ORIGINAL RESEARCH ARTICLE

Financial distress, psychological distress, and cost-related nonadherence among diabetic patients: Latent profile analysis

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ABSTRACT

Background: Diabetes imposes a huge economic burden on individuals, their families, the national health system, and the economy as a whole. Research on financial distress has not yet been explored in the diabetic population in Vietnam. This study was conducted to determine the prevalence of financial distress and its associated demographic, psychological distress, and cost-related nonadherence factors in patients with diabetes.

Methods: A cross-sectional study was conducted on 311 patients with diabetes attending the outpatient department of a public hospital in An Giang, Vietnam, from April 2025 to May 2025. Newly diagnosed, controlled, and ongoing-therapy patients were included and classified by current management into lifestyle modification, oral medications, or insulin therapy (alone or in combination). Latent Profile Analysis (LPA) was performed to classify patients with diabetes into their most likely group based on their financial distress profile.

Results: LPA identified three latent profiles: none (13.5%), mild (56.3%), and moderate (30.2%) financial distress. The ROC analysis identified a score of 25.5 as the optimal threshold for distinguishing between none and mild/moderate financial distress, with a sensitivity of 100% and a specificity of 98.9%. Multinomial logistic regression analysis revealed that higher psychological distress, being a worker or public employee, and cost-related nonadherence were significantly associated with having mild or moderate financial distress.

Conclusion: Psychological distress and cost-related nonadherence are factors influencing financial distress in patients with diabetes. Future interventions should target these factors to help reduce the level of financial distress in this population.

Key words: cost-related nonadherence, diabetes, financial distress, psychological distress, Vietnam

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Introduction

Vietnam's Gross domestic product (GDP) at current prices is expected to reach US$476.3 billion in 2024, up from US$433.7 billion in 2023, ranking fourth in the Association of Southeast Asian Nations (ASEAN) region and 34th globally (1). Vietnam's GDP per capita is estimated at US$4,700, up US$376 from 2023 (1). Healthcare facilities in Vietnam are classified into three technical levels: primary healthcare, providing outpatient treatment, basic healthcare, providing general inpatient and outpatient services and continuing medical education, and specialized healthcare, providing advanced treatment, specialized training, research, and technology transfer (2). Vietnam's healthcare spending is estimated at US$18.5 billion in 2022, accounting for 4.6% of the country's GDP (3). The health insurance participation rate in Vietnam will reach over 94.2% of the population in 2024, covering about 95.5 million people and approaching the goal of universal health insurance coverage (4). Rising diabetes rates have led to substantial economic strain, especially in countries with limited financial resources (5). Diabetes imposes a major economic burden on both individuals and their families, as well as on national health care systems and the economy as a whole (6). On average, people diagnosed with diabetes incur 2.6 times higher health care costs than those without diabetes (7). According to the International Diabetes Federation, diabetes is estimated to cost US$1.015 trillion in global health expenditure by 2024. This represents a 338% increase over the past 17 years (8). In Vietnam in 2024, total diabetes-related health expenditure was US$1,071 million, and diabetes-related health expenditure per capita was US$428.4 (9). This cost represents over 9% of the per capita GDP in Vietnam for 2024, which is estimated at US$4,700 (10). The burden on Vietnamese patients with diabetes mainly comes from direct medical costs (51.7%), followed by indirect costs (34.3%) and direct non-medical costs (14%) (11). Actual financial burdens, along with anticipation and anxiety about potential financial hardship, are all components of financial distress (11). Financial distress not only affects physical illness management but also has profound consequences on mental health, including depression, anxiety, and even suicide risk, especially in times of social and financial instability (12,13). The concept of financial distress has been recognized as a concern for people with diabetes (14,15). Patel et al. (2025) found a relationship between mental health problems and cost-related nonadherence with financial distress in patients with diabetes (14). In Vietnam, research on financial distress has been conducted on other chronic diseases (16), but has not been explored in patients with diabetes. Understanding the financial distress status of patients can help guide interventions in disease management in people with diabetes (15). Therefore, the objective of this study was to determine the prevalence of financial distress and its associated demographic, psychological distress, and cost-related nonadherence factors in patients with diabetes.

Methods

Setting and sample

A cross-sectional study investigating financial distress was conducted among patients with type 2 diabetes who were recruited from a public traditional medicine hospital in An Giang, Viet Nam, from April to May 2025. Newly diagnosed, controlled, and ongoing-therapy patients were included. They were also classified according to their current management into lifestyle modification, oral medications, or insulin therapy (alone or in combination). Approximately 75.2% of patients received oral agents alone, 21.9% received a combination of oral agents and insulin, and 1.0% each received diet and exercise only or insulin monotherapy. Sixteen patients (5.2%) were newly diagnosed, while most (72.1%) had diabetes for 10 years or less, and 27.9% had diabetes for more than 10 years. The study recruited patients aged 18 years or older who had a confirmed diagnosis of diabetes according to the diagnostic criteria of the Vietnamese Ministry of Health (17). No patients were excluded based on psychiatric history; however, individuals with cognitive impairment that prevented them from completing the questionnaire or who did not consent to participate were excluded. Psychological distress was evaluated in all participants using the PHQ-4 screening tool rather than formal psychiatric diagnosis.

