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Predicting the risk of type 2 diabetes: Standardized diabetes risk score among the Khmer ethnic minority in Vietnam

Tuyen Thi Hong Nguyen[1], Lam Phuc Duong[1]

Keywords: Khmer people; Tra Vinh (province); Modified diabetes risk score; type 2 diabetes; Vietnam
Parole chiave: Popolo Khmer; Tra Vinh (provincia di); punteggio di rischio di diabete modificato; diabete di tipo 2; Vietnam

Abstract

Background. *Predicting the risk of progression to type 2 diabetes, as well as identifying the factors that increase this risk, helps the population adjust the modifiable risk factors, improve quality of life, and reduce the disease burden.*
Subjects and methods. *A cross-sectional study was conducted on 918 ethnic Khmer minority people aged 40 and above in Vietnam who had never been diagnosed with type 2 diabetes.*
Objective. *To predict the 10-year risk of type 2 diabetes, the Finnish Diabetes Risk Scoring Scale, adjusted for the Asian population with modification of the waist circumpherence and Body Mass Index Cut-Offs, was used.*
Results. *The 10-year predicted risk of progression to type 2 diabetes in ethnic Khmer people aged 40 years and older in southern Vietnam, using the Asian-modified Finnish Diabetes Risk Scoring Scale, resulted 10.54% in the total population study, females have a higher risk at 12.62% compared to 8.01% of males. Among the items that make up the Finnish Diabetes Risk Scoring Scale, age, waist circumference, BMI, family history of diabetes, history of high blood glucose, and use of blood pressure medication were the most accurate predictors, with the area under the Receiver operating characteristic (ROC) curve at 0.83, 0.81, 0.77, 0.75, 0.74 and 0.73 respectively. The optimal cut-off score to identify progression to tipe 2 diabetes was 13.5 points (Se = 1.00, Sp = 1.00, p < 0.001). The multivariable logistic regression model shows that factors associated with high risk of type 2 diabetes progression in 10 years are age, gender, occupation, economic status, education level and regular alcohol consumption (p < 0.05). The study results provide a basis for proposing potential solutions to reduce modifiable risk factors for type 2 diabetes in the population. These include providing culturally appropriate health education and changing behavior to address alcohol consumption.*
Discussion and conclusions. *The use of the Asian-modified Finnish Diabetes Risk Scoring Scale to predict the risk of progression to type 2 diabetes and as a screening tool for undiagnosed type 2 diabetes is appropriate for the Vietnamese Khmer population.*

[1] *Statistics and Demography Department, Public Health Faculty, Can Tho University of Medicine and Pharmacy, CanTho, Vietnam*

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Introduction

Type 2 diabetes (T2D) is a non-communicable disease that is increasingly common globally. According to the International Diabetes Federation in 2021, there are 537 million adults (aged 20-79) worldwide, and more than 3 out of 4 adults with diabetes live in low- and middle-income countries (1). According to the 2021 STEPS (STEPwise approach to Surveillance) national survey on risk factors for non-communicable diseases, Vietnam has approximately 15.1 million adults with hypertension (23.3%) and 4.5 million with T2D (7.3%), and 17% have prediabetes (2); the estimated undiagnosed T2D cases are 50%. Prolonged chronic hyperglycemia can lead to metabolic disorders and result in damage to various organs, such as the heart, blood vessels, kidneys, eyes, and nerves (3,4). While there is no specific treatment for the disease, it can be prevented if people actively address the risk factors, especially during the prediabetes stage. Therefore, identifying individuals in the prediabetes stage is crucial for preventing disease progression or reducing severe complications of T2D (3). The main factors for T2D are environmental, genetic, obesity, and physical inactivity, all of which are increasing at a high rate (5,6).

