 diabetes among adults in Vietnam. *PLoS One*. 2022.
- 31) Chan JCN, Malik V, Jia W, et al. Diabetes in Asia: Epidemiology, risk factors, and pathophysiology. *JAMA*. 2009;301:2129-2140.
- 32) Bui HDT, Jing X, Lu R, et al. Prevalence of and factors related to microvascular complications in Vietnamese patients with type 2 diabetes mellitus. *Diabetes Metab Syndr Obes*. 2019.
- 33) Minh NN, et al. Lower extremity nerve conduction abnormalities in Vietnamese patients with type 2 diabetes mellitus. *Diabetes Metab Syndr Obes*. 2023.
- 34) Nguyen KT, Diep BTT, Nguyen VDK, et al. Diabetes management, control and complications in 1631 patients with type 2 diabetes mellitus in Vietnam. *Int J Diabetes Dev Ctries*. 2020.
- 35) Luk AO, et al. Quality of care in patients with diabetic kidney disease in Asia. *Diabetes Res Clin Pract*. 2016.
- 36) Dinh NTT, et al. Costs of major complications in people with and without diabetes. *Diabet Med*. 2022.
- 37) Pham TB, Nguyen TT, Truong HT, et al. Effects of diabetic complications on health-related quality of life impairment in Vietnamese patients. *J Diabetes Res*. 2020.
- 38) Nguyen HV, Tran TT, Nguyen CT, et al. Impact of comorbid chronic conditions on quality of life among elderly patients with type 2 diabetes in Vietnam. *Int J Environ Res Public Health*. 2019.
- 39) Kien NT, et al. Health-related quality of life among type 2 diabetes patients in Vietnam. *Diabetes Metab Syndr*. 2025.
- 40) Shrivastava SR, Shrivastava PS, Ramasamy J. Role of self-care in management of diabetes mellitus. *J Diabetes Metab Disord*. 2013;12:14.
- 41) Chrvala CA, Sherr D, Lipman RD. Diabetes self-management education for adults with type 2 diabetes mellitus. *Patient Educ Couns*. 2016;99:926-943.
- 42) Norris SL, Lau J, Smith SJ, et al. Self-management education for adults with type 2 diabetes. *Diabetes Care*. 2002;25:1159-1171.
- 43) Tshiananga JK, Kocher S, Weber C, et al. The effect of nurse-led diabetes self-management education. *Cochrane-related review summary*. 2012.
- 44) Nguyen PVN, et al. Effectiveness of a digital diabetes self-management education and support program in Vietnamese adults with type 2 diabetes. 2025.
- 45) Dang NAT, et al. Peer-based diabetes self-management support in rural Vietnam: A feasibility study. 2023.
- 46) Cangelosi G, et al. Nurse case manager lifestyle medicine in the management of type 2 diabetes. *J Pers Med*. 2022.
- 47) Beck J, Greenwood DA, Blanton L, et al. National standards for diabetes self-management education and support. *Diabetes Care*. 2017;40:1409-1419.
- 48) World Health Organization. Package of Essential Noncommunicable Disease Interventions for Primary Health Care. Geneva: WHO; 2020.
- 49) World Health Organization. HEARTS technical package for cardiovascular disease management in primary health care. Geneva: WHO; 2020.
- 50) World Health Organization. Global action plan for the prevention and control of noncommunicable diseases 2013-2020. Geneva: WHO; 2013.
- 51) Lim LL, Lau ESH, Kong APS, et al. Aspects of diabetes care in Asia. *Lancet Diabetes Endocrinol*. 2021.
- 52) Ma RCW, Chan JCN. Type 2 diabetes in East Asians: Similarities and differences with populations in Europe and the United States. *Ann N Y Acad Sci*. 2013;1281:64-91.
- 53) Ramachandran A, Snehalatha C, Ma RCW. Diabetes in South-East Asia: An update. *Diabetes Res Clin Pract*. 2014;103:231-237.
- 54) Hu FB. Globalization of diabetes: The role of diet, lifestyle, and genes. *Diabetes Care*. 2011;34:1249-1257.
- 55) Ley SH, Hamdy O, Mohan V, Hu FB. Prevention and management of type 2 diabetes: Dietary components and nutritional strategies. *Lancet*. 2014;383:1999-2007.

## **Type 2 Diabetes Mellitus in Vietnam: Epidemiology, Risk Factors, Complications, Nursing Implications and Health-System Challenges - A Comprehensive Review**

- 56) Schellenberg ES, Dryden DM, Vandermeer B, et al. Lifestyle interventions for patients with and at risk for type 2 diabetes. *Ann Intern Med.* 2013;159:543-551.
- 57) Willi C, Bodenmann P, Ghali WA, et al. Active smoking and risk of type 2 diabetes. *JAMA.* 2007;298:2654-2664.
- 58) Walicka M, Krysiński A, La Rosa GR, et al. Influence of quitting smoking on diabetes-related complications. *Diabetes Metab Syndr.* 2024;18:103044.
- 59) Whelton PK, Carey RM, Aronow WS, et al. Guideline for prevention, detection and management of high blood pressure. *Hypertension.* 2018;71:e13-e115.
- 60) Global Health and Population Project on Access to Care for Cardiometabolic Diseases Collaborators. Progress toward universal health coverage in Vietnam: Diabetes medication dispensing trends from 2015 to 2021. *Diabetes Res Clin Pract.* 2024.