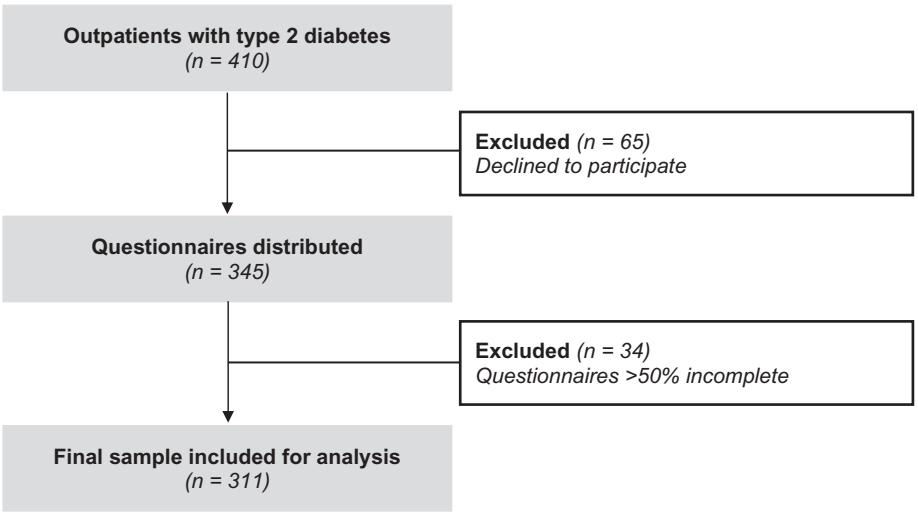

Figure 1. Flowchart of the study sample.

Data collection

A convenience sampling method was used. After obtaining written informed consent from eligible patients, designated health workers distributed self-administered questionnaires to participants while they were waiting for their turn to be seen at the hospital's outpatient department. During the two-month study period, 10 participants were recruited each day, and 410 printed questionnaires were distributed. Sixty-five respondents did not agree to participate, and 34 questionnaires with more than half incomplete were excluded, leaving 311 valid questionnaires for the current analysis (Figure 1).

Measures

The self-administered printed Vietnamese questionnaire used in this study consisted of two basic parts (Appendix). The first part measured the outcome variable, financial distress. The second part measured the variables psychological distress, cost-related nonadherence, and demographic and health-related characteristics. The validated Vietnamese version of the 11-item Comprehensive Score for Financial Toxicity (COST) was used to assess financial distress (18). The only correction made to the original version was the replacement of terminology related to cancer treatment with that related to diabetes management, consistent with previous studies (14,19). A 5-point Likert scale was used to assess each item, with response options from 0 (very much) to 4 (not at all). Scores were calculated by first reverse coding seven items (2, 3, 4, 5, 8, 9, and 10), and then summing all items, with lower scores indicating higher financial distress. The Cronbach's alpha value of the COST in the sample of this study was 0.85, indicating good internal consistency. The Patient Health Questionnaire–4 (PHQ-4) scale, Vietnamese version, was used to assess psychological distress (20). The PHQ-4 consists of four questions, divided into two subscales to screen for depression (first two questions) and anxiety (last two questions). Participants were asked to respond to options ranging from 0 (not at all) to 3 (almost every day). The total psychological distress score was calculated as the sum of the four items and thus could range from 0 to 12. The Cronbach's alpha value of this questionnaire in our study was 0.94, indicating good internal consistency. Cost-related nonadherence (CRN), defined as the insufficient use of medications due to cost, was assessed using five questions about behaviors aimed at saving money on prescriptions. The Vietnamese version was referenced from a previous study (21). These behaviors included delaying prescription refills, only partly filling a prescription, skipping medication doses, taking a lower dose of medication, and using someone else's medication. Participants were considered to exhibit CRN if they reported engaging in at least one of the

five nonadherence behaviors. The CRN scale demonstrated good internal consistency in this study, with a Cronbach's alpha of 0.81. Demographic characteristics collected included gender, age, place of residence, marital status, education level, occupation, number of family members, average monthly income (million Vietnamese Dong [VND]), and health insurance participation. Health-related characteristics collected included type of diabetes, duration of diabetes, presence of comorbidities (hypertension, dyslipidemia, arthritis/osteoarthritis, osteoporosis, chronic kidney disease, other chronic diseases), number of antidiabetic medications in the current prescription, total number of medications prescribed, most recent blood glucose level (mmol/L), and most recent glycated hemoglobin (HbA1c) level (%).