The Finnish Diabetes Risk Score (FINDRISC) scale assesses the risk of progressing to T2D based on 8 factors, including age, Body Mass Index (BMI), waist circumference, daily physical activity, consumption of fruits and vegetables, use of blood pressure-lowering medication, history of elevated blood glucose, and family history of diabetes (7). The total score ranges from 0 to 26, with a higher score indicating a higher risk of developing Type 2 Diabetes. The FINDRISC scale has been adapted to use Asian-specific BMI and waist circumference cut-off points. The highest cut-off for waist circumference is based on the Asian standard (90 cm for men and 80 cm for women) instead of the European standard (102 cm for men and 88 cm for women) used in the original FINDRISC. The BMI classification is also specific for the Asian population. According to the World Health Organization (WHO), the risk of T2D and cardiovascular disease increases in Asians with a BMI ≥ 25 kg/m^2, and the classification is as follows: BMI < 18.5 kg/m^2: underweight; 18.5 kg/m2 – 23 kg/m2: acceptable risk; 23 kg/m2 - < 27.5 kg/m2: increased risk; ≥ 27.5 kg/m2: high risk (8). The scoring for each item is presented in Table 1.

Table 1 - The FINDRISC scale evaluates the risk of diabetes for Asians

Item	Standard		Score
1. Age, years	< 45		0
	45 - 54		2
	55 - 64		3
	> 64		4
2. BMI, kg/m²	< 23		0
	23 - < 27,5		1
	≥ 27,5		3
3. Waist circumference, cm	Male	Female	
	< 82	< 72	0
	82 – 90	72 - 80	3
	> 90	> 80	4
4. Physical activity ≥ 4 hr/week	Yes		0
	No		2
5. Daily consumption of vegetables, fruits	Yes		0
	No		1
6. Use of blood pressure medication	No		0
	Yes		2
7. History of high blood glucose	No		0
	Yes		2
8. Family history of diabetes	No		0
	Yes, 2nd degree relative		3
	Yes, 1^{sd} degree relative		5

The Khmer people are an ethnic minority group, representing 1.4% of the total population in Vietnam. Tra Vinh province has the largest Khmer population, accounting for 32% of the province's residents (9). The Khmer people are primarily farmers (engaged in rice cultivation), hired laborer and small-scale merchants in local markets. They face economic difficulties, and their educational attainment is relatively low (in the study sample, 12.9% were illiterate, and 59.0% had only completed primary education, 1-5 years of schooling). As a result, they have limited knowledge of disease prevention, understanding of the consequences of diseases, and access to healthcare services. Economic challenges are the biggest obstacle for them in affording screening and treatment services. Therefore, a cost-free tool is needed for local healthcare workers to estimate the risk of T2D in the Khmer population, provide early notification, and facilitate their access to diagnosis and treatment. The assessment of the 10-year risk of diabetes among the Khmer population aged 40 and above in Tra Vinh has not been reported in previous studies. FINDRISC is a non-invasive and feasible tool to predict the risk of T2D in high-risk undiagnosed individuals (7).

Materials and methods

1. Study Design

This cross-sectional study was conducted from June to September 2023 in the community of Tra Vinh province, which is a province in the Mekong Delta region of southern Vietnam. It aimed to estimate the risk of developing T2D mellitus over the next 10 years (2033) among Khmer adults aged 40 and above, who had the cognitive capacity and communication ability, had not been previously diagnosed with diabetes, and consented to participate in the study.

2. Sample size

The sample size was calculated using the following formula:

$$n = Z^2_{1-\alpha/2}\frac{p(1-p)}{d^2};$$

where, n is the smallest sample size to be achieved in the study; p is the predicted 10-year T2D rate of 16.7% (based on a previous study in Da Nang, Vietnam in 2017 (10)); d is the absolute error of 5%, and Z(1-α/2) is the Z-statistic for a 95% confidence level. A design effect of 1.5 was applied. The minimum sample size calculated using the formula was 896 people. In practice, when creating the sample, we collected an excess sample, totaling 950 questionnaires, to account for potential sample errors. After removing subjects with incomplete data, the final number of questionnaires collected was 918, and we used it for the analysis.