Data analysis

Frequencies, percentages, means, and standard deviations (SD) were calculated to describe participants' characteristics using SPSS 22.0. Latent Profile Analysis (LPA) was conducted to classify individuals with diabetes into their most likely groups based on their financial distress profiles. LPA explored the latent groups of a dataset consisting of 11 quantitative variables from the COST scale and was performed using R software with the tidyLPA package. Four different parameterization models were considered, including EEI (Equal volume, Equal shape, and coordinate axes orientation), VVI (Variable volume and Variable shape, with coordinate axes orientation), EEE (Equal volume, Equal shape, and Equal orientation), and VVV (Variable volume, Variable shape, and Variable orientation), corresponding to assumptions about different constraints placed on the variance (equal or variable) and covariance (zero, equal, or variable) of the profiles. In each model, solutions from 1 to 6 classes were estimated. The best model was determined based on entropy > 0.8 and significant Bootstrapped Likelihood Ratio Test (BLRT; P < 0.05), as well as the smallest values of the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), and sample-size adjusted Bayesian Information Criterion (aBIC) (22). After the number of profiles was determined, participants were grouped into the most likely latent profiles based on maximum posterior probability. The sample size in our study was much higher than the minimum required threshold of 200 for LPA to ensure the stability of model estimates (14). Optimal COST score thresholds for differentiating between no and mild/moderate financial distress were established through Receiver operating characteristics (ROC) analysis, conducted using Jamovi software (version 2.6.44). A chi-square test, Fisher-Freeman-Halton Exact Test, and analysis of variance (ANOVA) test were used to examine the association between patient characteristics and the obtained profiles of financial distress, and significant factors were subsequently included in a multinomial logistic regression analysis. The alpha level was set at 0.05 for all statistical tests.

Results

Participant characteristics

Of the 410 questionnaires distributed, 311 valid responses were received, resulting in a 75.9% response rate. The mean (SD) age was 56.94 (11.17) years. Women accounted for 54.7% of the sample. Most patients (60.5%) lived in rural areas, 99% had health insurance, 59.8% had an upper secondary education or higher, and 78% were married. The mean (SD) duration of diabetes was 6.76 (6.5) years. Most participants had type 2 diabetes (98.4%) and comorbid hypertension (79.7%). Detailed information on demographic and health-related characteristics is presented in Table 1. Blood glucose ($r = 0.18$, $p < 0.01$), duration ($r = 0.17$, $p < 0.01$), and number of medications ($r = 0.35$, $p < 0.01$) were significantly correlated with psychological distress. Furthermore, psychological distress showed significant correlations with financial distress ($r = -0.56$, $p < 0.01$) and cost-related nonadherence ($r = 0.43$, $p < 0.01$), as presented in Table 2.

Identification of financial distress subgroups

The Latent profile analysis results on the 11 items of the COST scale present only the results for the EEI and EEE models, because the VVI and VVV parametrizations failed to converge despite multiple initializations and were therefore excluded. Based on

Table 1. Characteristics of the study participants (n = 311)

Characteristics		n (%)	Financial distress			Chi-square (P value)
			No	Mild	Moderate	
Gender	Woman	169 (54.7)	23 (54.8)	95 (54.3)	51 (55.4)	0.984
	Man	140 (45.3)	19 (45.2)	80 (45.7)	41 (44.6)	
Place of residence	Rural	187 (60.5)	23 (54.8)	91 (52)	73 (79.3)	<0.001
	Urban	122 (39.5)	19 (45.2)	84 (48)	19 (20.7)	
Marital Status	Single / Widowed / Divorced	68 (22)	7 (17.1)	36 (20.6)	25 (26.9)	0.354
	Married	241 (78)	34 (82.9)	139 (79.4)	68 (73.1)	
Education level	Lower secondary or below	125 (40.2)	7 (16.7)	62 (35.4)	56 (59.6)	<0.001
	Upper secondary or above	186 (59.8)	35 (83.3)	113 (64.6)	38 (40.4)	
Occupation*	Retired/homemaker	87 (28.1)	18 (42.9)	44 (25.1)	25 (26.9)	0.008
	Farmer/trader/laborer	150 (48.4)	15 (35.7)	80 (45.7)	55 (59.1)	
	Worker/public employee	73 (23.5)	9 (21.4)	51 (29.1)	13 (14)	
Health insurance	No	3 (1)	0 (0)	2 (1.2)	1 (1.1)	1.000
	Yes	301 (99)	39 (100)	171 (98.8)	91 (98.9)	
Type of diabetes	Type 1	5 (1.6)	0 (0)	1 (0.6)	4 (4.3)	0.055
	Type 2	303 (98.4)	41 (100)	172 (99.4)	90 (95.7)	
Hypertension	No	63 (20.3)	11 (26.2)	34 (19.4)	18 (19.1)	0.588
	Yes	248 (79.7)	31 (73.8)	141 (80.6)	76 (80.9)	
Dyslipidemia	No	161 (51.8)	27 (64.3)	85 (48.6)	49 (52.1)	0.187
	Yes	150 (48.2)	15 (35.7)	90 (51.4)	45 (47.9)	
Arthritis/ Osteoarthritis	No	253 (81.4)	35 (83.3)	142 (81.1)	76 (80.9)	0.937
	Yes	58 (18.6)	7 (16.7)	33 (18.9)	18 (19.1)	
Osteoporosis	No	282 (90.7)	42 (100)	157 (89.7)	83 (88.3)	0.077
	Yes	29 (9.3)	0 (0)	18 (10.3)	11 (11.7)	
Chronic kidney disease	No	285 (91.6)	41 (97.6)	163 (93.1)	81 (86.2)	0.046
	Yes	26 (8.4)	1 (2.4)	12 (6.9)	13 (13.8)	
Other chronic conditions**	No	303 (97.4)	42 (100)	170 (97.1)	91 (96.8)	0.773†
	Yes	8 (2.6)	0 (0)	5 (2.9)	3 (3.2)	
Cost-related nonadherence	No	168 (54)	40 (95.2)	90 (51.4)	38 (40.4)	<0.001‡
	Yes	143 (46)	2 (4.8)	85 (48.6)	56 (59.6)	
Age	Mean (SD)	56.94 (11.17)	56.13 (11.22)	58.69 (11.5)	56.13 (11.22)	0.188‡
Number of family members	Mean (SD)	5.13 (1.75)	5.09 (1.84)	5.39 (1.69)	5.09 (1.84)	0.105‡
Average monthly income (million VND)	Mean (SD)	5.83 (3.36)	6.33 (3.23)	4.23 (2.7)	6.33 (3.23)	<0.001‡

Table 1 (*Continued*)

Characteristics		n (%)	Financial distress			Chi-square (P value)
			No	Mild	Moderate	
Number of diabetes medications in current prescription	Mean (SD)	1.9 (0.81)	2.02 (0.87)	1.88 (0.73)	2.02 (0.87)	<0.001‡
Total number of prescribed medications	Mean (SD)	3.19 (1.85)	3.28 (1.88)	3.56 (1.79)	3.28 (1.88)	<0.001‡
Most recent blood glucose level (mmol/L)	Mean (SD)	7.8 (2.01)	7.87 (1.87)	8.09 (2.29)	7.87 (1.87)	0.004‡
Most recent HbA1c level (%)	Mean (SD)	7.21 (1.28)	7.21 (1.31)	7.44 (1.05)	7.21 (1.31)	0.010‡
Duration of diabetes (years)	Mean (SD)	6.76 (6.5)	6.93 (7.49)	7.46 (5.25)	6.93 (7.49)	0.045‡
Depression	Mean (SD)	2.06 (1.62)	1.91 (1.31)	3.12 (1.7)	1.91 (1.31)	<0.001‡
Anxiety	Mean (SD)	2.12 (1.74)	1.89 (1.36)	3.41 (1.74)	1.89 (1.36)	<0.001‡
Psychological distress	Mean (SD)	4.17 (3.28)	3.79 (2.55)	6.53 (3.34)	3.79 (2.55)	<0.001‡

Note: *Occupation was classified into three groups: retired and homemaker (no income jobs), farmer/trader/freelance laborer (unstable income jobs), and factory worker/public employee (stable income jobs).**Other chronic conditions included: cancer – 5 cases (1.6%), gout – 1 case (0.3%), hyperthyroidism – 1 case (0.3%), decompensated cirrhosis – 1 case (0.3%). †Fisher-Freeman-Halton Exact Test. ‡One-way analysis of variance (ANOVA).

Table 2. Correlations among financial distress, psychological distress, cost-related nonadherence and clinical indicators among patients with diabetes (N = 311)

Variable	CRN	COST	PHQ-4	Blood glucose	HbA1c	Duration of diabetes	No. of antidiabetic medications
Cost-related nonadherence (CRN)	1						
Financial distress (COST)	-0.39‡	1					
Psychological distress (PHQ-4)	0.43‡	-0.56‡	1				
Blood glucose (mmol/L)	0.16‡	-0.22‡	0.18‡	1			
Glycated hemoglobin (HbA1c, %)	0.10	-0.23‡	0.09	0.43‡	1		
Duration of diabetes (years)	0.10	-0.13*	0.17‡	0.13*	-0.01	1	
No. of antidiabetic medications	0.17‡	-0.26‡	0.35‡	0.28‡	0.25‡	0.18‡	1

Note: *p < 0.05, ‡p < 0.01.

entropy, BLRT values, AIC, BIC, aBIC, the EEE model with 3 classes was determined to be the optimal model for financial distress among patients with diabetes (Table 3).