3. Data collection

The study used a population proportionate to size (PPS) sampling method (Figure 1), following these 4 steps:

1) From the total of 106 communes/wards in Tra Vinh province;

2) 30 communes/wards were selected based on the

No.	Ward/Commune name	N. of Khmer people ≥ 40 ys	Cumulative size	N. associated
1	Cầu Ngang	169	169	0 - 169
2	Mỹ Long	18	187	170 -187
3	Mỹ Long Bắc	32	219	188 - 219
4	Mỹ Long Nam	14	233	220 - 233
5	Mỹ Hòa	1,217	1,450	234 - 1450
6	Vĩnh Kim	24	1,474	1,451 - 1,474
7	Kim Hòa	2,103	3,577	1,475 - 3,577
8	Hiệp Hòa	1,789	5,366	3,578 - 5,366
9	Thuận Hòa	1,618	6,984	5,367 - 6,984
10	Long Sơn	2,250	9,234	6,985 - 9,234
11	Nhị Trường	3,107	12,341	9,235 - 12,341
12	Trường Thọ	2,440	14,781	12,342 - 14,781
13	Hiệp Mỹ Đông	32	14,813	14,782 - 14,813
14	Hiệp Mỹ tây	29	14,842	14,814 - 14,842
15	Thạnh Hòa Sơn	2,273	17,115	14,843 - 17,115

1. Compiled a list of 106 clusters (wards/communes) in Tra Vinh province, Vietnam.
2. Purposively selected 30 communes out of 100 communes, based on the size of the Khmer population aged over 40 years in each cluster.
• The cluster interval k = 129,202/30 = 4,306
• A random number x = 201 (satisfying the condition $1 \leq x \leq 4,306$)
• The first cluster: chosen with the order number in the list as x = 201, at cluster 3, around cluster 188 - 219.
• The next cluster: x + k, x + 2k, ..., x + (n - 1)k. The total number of clusters is 30.
3. Sample size in each cluster: survey at least 30 Khmer people over 40 years old in each cluster.

Figure 1 -The procedure for implementing the Probability Proportional to Size (PPS) sampling method (Presenting the first 15 clusters out of the total 106 clusters).

size of the Khmer population aged 40 and above;

3) A list of Khmer individuals was compiled, and systematic random sampling was used to select participants based on the population proportion in those 30 communes;

4) Local health officials invited the selected individuals (who consented to participate) to the commune health stations for medical examination and interviews.

4. Contents and Data Collection Methods

1) Participants' information and anthropometric measurements were collected through direct interviews using the WHO STEPS questionnaire (Vietnamese version) (11). For Khmer participants who only spoke the Khmer language, only the interviewers who were proficient in the Khmer language conducted the interviews in Khmer.

2) Participants were asked about their history of antihypertensive medication use, history of dysglycemia, and family history of diabetes.

3) The FINDRISC score was calculated using BMI and waist circumference cut-offs for the Asian population. The highest cut-off was for the Asian waist circumference standard (90 cm for men and 80 cm for women), instead of the European standard (102 cm for men and 88 cm for women) used in the original FINDRISC. BMI categories were also based on the WHO Asian classification: BMI <18.5 kg/m2: underweight; 18.5-23 kg/m2: acceptable risk; 23-<27.5 kg/m2: increased risk; ≥27.5 kg/m2: high risk (8).

4) The 10-year T2D risk was estimated using the FINDRISC-Asia scoring system: <7 points, low risk (1/100); 7-11 points, slightly elevated risk (1/25); 12-14 points, moderate risk (1/6); 15-20 points, high risk (1/3); >20 points, very high risk (1/2) (7).