The mean (SD) score on the overall COST scale was 19.37 (6.18). The mean (SD) scores for the three profiles (Profiles 1 to 3) were 30.38 (3.21), 20.26 (2.59), and 12.80 (3.22), respectively. Each profile was defined

Table 3. Fit indices for different profiles of models

Model	Profiles	AIC	BIC	aBIC	Entropy	BLRT (p)
EEI	1	8883	8965	8896	1.000	
	2	8237	8364	8256	0.846	0.010
	3	7980	8152	8006	0.873	0.010
	4	7916	8133	7949	0.885	0.010
	5	7676	7938	7716	0.894	0.010
	6	7585	7891	7631	0.907	0.010
EEE	1	7548	7836	7592	1.000	
	2	7507	7840	7557	0.990	0.010
	3	7363	7740	7420	0.981	0.010
	4	7394	7817	7458	0.914	1.000
	5	7288	7756	7359	0.943	0.010
	6	7249	7762	7327	0.897	0.010

Note: Model types: EEI = Equal variances, covariances fixed to zero; EEE = Equal variances, equal covariances. Fitting indicators - *Abbreviations* AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion; aBIC = Adjusted Bayesian Information Criterion; BLRT = Bootstrap Likelihood Ratio Test.

as follows: Profile 1: no financial distress group with 42 patients (13.5%), Profile 2: mild financial distress group with 175 patients (56.3%), and Profile 3: moderate financial distress group with 94 patients (30.2%). Detailed information on the distribution of items by profile is presented in Figure 2. The analysis of the association between three latent profiles and demographic and health-related characteristics of diabetic patients is shown in Table 1. Variables such as residence, education level, occupation, chronic kidney disease status, monthly income, number of diabetes medications, total number of medications prescribed, blood glucose level, HbA1c level, diabetes duration, depression, anxiety, psychological distress, and cost-related nonadherence showed significant differences between the three subgroups. ROC analysis of the three-profile solution, as shown in Figure 3, revealed that a score of 25.5 was identified as the optimal threshold to distinguish between no financial distress and mild/moderate financial distress. This threshold had a sensitivity of 100%, specificity of 98.9%, positive predictive value of 93.3%, and negative predictive value of 100%.

Predictive models

The multinomial logistic regression model showed a good fit to the data (Pearson and Deviance tests both had p = 1.000), was statistically significantly different from the null model (χ^2 = 204.905, df = 24, p < 0.001), and explained approximately 60.4% of the variance in financial distress classification, according to the Nagelkerke R^2 index. Table 4 shows that higher psychological distress were significantly associated with a higher likelihood of being in the mild financial distress group (OR = 3.32, 95% CI: 1.92–5.73, p < 0.001) and the moderate financial distress group (OR = 4.55, 95% CI: 2.60–7.95, p < 0.001). Participants in the retired or homemaker group were significantly less likely to be in the mild financial distress group (OR = 0.09, 95% CI: 0.02–0.47, p = 0.004) and moderate financial distress group (OR = 0.12, 95% CI: 0.02–0.80, p = 0.029), compared to workers or public employees. Compared with the no financial distress group, patients without cost-related nonadherence had a significantly lower risk of being in the mild financial distress group (OR = 0.05, 95% CI: 0.004–0.55, p = 0.015) and the moderate financial distress group (OR = 0.05, 95% CI: 0.004–0.58, p = 0.018). Additionally, monthly income was identified as a significant protective factor for moderate financial distress (OR = 0.79, 95% CI: 0.64–0.98, p = 0.031).