5. Statistical analysis

Data analysis was performed using Stata software version 17.0. The distribution of study variables was described using chi-square tests. Independent variables associated with the prediction of 10-year T2D risk were identified through univariate analysis, and those variables were then selected for inclusion in a multivariate logistic regression model. Receiver operating characteristic (ROC) curves were used to evaluate the predictive value of the items in determining the 10-year diabetes risk. A statistical significance level of $p < 0.05$ was chosen.

Results

The total number of survey participants was 918, with 418 males and 500 females. Their average age was 67.5 years, with the youngest being 40 and the oldest 82. The majority of the participants, 63.4%, were engaged in agricultural occupations, while 13.3% were small-scale market vendors and hired laborers, and 23.3% were retired or had other occupations. 14.4% of the participants were living alone, and 12.9% were illiterate.

The risk of developing T2D is presented in Table 2, with the percentages for the risk levels of Low Risk, Moderately Low Risk, Moderate Risk, and High Risk being 28.8%, 36.9%, 16.0%, and 18.3% respectively. There were no cases in the Very High Risk category.

The optimal cut-off value of the FINDRISC scale was 13.5 to assess the 10-year risk of T2D in the Khmer community aged over 40 (Sensitivity = 1.00 and Specificity = 1.00, $p < 0.001$). The predictive performance of the FINDRISC scale items is represented by the ROC Curve. Among the factors, age (Area Under the Curve (AUC)) = 83%; the optimal cutoff value was 66 years old) has the highest value, followed by Waist circumference (AUC = 81%; cutoff value = 81.5), BMI (AUC = 76.7%; cutoff value = 22.95), having a family member with diabetes (AUC = 74%), a history of high blood glucose (AUC = 74.6%), and having previously been prescribed blood pressure medication (AUC = 72.7%); having physical activity of 4h/week is considered a protective factor against risk (AUC = 27.3%). The factors that have less value in distinguishing the high-risk level of progression to diabetes are gender (AUC = 67.8%) and daily consumption of vegetables and fruits (AUC = 59.2%) (Figure 2*)*.

We selected 9 determining factors for the Asian FINDRISC score and incorporated them into a multiple regression model to identify independent factors that increase or decrease the Asian FINDRISC score in the Khmer community aged 40 and above (Table 3). The equation is as follows: Asian FINDRISC score = -18.68 + 0.14*Age - 1.72 *female + 0.27*BMI + 0.17* Waist circumference -1.96*Physical activity ≥ 4 hours/week - 1.26*Daily consumption of vegetables, fruits + 2.12*Use of blood pressure medication + 1.82*History of high blood glucose + 3.68*2*2nd degree relative + 4.94*3*1st degree relative (for individuals without a specific variable in the equation, the value of that variable is set to 0). The results are as follows: for every 1 year increase in age, the score increases by 0.14 points; females have a decrease of

Table 2 - Predicting the risk of diabetes in males and females using the Asian FINDRISC

FINDRISC		n (%)				Prediction of T2D risk		
		Total	Male	Female		Total	Male	Female
<7	Low risk	264 (28.8)	114 (27.3)	150 (30.0)	1/100	0.29	0.27	0.30
7-11	Low-moderate risk	339 (36.9)	181 (43.3)	158 (31.6)	1/25	1.48	1.73	1.26
12-14	Moderate risk	147 (16.0)	95 (22.7)	52 (10.4)	1/6	2.67	3.78	1.73
15-20	High risk	168 (18.3)	28 (6.7)	140 (28.0)	1/3	6.10	2.23	9.33
>20	Very high risk	0 (0.0)	0 (0.0)	0 (0.0)	1/2	0	0	0
Mean, SD *(min, max)*		9.2 ±4.2 *0 - 19*	8.8 ±3.9 *0 - 19*	9.6 ±4.4 *3 – 19*		p < 0.001		
Total		918 (100)	418 (100)	500 (100)		10.54	8.01	12.62

n: frequencies, (%): Column percentage, SD: standard deviation, T2D: Type 2 diabetes