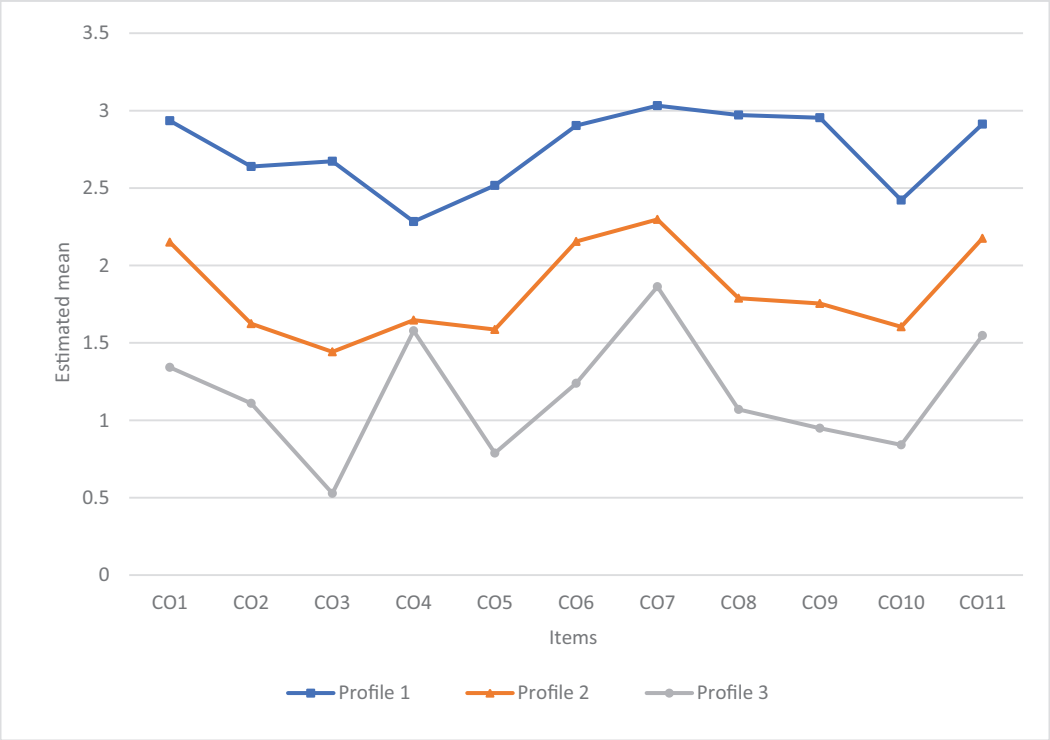

Figure 2. Potential profile characteristics of financial distress in patients. Estimated means were derived from the latent profile model. Scores were based on a 0–4 Likert scale, with higher scores indicating lower levels of financial distress. CO1 to CO11 correspond to the 11 items of the comprehensive score for financial distress (COST) scale.

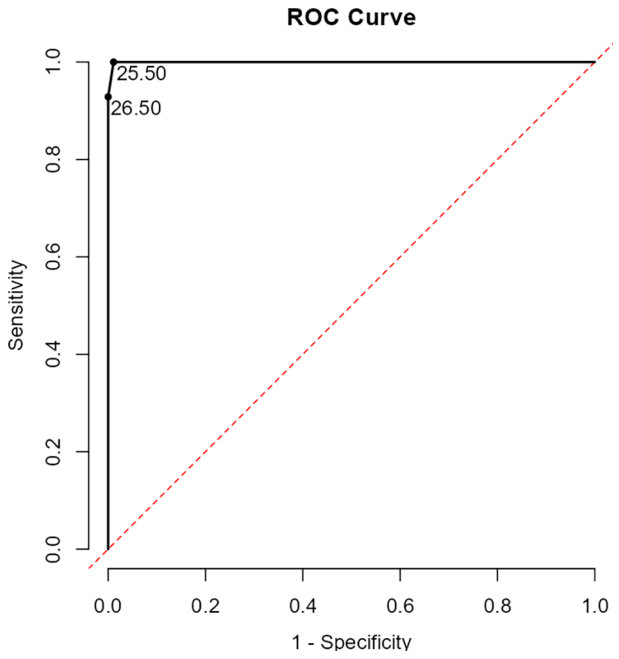

Figure 3. Receiver Operating Characteristic (ROC) curves for models using financial distress scores to predict no vs. mild/moderate financial distress.

Discussion

Our study used Latent Profile Analysis to identify financial distress profiles of diabetic patients in Vietnam, revealing three latent profiles including none, mild, and moderate financial distress. The number and mean scores of these profiles are similar to previous studies (14,23–25). However, the naming of the three profiles in this study was determined based on the severity of the original scale (including four profiles) and its corresponding mean values, so there was no severe financial distress group. The mean score of the overall COST was 19.37, which is almost equivalent to the results observed in patients with diabetes in high-income countries such as the USA (14). Of the patients studied, 86.5% were classified as having financial distress. This indicates that financial distress is common in patients with diabetes and is also similar to the findings in patients with cancer (87.7%) in Vietnam (16). In addition, patients with non-cancer chronic diseases were also found to experience financial hardship

Table 4. Multinomial logistic regression analysis of factors influencing financial distress among patients with diabetes (N= 311)