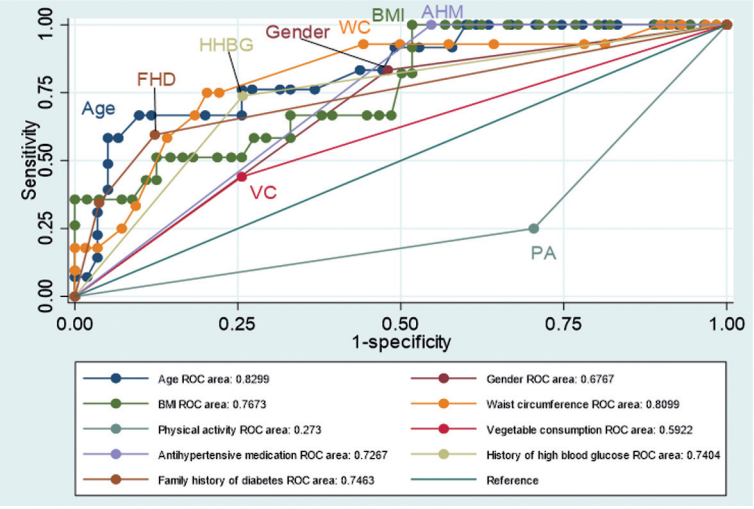

Figure 2 - Display the ROC curve between the Asian FINDRISC and the individual items of the scale
FHD: Family history of diabetes; HHBG: History has been found of high blood glucose; WC: Waist circumference; BMI: Body mass index; AHM: History of taken antihypertensive medication; PA: Physical activity; VC: Vegetable consumption.

Table 3 - The multiple regression equation for the 8 items of the Asian FINDRISC scale

Item	Coefficient	Std. err.	t	95% CI	p-value
Age, 1 year	0.14	0.004	36.54	0.13 – 0.14	< 0.001
Gender, male	-1.73	0.088	-19.69	-1.90 - -1.55	< 0.001
BMI, 1 kg/m²	0.27	0.018	14.83	0.23 – 0.30	< 0.001
Waist circumference, 1 cm	0.17	0.006	29.16	0.16 – 0.18	< 0.001
Physical activity ≥ 4 hr/week	-1.96	0.092	-21.40	-2.14 - -1.78	< 0.001
Daily consumption of vegetables, fruits	-1.26	0.081	-15.62	-1.42 - -1.10	< 0.001
Use of blood pressure medication	2.12	0.094	22.54	1.94 – 2.31	< 0.001
History of high blood glucose	1.82	0.101	18.10	1.62 – 2.02	< 0.001
Family history of diabetes					
Yes, 2nd degree relative	3.68	0.112	32.71	3.46 – 3.90	< 0.001
Yes, 1sd degree relative	4.94	0.136	36.39	4.67 – 5.20	< 0.001
Constant	-18.68	0.544	-34.37	-19.75 - -17.62	< 0.001

Std. err.: standard error, CI: confidence interval

1.72 points; every 1 unit increase in BMI is associated with a 0.27 point increase; every 1 cm increase in waist circumference corresponds to a 0.17 point increase; having physical activity ≥ 4 hours/week and a daily consumption of vegetables and fruits decrease the score by 1.96 and 1.26 points respectively; the use of blood pressure medication and a history of high blood glucose increase the score by 2.12 and 1.82 points respectively; having a first-degree relative with diabetes increases the score by 4.94 points, while having a second-degree relative increases the score by 3.68 points. The sum of the component scores is the Asian FINDRISC score, which predicts a high risk of progressing to T2D if the Asian FINDRISC score is > 13.5.

In the univariate logistic regression analysis, 7 variables were found to be statistically significant and were included in the multivariate logistic regression model (Table 4). This model selection approach increases the power to detect and avoid omitting any confounding variables or covariates, which could lead to biased estimates and incorrect conclusions. Each additional year of age increased the odds ratio (OR) of T2D by 1.3 (OR = 1.3, 95% CI 1.3-1.4, p < 0.001). Females had a 24-fold higher risk of developing T2D compared to males (OR = 24.0, 95% CI 18.8-65.3, p < 0.001). Small-scale vendors and hired laborers had a 2.8-fold higher risk compared to farmers (OR = 2.8, 95% CI 1.1-7.2, p = 0.026). The poor (as confirmed by the government) had a 2.7-fold higher risk compared to the non-poor (OR = 2.7, 95% CI 1.2-6.4, p = 0.022). Individuals with more than 12 years of education and the illiterate had a 40.6-fold (OR = 40.6, 95% CI 12.6-130.7, p < 0.001) and 7.3-fold (OR = 7.3, 95% CI 3.4-15.6, p < 0.001) higher risk, respectively, compared to those with 1-12 years of education. Frequent alcohol consumption was associated with a 3.4-fold higher risk compared to non-drinkers (OR = 3.4, 95% CI 1.6-7.6, p = 0.002).

Discussion

The predicted 10-year risk of progression to T2D among ethnic Khmer individuals aged 40 and above in southern Vietnam, using the adapted Asian FINDRISC scale, is 10.54% for the total population. Females have a higher risk at 12.62% compared to 8.01% for males. This figure is higher compared to studies in Thua Thien Hue province in central Vietnam in 2020, where the projected 10-year T2D progression risk in the community was 4.24%; similar to our study,

Table 4 - Multivariable logistic regression analysis of demographic factors and risk of T2D over the next 10 years (n = 918)

Values	Risk of T2D		Univariate analysis		Multivariate analysis	
	High (n = 168)	Low, Moderate (n = 750)	OR 95% CI	p-value	OR 95% CI	p-value
Age, mean (SD), years (min – max)	67.5 (±8.7) *(52 - 82)*	56.8 (±10.6) *(40 - 77)*	1.2 (1.1-1.2)	< 0.001	1.3 (1.3-1.4)	< 0.001
Gender, n (%)						
Male	28 (6.7)	390 (93.3)	1		1	< 0.001
Female	140 (28.0)	360 (72.0)	5.4 (3.5-8.3)	< 0.001	24.0 (8.8-65.3)	
Occupation, n (%)						
Farmer	60 (10.3)	522 (89.7)	1		1	
Small business, hired laborer	30 (24.6)	92 (75.4)	2.8 (1.7-4.6)	< 0.001	2.8 (1.1-7.2)	0.026
Retirement, others	78 (36.5)	136 (63.5)	5.0 (3.4-7.3)	< 0.001	0.9 (0.4-1.9)	0.728
Economic status, n (%)						
Not poor	138 (20.1)	550 (79.9)	1	0.018	1	0.022
Poor	30 (13.0)	200 (87.0)	0.6 (0.4-0.9)		2.7 (1.2-6.4)	
Marital status, n (%)						
Single	54 (40.9)	78 (59.1)	1	< 0.001	1	0.682
Married	114 (14.5)	672 (85.5)	0.3 (0.2-0.4)		0.8 (0.4-1.9)	
Using alcohol and beer, n (%)						
No	124 (25.7)	358 (74.3)	1		1	
Yes	44 (10.1)	392 (89.9)	0.3 (0.2-0.5)	< 0.001	3.4 (1.6-7.6)	0.002

n: frequencies, (%): row %, CI, confidence interval; OR, odd ratio

females were predicted to have a higher risk at 8.18% compared to 4.91% for males (12). The higher disease prevalence and risk in females compared to males have also been reported in many previous studies (13). Women appear to bear a greater burden of risk factors at the time of T2D diagnosis (14). Pregnancy can lead to metabolic abnormalities resulting in gestational diabetes, which is also a major risk factor for the subsequent development of T2D in women (15,16). Additionally, the increasing prevalence of obesity during the menopausal period (17), is also a strong risk factor for T2D (18).

The optimal cutoff value of ≥ 13.5 on the Asian FINDRISC scale has the highest discriminative power to diagnose high risk of developing T2D within 10 years in the study population (with Sensitivity at cutpoint: 1.00 and Specificity at cutpoint =1.00). Our cutoff point is higher compared to a 2016 study in Norway, which found the Asian FINDRISC cutoff with the best predictive value for T2D to be 11 points (19), or a study in Madrid, Spain that reported ≥ 13 points (20); while the initial recommendation for the scale was ≥ 15 points (7). Clearly, different study populations may yield slightly varying results. If the ≥ 15 point cutoff was applied to this study population, it would have significantly underestimated the 10-year diabetes risk compared to the actual risk. In general, more recent studies have consistently shown a lowering of the Asian FINDRISC cutoff point for assessing T2D risk compared to earlier recommendations.

Age is an important factor in the risk of progressing to T2D. The age of onset for diabetes is typically over 40 years old, with the disease often developing silently and being difficult to detect. In our study, the threshold of 66 years old was assessed to be at high risk (Sensitivity at cutpoint: 0.67, Specificity at cutpoint: 0.90). Age is directly proportional to the risk of developing T2D due to the progressive deficiency in insulin secretion with aging (21) and the increasing state of insulin resistance due to metabolic changes (22). Occupation is also related to a higher risk of progressing to T2D. Sedentary occupations such as small-scale trading and freelance work have a higher risk compared to farmers, which is closely related to higher levels of physical activity. The farmers in this context mainly grow rice using manual labor, without modern machinery or mechanization in agriculture.

In Vietnam, individuals who are truly poor will be officially recognized as such by the government. This study found that the poor have nearly a 3-fold higher risk of developing T2D compared to the non-poor. Similarly, a study by Chih-Cheng Hsu in China (23), showed that compared to those with average incomes, the poor have around a 50% higher risk of developing T2D. Additionally, we can also observe that the poor are less likely to receive regular health check-ups and glucose tests as recommended. Maintaining a healthy lifestyle and diet when experiencing blood glucose dysregulation is also more challenging for low-income groups.

Frequent alcohol consumption has a 3.4-fold higher risk of progressing to T2D (in this study, frequent use was defined as consuming at least 6 alcohol units at least once a week). Moderate alcohol intake (16g of pure alcohol per day) has a protective effect for non-drinkers, but high consumption (50g) no longer provides a protective factor (24,25). Alcohol affects the hormonal balance of blood glucose, specifically insulin. Excessive alcohol consumption can slow down or disrupt the production of insulin (26,27).

Conclusion

The 10-year diabetes risk forecast according to the Asian FINDRISC scale is 10.54%, with a risk of 8.01% for males and 12.62% for females. The optimal cut-off point for predicting a high risk of progression to type 2 diabetes on the scale is 13.5. The items of the Asian FINDRISC scale effectively measure accuracy, except for the item related to daily fruit and vegetable consumption. Using the Asian FINDRISC scale to predict the risk of progression to type 2 diabetes and to screen for undiagnosed cases is appropriate for the Khmer Vietnamese population.

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Ethical approval: The research was approved by the Biomedical Research Ethics Committee of Can Tho University of Medicine and Pharmacy (Decision No. 23.013.NCS/PCT-HĐĐĐ15.6/23). Participants' information was kept confidential and used only for research purposes. The survey did not cause any harm to the participants, and they were free to withdraw from the study at any stage. The study was approved by the Department of Health, the District Health Center, and the local Health Stations where the study participants resided in Tra Vinh province.

Authors Contributions: T.T.H. Nguyen designed the details of the study. T.T.H. Nguyen and L.P. Duong investigated the data and ensured accurate and strict exclusions according to the study crite-

ria. The analysis was carried out by T.T.H. Nguyen interpreted the analysis and wrote the paper. L.P. Duong contributed to the critical evaluation and revision of the manuscript. T.T.H. Nguyen and L.P. Duong approved the final version of the article.

Availability of data and material: The data sets during and /or analysed during the current study are available from the corresponding author on reasonable request.

Conflict of Interests: All authors declare no conflicts of interest in this paper.

Riassunto

Previsione del rischio di diabete di tipo 2: punteggio standardizzato di rischio di diabete tra la minoranza etnica Khmer in Vietnam

Contesto. Prevedere il rischio di progressione verso il diabete di tipo 2, nonché identificare i fattori che aumentano tale rischio, aiuta la popolazione a "migliorare" i fattori di rischio modificabili, a promuovere la qualità della vita ed a ridurre il carico di malattia.

Obiettivo. Prevedere il rischio di diabete di tipo 2 a 10 anni utilizzando la Scala finlandese di rischio del diabete di tipo 2, adattata per la popolazione asiatica con modifiche della circonferenza toracica e modifiche dei Cut-Offs dell'Indice della massa corporea.

Soggetti e metodi. Studio trasversale condotto su 918 persone appartenenti alla minoranza etnica Khmer di età pari o superiore a 40 anni in Vietnam che non avevano ricevuto in precedenza una diagnosi di diabete di tipo 2. È stata utilizzata la scala Scala finlandese di rischio del diabete di tipo 2 adattata, con modifiche alla circonferenza della vita e diversi limiti dell'Indice di Massa Corporea, adattati per la popolazione asiatica.

Risultati. Il rischio di progressione verso il diabete di tipo 2 previsto a 10 anni nelle persone di etnia Khmer di età pari o superiore a 40 anni nel Vietnam meridionale, utilizzando la Scala finlandese di rischio del diabete di tipo 2 modificata per l'Asia, è del 10,54% nella popolazione totale, mentre le femmine hanno un rischio più elevato al 12,62% rispetto all'8,01% degli uomini. Tra gli elementi che compongono la Scala finlandese di rischio del diabete di tipo 2 - età, circonferenza della vita, BMI, storia familiare di diabete, storia di glicemia alta e uso di farmaci per la pressione sanguigna - sono stati i predittori più accurati, con l'area sotto la curva Receiver operating characteristic (ROC) rispettivamente a 0,83, 0,81, 0,77, 0,75, 0,74 e 0,73. Il punteggio di cut-off ottimale per identificare la progressione verso il diabete di tipo 2 era di 13,5 punti (Se = 1,00, Sp = 1,00, $p < 0,001$). Il modello di regressione logistica multivariata mostra che i fattori associati ad un rischio elevato di progressione del diabete di tipo 2 in 10 anni sono età, sesso, occupazione, stato economico, livello di istruzione e consumo regolare di alcol ($p < 0,05$). I risultati dello studio forniscono una base per proporre potenziali soluzioni per ridurre i fattori di rischio modificabili per il diabete di tipo 2 nella popolazione. Questi includono fornire un'educazione sanitaria culturalmente e contenutisticamente appropriata e cambiare comportamento per affrontare il consumo di alcol.

Conclusioni. L'uso della scala FINDRISC per predire il rischio di progressione verso il diabete di tipo 2 e come screening per il diabete di tipo 2 non diagnosticato è risultato appropriato per la popolazione vietnamita di etnia Khmer.

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Corresponding author: Tuyen Hong Thi Nguyen, MSc, Statistics and Demography Department, Public Health Faculty, Can Tho University of Medicine and Pharmacy, No. 179, Nguyen Van Cu St, An Khanh Ward, Ninh Kieu District, Can Tho City, 94117, Vietnam
e-mail: nthtuyen@ctump.edu.vn

ORCIDs
Tuyen Hong Thi Nguyen: 0000-0002-1332-5862
Lam Phuc Duong: 0009-0002-0146-6243