Predictor	Mild vs no FD OR (95% CI)	*p*-value	Moderate vs no FD OR (95% CI)	*p*-value
Psychological distress	3.32 (1.92–5.73)	<0.001	4.55 (2.60–7.95)	<0.001
Occupation: Retired/Homemaker (reference: Worker/public employee)	0.09 (0.02–0.47)	0.004	0.12 (0.02–0.80)	0.029
Occupation: Farmer/trader/laborer (reference: Worker/public employee)	0.69 (0.18–2.63)	0.585	1.29 (0.27–6.20)	0.748
Monthly income	0.87 (0.74–1.03)	0.11	0.79 (0.64–0.98)	0.031
CRN: No (reference: Yes)	0.05 (0.004–0.55)	0.015	0.05 (0.004–0.58)	0.018
HbA1c (%)	1.18 (0.78–1.80)	0.431	1.59 (0.97–2.60)	0.064
Blood glucose level (mmol/L)	0.90 (0.65–1.25)	0.524	0.87 (0.61–1.24)	0.431
Duration of diabetes (years)	1.01 (0.90–1.13)	0.832	1.01 (0.89–1.14)	0.884
Number of diabetes medications	1.84 (0.57–5.90)	0.308	1.14 (0.33–3.91)	0.833
Place of residence: rural (reference: urban)	0.93 (0.28–3.11)	0.904	2.74 (0.67–11.19)	0.159
Education: Lower secondary or below (reference: Upper secondary or above)	1.04 (0.22–4.85)	0.961	0.88 (0.17–4.65)	0.879
Chronic kidney disease: No (reference: Yes)	6.89 (0.26–185.7)	0.251	5.13 (0.17–154.3)	0.346

Abbreviations: FD – financial distress; OR – odds ratio; aOR – adjusted odds ratio; CI – confidence interval. Independent variables included in the multinomial logistic regression model were: place of residence, education level, occupation, chronic kidney disease, average monthly income, number of diabetes medications, total number of prescribed medications, blood glucose level (mmol/L), HbA1c level, duration of diabetes, depression, anxiety, psychological distress, and cost-related nonadherence. All of these variables were included in the multivariable regression model based on their statistical significance in prior bivariate analyses ($p < 0.05$), except for variables excluded due to multicollinearity, namely: total number of prescribed medications, depression, and anxiety.

(62.2%) (26). Notably, recent health insurance reforms in Vietnam have helped reduce out-of-pocket costs for some patients, as shown by the fact that the majority of survey respondents had health insurance, but a certain gap still exists. A study in Vietnam showed that people with diabetes are greatly affected by direct non-medical costs and indirect costs (27). In 2020, out-of-pocket costs in Vietnam accounted for about 39.6% of total health expenditure, while the global average was 16.32% (28). Lower income emerged as a risk factor, consistent with global studies demonstrating its role in influencing financial stress (29,30). This finding is not surprising, as lower-income patients often have fewer financial reserves or support to draw upon when paying for medical or non-medical expenses (24). As a result, they may resort to credit cards, borrowing, mortgaging assets, or applying for installment plans (31), which may contribute to higher levels of financial distress. Low-income individuals are more likely to have difficulty obtaining necessary care due to high costs compared to those with higher incomes (32). Interestingly, while low income is a factor that increases financial distress, employment status with no income—including retirement and homemaking—is a significant protective factor against financial distress. This may be explained by a number of factors. In Vietnam, it is common for the elderly to be cared for and assisted by family members in their own homes. The majority of the elderly still live with their spouses and with their children (33). This allows family members to care for the elderly in their own homes. Furthermore, wives in Vietnam still perform the majority of housework (34). Traditionally, Vietnamese wives enjoy a large share of family power by holding the keys to the "family money chest (35)." Compared with patients without CRN, patients experiencing CRN had more financial hardship from medical bills (36), consistent with our study. Previous research has also shown that those who engage in cost-coping behaviors—such as delaying care, taking less or skipping medications, borrowing money, maxing out credit card limits, and not paying bills—are more likely to

experience greater financial distress (19). This association may be more severe because it may promote the uncontrollable impact of increased financial burden, especially in vulnerable populations (36). Studies have shown that patients who exhibit cost-related nonadherence are associated with poorer health outcomes and higher rates of hospitalization (37). Higher psychological distress scores were significantly associated with a higher likelihood of being in the mild financial distress group and the moderate financial distress group. Studies have shown that financial distress leads to a threefold increase in the likelihood of emotional distress, including conditions such as depression and anxiety disorders, in patients (38). Financial distress appears to undermine emotional quality of life (26), as patients facing heavy financial burdens may experience anxiety or other negative emotions that can interfere with their treatment (39). Moreover, the psychological burden of chronic illness, particularly depression, is a key factor contributing to the increased risk of suicide among patients with diabetes (40). Economic crises can lead to prolonged insecurity and financial strain—including loss of income, unemployment, debt, and social instability—which significantly contribute to an increased risk of suicide (13). Therefore, there is a need to reduce financial distress in patients. Healthcare professionals should perform financial distress screening to promptly identify families with financial burdens, support patients in managing stress, and discuss costs to reduce burden when developing treatment plans. Our study provides the first suggestion in Vietnam for the threshold for classifying financial distress in people with diabetes, showing that it is possible to set a score of 25.5 as the optimal threshold for distinguishing between non-financial distress and mild/moderate financial distress. In practice, the COST scores obtained are integers, so this threshold is rounded up such that scores of 26 and above are considered non-financial distress, whereas scores below 26 are considered financial distress. Our results consistent with a study in patients with diabetes (14), as well as with findings reported in patients with cancer (23). Strengths and limitations: This study is among the first to assess financial and psychological distress in diabetic patients in Vietnam. However, this study has some limitations. First, the survey was conducted only in a public hospital, thus limiting the generalizability of the findings. Second, it used a cross-sectional design, making it difficult to determine the causal relationship between financial distress, psychological distress, and cost-related nonadherence. Third, most patients were covered by health insurance, so the results may not reflect the financial distress experienced by uninsured patients. Future studies should include other factors related to financial distress and conduct multicenter studies to better generalize the results.

Conclusions

This study identified three types of financial distress in diabetes, including no, mild, and moderate financial distress. Occupation, monthly income, PHQ-4 score, and cost-related nonadherence (CRN) were factors associated with financial distress in diabetes. Clinicians should consider applying targeted interventions based on cost-related nonadherence and psychological distress to help patients manage their financial distress.

Conflict of Interest: Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article.

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Appendix – Survey Questionnaire: Financial Distress, Psychological Distress, and Cost-Related Nonadherence Among Diabetic Patients: Latent Profile Analysis

Part I. Financial distress

Please indicate how well each statement describes your situation during the past 7 days.

No.	Statement	Not at all (0)	A little bit (1)	Somewhat (2)	Quite a bit (3)	Very much (4)
1	I know that I have enough money in savings, retirement, or assets to cover the costs of my treatment					
2	My out-of-pocket medical expenses are more than I thought they would be					
3	I worry about the financial problems I will have in the future as a result of my illness or treatment					
4	I feel I have no choice about the amount of money I spend on care					
5	I am frustrated that I cannot work or contribute as much as I usually do					
6	I am satisfied with my current financial situation					
7	I am able to meet my monthly expenses					
8	I feel financially stressed					
9	I am concerned about keeping my job and income, including paid work at home					
10	My treatment has reduced my satisfaction with my present financial situation					
11	I feel in control of my financial situation					

Part II. Psychological distress, cost-related nonadherence, and demographic and health-related characteristics

1. Psychological distress

Over the past 2 weeks, how often have you been bothered by the following problems?

Symptom	Not at all (0)	Several days (1)	More than half the days (2)	Nearly every day (3)
Feeling down, depressed, or hopeless.				
Little interest or pleasure in doing things.				
Feeling nervous, anxious, or on edge.				
Not being able to stop or control worrying.				

2. Cost-related nonadherence

In the past 12 months, have you done any of the following to save money on prescription drugs?

No.	Behavior	Yes	No
1	Delaying prescription refills		
2	Only partly filling a prescription		
3	Skipping medication doses		
4	Taking a lower dose of medication		
5	Using someone else's medication		

3. Socio-demographic and clinical information

- Year of birth: _____
- Gender: ☐ Male ☐ Female
- Place of residence: ☐ Urban ☐ Rural
- Marital status: ☐ Single ☐ Married ☐ Widowed ☐ Divorced
- Education level: ☐ Below secondary ☐ Secondary ☐ High school ☐ College ☐ University ☐ Postgraduate
- Occupation: ☐ Homemaker ☐ Student ☐ Retired ☐ Farmer ☐ Worker ☐ Public employee ☐ Trader / Freelancer ☐ Other: _____
- Household size: _____ persons
- Monthly income: _____ million VND
- Health insurance: ☐ Yes ☐ No
- Type of diabetes: ☐ Type 1 ☐ Type 2
- Current diabetes regimen: ☐ Diet & exercise only ☐ Oral antidiabetic drugs only ☐ Oral drugs + Insulin ☐ Insulin only
- Duration of diabetes: ☐ <5 years ☐ 5–10 years ☐ >10 years
- Most recent blood glucose (mmol/L): _____
- Most recent HbA1c (%): _____
- Number of diabetes medications currently prescribed: _____
- Number of total medications prescribed for all conditions: _____
- Comorbidities (check all that apply): ☐ Hypertension ☐ Chronic kidney disease ☐ Dyslipidemia ☐ Osteoporosis ☐ Arthritis ☐ Peptic ulcer ☐ Anxiety / Depression / Insomnia ☐ Cancer ☐ Other: