

ASSESSMENT OF RISK OF DEVELOPING TYPE 2 DIABETES AMONG THE ADULT POPULATION RESIDING AT GOKARNESHWOR MUNICIPALITY, KATHMANDU

Jyotsana Pokharel, Srijana Pandey, Basanti Adhikari, Aarati Kattel, Pooja Prakash Paswan

Department of Nursing, Nepal Medical College, Attarkhel, Gokarneshwor-8, Kathmandu, Nepal

ABSTRACT

Diabetes is a growing global burden disease for individuals, families and countries. It has emerged as a major global health challenge affecting people in low- and middle-income countries including Nepal. Diabetes leads to extensive morbidity and mortality, prediction of one's high risk for type II diabetes is an important issue as it can lead to early recognition and treatment. Therefore, this study was carried out to find the risk of developing type II Diabetes among the adult population residing at Gokarneshwor Municipality in Kathmandu. A descriptive cross-sectional study was conducted among 202 adults aged 18 years and above of Gokarneshwor Municipality in ward number 1 from August-September 2025. Non-probability convenience sampling techniques was used to collect the data. SPSS-16 was used for data entry and analysis. Descriptive statistics such as median, frequency and inferential statistics such as chi-square tests were used. The study revealed that over a third (38.1%) of respondents were below 35 years. Majority (66.3%) of respondents were female and only (33.7%) were male. Only (20.3%) of the respondents had family history of diabetes. Most of the respondents (65.3%) performed moderate physical exercise. Less than half (39.1%) of the respondents had waist circumference ≥ 90 in females and ≥ 100 in males. The proportion of respondents with high risk, moderate risk and low risk of developing diabetes were 29.7%, 50.5%, and 19.8% respectively. The analysis showed body mass index ($P = 0.003$) was significantly associated with risk of developing type 2 diabetes. The study showed nearly one-third of the study participants were in high-risk group and half of them were at moderate risk of developing type II diabetes Mellitus. This increasing risk of development of type 2 diabetes in this population can be prevented by prompt awareness of preventive measures through lifestyle modifications.

KEYWORDS

Adults, Indian diabetic risk score, type 2 diabetes mellitus

Received on: March 22, 2026

Accepted for publication: June 30, 2026

CORRESPONDING AUTHOR

Ms. Jyotsana Pokharel,
Assistant Professor
Department of Nursing,
Nepal Medical College Teaching Hospital,
Attarkhel, Gokarneshwor-8, Kathmandu, Nepal
Email: pokhareljyotsana@gmail.com
Orcid No: <https://orcid.org/0000-0002-3416-4543>
DOI: <https://doi.org/10.3126/nmcj.v28i2.97787>

Cite this paper as: Pokharel J, Pandey S, Adhikari B, Kattel A, Paswan PP. Assessment of risk of developing type 2 Diabetes among the adult population residing at Gokarneshwor Municipality, Kathmandu. *Nepal Med Coll J* 2026; 28: 167-73.

INTRODUCTION

Diabetes is the growing global burden disease for individuals, families and countries. The latest International Diabetes Federation (IDF) Diabetes Atlas 2025 reported that 1 in 9 of the adult population (20-79 years) is living with diabetes. By, 2050, it is estimated that 1 in 8 adults will be living with the disease, with an increase of 46.0%.¹ There is an increasing trend in the prevalence of type 2 diabetes in low-and middle-income countries (LMICs), and more than 75.0% adults with type II diabetes are now living in developing countries.² According to the United Nations (UN), non-communicable diseases (NCDs) including diabetes account for high mortality rates globally; 63.0% of death worldwide.³ Currently, South Asia is experiencing an increasing burden of type 2 diabetes and its complications. Approximately one-fifth of all adults with type 2 diabetes in the world live in the South-East Asia Region.⁴ The prevalence of diabetes is increasing alarmingly, reaching epidemic levels and affecting individuals across all age groups.² Nepal is experiencing an epidemiological transition with a prevalence of NCDs estimated to range from 31.0% to 36.5%.^{5,6} High diabetes prevalence is driven by economic expansion, urbanization, lifestyle choices and ageing.⁷ Type II diabetes has been seen in increased number in younger age groups in developed and developing countries affecting their physical, mental health and their academic performance.^{8,9} The factors like sedentary lifestyle behaviors, including daily smoking, heavy alcohol drinking, obesity, and reduced physical activity rapid population growth, urbanization, increased stress, and improper food intake are attributing factors for diabetes mellitus.¹⁰

The risk complications of diabetes are far worse if the individual who is prone to diabetes for various reasons doesn't get diagnosed and treated properly. Some of the complications include coronary artery disease, stroke, diabetic retinopathy, diabetic neuropathy, and diabetic nephropathy. Because of the disease's growing burden, its iceberg nature, its consequences, and the ability to prevent these complications through early identification and treatment, strong efforts for early diabetes diagnosis are essential.¹¹ Screening becomes an essential method because people are not aware of their diabetic status until and unless they develop the symptoms.¹² With the increasing trend in

DM, identification of individuals with high risk becomes crucial because it help delay or interrupt its complications and thereby reduce the clinical, social and economic burden due to diabetes.¹³ Periodic screening for identifying high-risk individuals can be carried out using non-invasive tools as it can be effectively applied to large populations.¹⁴ The present study aimed to assess the risk of developing diabetes mellitus type 2, among adults of a ward number 1 of Gokarneshwor Municipality using the Indian Diabetes Risk Score (IDRS). Indian diabetes risk score (IDRS) is a cost-effective tool for screening of undiagnosed persons with diabetes in the community. It uses four simple characteristics such as age, waist circumference, family history of diabetes, and physical activity to assess risk of diabetes. An IDRS value ≥ 60 had the optimum sensitivity (72.5%) and specificity (60.1%) for determining undiagnosed diabetes with a positive predictive value of 17.0%, negative predictive value of 95.1%, and accuracy of 61.3%.¹⁵

MATERIALS AND METHODS

A community based descriptive cross-sectional study was conducted among 202 adults aged above 18 years of Ward No. 1 Gokarneshwor Municipality from August 2025 - September 2025. Ethical approval to conduct study was taken from Nepal Medical College - Institutional Review Committee (NMC-IRC) of reference number 16-082/083. Formal permission for data collection was taken from the Ward office of Gokarneshwor Municipality. Adults above 18 years, not diagnosed with diabetes, who were present and those willing to participate were included in the study. This ward was selected purposively. Households were selected using a convenience sampling technique. The researcher visited the study community and approached households that were easily accessible and available during data collection period. Households where there were individuals who had not been previously diagnosed with diabetes were selected as study participants. Households without an eligible participant or those that declined to participate were excluded. Sample size was calculated by taking the high-risk score of IDRS score (prevalence) i.e. 13.7% from the study done in Melmaruvathur Adhiparasakthi Institute of Medical Sciences (MAPIMS) by Jeyaseeli *et al.*¹⁶ Assuming 95.0% confidence level that is 1.96 and allowable error of 5.0%, sample size was

calculated as $n = z^2pq/d^2$ $n = (1.96)^2 * 0.137 * 0.863 / (0.05)^2$ $n = 182$. Assuming 95.0% confidence level and allowable error of 5.0%, total number of samples was 202 by adding nonresponse rate, 10.0%. During the data collection, there was not any restriction in collecting the data of more than one eligible person in the same house. Research instruments consisted of section A and B. *Section A*: Socio-demographic details and risk factors such as alcohol, tobacco, smoking & high sweets intake. *Section B*: The IDRS questionnaire. IDRS questionnaire is a validated tool developed by Mohan *et al*¹⁵ to assess the diabetic risk among the Indian population. The questionnaire contained two modifiable (waist circumference, physical activity) and two non-modifiable risk factors (age, family history) for diabetes. The vigorous physical activity included activities requiring physical strain resulting in cardiovascular activity and sweating (such as running, jogging, swimming, heavy lifting, farm work). Moderate physical activity involved activities like cleaning the house, washing clothes by hand, fetching water/wood, gardening, bicycling, and walking at a moderate pace. Mild physical activity, respondent's involvement in activities like yoga, asana, pranayama, and meditation every day of the week. Waist circumference was measured around bare skin at the midpoint between lowest rib and the top of hip bone, which is typically around belly button measuring after a normal exhale. Anthropometric measurement was done to measure height, weight, waist circumference and to calculate body mass index (BMI). BMI was classified according to WHO BMI classification. Height was measured in meters and weight was measured in kilograms. Out of the total score of 100, individuals with ≥ 60 were considered to have a high risk of diabetes mellitus. Individuals with a score of 30-50 were considered to have moderate risk and those with < 30 were considered to have low risk of diabetes mellitus. Pretesting was done in 10.0% of the total sample in same area and those population were excluded in the time of data collection. Both verbal and written consent were taken from the participants who were under the inclusion criteria and only after explaining the purpose of the study, face-to-face interview was done with each respondent using interview schedule. Approximately 15-20 minutes was taken to collect data from each respondent. Confidentiality and anonymity of the data was maintained. Data was analyzed using SPSS-16.

RESULTS

Table 1 illustrates socio-demographic characteristics of respondents. Among 202 respondents more than 1/3rd 38.1% were

Table 1: Socio-demographic characteristics of the respondents (n=202)

Variables	n	%
Age group (in years)		
18-34	77	38.1
35-49	60	29.7
≥ 50 years	65	32.2
Mean age $\pm$ SD = 42.58 $\pm$ 14.7		
Sex		
Male	68	33.7
Female	134	66.3
Religion		
Hindu	117	57.9
Buddhist	81	40.1
Others	4	2.0
Marital status		
Married	181	89.6
Unmarried	20	9.9
Education status		
Literate	148	73.3
Illiterate	54	26.7
Among literate n=148		
Informal	31	20.9
Primary-secondary	67	45.3
Higher secondary	36	24.3
Bachelor's & above	14	9.5
Occupation		
Home maker	86	42.6
Private service	11	5.4
Government service	23	11.4
Business	32	15.8
Agriculture	34	16.8
Others	16	7.9
Type of family		
Nuclear	130	64.4
Joint	68	33.7
Extended	2	2.0
Body mass index (WHO classification)		
Normal	73	36.1
Underweight	5	2.5
Overweight	89	44.1
Obese	35	17.3

Table 2: Respondent's behaviour of consuming, tobacco cigarettes and fast foods (n=202)

Variables	n	%
Consumption of tobacco		
Never	166	82.2
Ever	36	17.8
Consumption of cigarettes		
Never	142	70.3
Ever	60	29.7
Consumption of fast foods		
Less than 3 times per week	72	35.6
More than 3 times per week	130	64.4

between age group 18-34 years of age. Regarding the sex two-third (66.3%) were female. Among the total respondents 57.9% were Hindu followed by Buddhist 40.1%. Most of the participants, 89.6%, were married

Table 3: Respondent's physical activity, waist circumference and family history of diabetes (n=202)

Variables	n	%
Physical activity		
Vigorous exercise	26	12.9
Moderate exercise	132	65.3
Mild physical exercise	35	17.3
No exercise	9	4.5
Waist circumference females (n=134)		
<80 cm in females	28	20.8
80-89 cm in females	49	36.6
≥90 cm in females	57	42.6
Waist circumference males (n=68)		
<90 cm in males	31	45.5
90-99 cm in males	18	26.5
≥100 cm in males	19	28.0
Family history of diabetes		
No history	161	79.7
Either parent	37	18.3
Both parents	4	4.0

Table 4: Respondent's risk of developing type 2 diabetes mellitus (n=202)

Variables	n	%
Risk of development of type 2 diabetes mellitus		
Low risk	40	19.8
Moderate risk	102	50.5
High risk	60	29.7

and about 3/4th of the respondents 73.3% were literate. Among the literate nearly half 45.3% had studied up-to class 10. Similarly, regarding the occupation, nearly half of the respondents 42.6% were home makers and more than half of the respondents 64.4% had nuclear family. Regarding the body mass index, nearly half, 44.1% were overweight.

Table 2 shows the behaviour of respondents regarding consumption of tobacco, cigarettes and sweets. Out of 202 respondents, only 17.8% and 29.7% had ever consumed the habit of consumption tobacco and cigarettes. More than half of the respondents, 64.4%, had the habit of consumption of fast foods more than 3 times per week

Table 3 explains the types of physical activity, waist circumference and family history of diabetes of the respondents. More than half of the respondents 65.3% were involved in doing moderate exercises which includes activities like cleaning the house, washing clothes by hand, fetching water/wood, loads, gardening, bicycling, walking at a moderate pace. Regarding the waist circumference, 42.6% of females have ≥90 cm of waist circumference and only 28.0% of the males have waist circumference ≥100cm and there was no family history of diabetes in most of the respondents i.e. 79.7%.

Table 4 depicts that, out of 202 respondents, only 19.8 have the low risk of developing type II diabetes mellitus whereas majority of the respondents have moderate to high risk of developing type 2 diabetes mellitus.

Table 5 shows the association of risk of developing type II diabetes with selected socio-demographic variables. The above table shows that there is significant association of risk of developing type 2 diabetes with body mass index ($p = 0.003$) and there was no association with other selected variables like gender and religion, respectively.

Table 5: Association of respondents' selected socio-demographic variables with risk of developing type 2 diabetes mellitus (n=202)

Socio-demographic characteristics	Risk of developing diabetes					P value
	Total	Low risk		Moderate and high risk		
		n	%	n	%	
Gender						
Male	68	14	20.5	54	79.55	0.842
Female	134	26	19.4	108	80.6	
Body mass index						
Normal	78	24	30.7	54	69.2	0.003*
Overweight and above	124	16	12.9	108	87.1	
Religion						
Hindu	117	25	21.4	92	78.6	0.512
Others	85	15	17.6	70	82.4	

*= significantly associated

DISCUSSION

In this study IDRS was used to assess the risk of developing type 2 diabetes mellitus among adults. This study found 29.7% of the respondents were at high risk, 50.5% were at moderate risk and 19.8% were at low risk of developing the type 2 diabetes mellitus which is similar with the findings of study done in Nepal in Banepa municipality where 31% of respondents were at high-risk and 51.4% were at moderate risk and 17.6% were at lower risk of developing type 2 diabetes mellitus.¹⁷ Similar findings were noted in the study done in Pune, Maharashtra, India using IDRS where the prevalence of people at high risk of diabetes was 36.55%.¹⁸ The findings is also supported by the studies done in Jhalawar Medical College, Jhalawar, Rajasthan where 28.2% were at high risk, 59.1% were at moderate risk and 12.7% participants were in low risk, of developing diabetes according to IDRS score.¹⁹ Similar community based study done around semi urban population of Chennai near Poonamallee and Avadi²⁰ revealed 18.0%, 45.0% and 37.0% have low, moderate and high risk of developing type 2 diabetes mellitus. Half of the participants were at moderate risk, to which we can predict that if the condition remains the same, then these people will be the potential candidates for the high-risk group. The results have similarities, it might be because of geographical proximities influencing environment, behaviour also because of similar culture, norms, lifestyles, and social systems. This study findings revealed 36.1% have normal body mass index which is in

contrast with the study findings done in Banepa where 58.8% of the respondents have normal body mass index.¹⁷ Similarly this finding is also contrast with the study finding done in Tamil Nadu where 49.7% of the respondents have normal BMI.²¹ Only 29.7% of respondents were between the age group of 35-49 years of age which is not supported by the study done in a rural community of West Bengal, India²² where 49.7% were between the age group 35-49 years of age. The findings is also not supported by the study done in Banepa¹⁷ and the study done in Rajasthan.¹⁹

Cigarette consumption was found with 29.7% of the respondents while tobacco was found with 18.9% of the respondents. More than half of the respondents 64.4% were found to consume fast foods more than 3 times per week. The findings is supported by the study done in Tamil Nadu where 59.2% were found to consume fast foods more than 3 times per week.²¹ The increased intake of fast foods should be stopped by raising the awareness regarding its adverse effects on health and health education should be given encouraging the people to intake healthy as well as homemade foods, fruits, pulses green vegetables. Family history was found to be positive in either parent in 18.3% of the respondents in this study, which is in contrast with the study done in Nagpur, Maharashtra²³ where 44.8% were having positive family history in either parent. In this study, 42.6% of female respondents were found to have their waist circumference ≥ 90 cm which is in line with the study done in Nagpur, Maharashtra

where 38.35% of the female respondents were having the waist circumference ≥ 90 cm. This study findings revealed that 28.0% of the males' respondents were having waist circumference ≥ 100 cm which also supported with the study findings done in Nagpur Maharashtra where 33.7% of male respondents were having waist circumference ≥ 100 cm.²³ The findings are also supported by the study in adults of a rural community of West Bengal²⁴ and the study done in Hyderabad²⁵ where 46.9% and 45.4% had a waist circumference of more than 90 cm for females, respectively. Current study findings showed age ($p = 0.000$), physical activity ($p = 0.001$) and body mass index ($p = 0.003$) were significantly associated with risk of developing type 2 diabetes. The study is supported by the study findings of Maharashtra where age ($p < 0.001$), physical activity ($p < 0.001$) and body mass index ($p < 0.001$) were significantly with risk of developing type 2 diabetes mellitus.²³ Similarly the study findings were in line with the study done in Banepa¹⁷ where BMI ($P < 0.01$) was significantly associated with the risk of developing type 2 diabetes mellitus.

As the prevalence of people at high risk for diabetes was high, in the study lifestyle changes and awareness regarding risk factors are needed to control diabetes in the study population. This increasing trend of risk requires an urgent application of preventive measures through lifestyle modification. This study also emphasized the need for early identification of high-risk individuals and planning for the appropriate intervention to prevent, or delay, the onset of diabetes

ACKNOWLEDGMENT

We would like to thank respondents of Ward No. 1 and Ward Office of Gokarneshwor Municipality for granting permission to conduct this research. Also, we would like to thank all the helping hands for making this study successful.

Conflict of interest: None

Source of research fund: None

REFERENCES

1. International Diabetes Federation. IDF diabetes atlas. International Diabetes Federation.(2025) Available at: <https://idf.org/about-diabetes/diabetes-facts-figures/> (Accessed on: July 2025)
2. WHO. Global report on diabetes. Geneva: World Health Organization. (2016) Available at: <https://www.who.int/publications/item/9789241565257> (Accessed on: June 2025)
3. Tandon S, Chew M, Eklun-Gadegbeku CK et al. Validation and psychometric properties of the 8-item Morisky Medication Adherence Scale (MMAS-8) in Type 2 diabetes patients in sub-Saharan Africa. *Diabetes Res Clin Pract* 2015; 110: 129-36. DOI: <https://doi.org/https://doi.org/10.1016/j.diabres.2015.10.001>
4. Ramachandran A and Snehalatha C. Rising burden of obesity in Asia. *Int J Obes* 2010; 1: 868573. DOI: <https://doi.org/10.1155/2010/868573>
5. Abebe SM, Berhane Y, Worku A et al. Diabetes mellitus in Northwest Ethiopia: a community-based study. *BMC Public Health* 2014; 14: 1-8. DOI: 10.1186/1471-2458-14-97.
6. Bhandari GP, Neupane S, Ghimire U, Khanal A. Prevalence of non-communicable disease in Nepal Hospital Based Study. *J Nepal Health Res Counc* 2010; 1-4.
7. Romdhane HB, Ali SB, Aissi W et al. Prevalence of diabetes in Northern African countries: the case of Tunisia. *BMC Public Health* 2014; 14: 86.
8. Gopalakrishnan S, Rama R, Muthulakshmi M. Assessing the risk of developing type 2 diabetes mellitus among medical students in Chennai using Indian diabetes risk score. *Int J Community Med Public Health* 2017; 234: 2366.
9. Magliano DJ, Sacre JW, Harding JL et al. Young-onset type 2 diabetes mellitus - implications for morbidity and mortality. *Nat Rev Endocrinol* 2020; 16: 321-31.
10. Henson J, Dunstan DW, Davies MJ, Yates T. Sedentary behaviour as a new behavioural target in the prevention and treatment of type 2 diabetes. *Diab Metab Res Rev* 2016; 32: 213-20.
11. Sidenur B, Amrutha AM, Mangasuli V et al. Assessment of risk of type 2 diabetes using Indian diabetes risk score: A community based crosssectional study in urban field practice area of a medical college, Chitradurga. *Int J Preclin Clin Res* 2022; 3: 45-8.
12. Pawar S, Naik J, Prabhu P et al. Comparative evaluation of Indian diabetes risk score and finnish diabetes risk score for predicting risk of diabetes mellitus type II: A teaching hospital-based survey in Maharashtra. *J Family Med Prim Care* 2017; 6: 120
13. Forst T, Standl E, Hohberg C et al. IRIS II study: the IRIS II score - assessment of a new clinical algorithm for the classification of insulin resistance in patients with type 2 diabetes. *Diabet Med* 2004; 21: 1149-53.
14. Sengupta B and Bhattacharjya H. Validation of Indian diabetes risk score for screening

- prediabetes in west Tripura District of India. *Indian J. Community Med* 2021; 46:30-4.
15. Mohan V, Deepa R, Deepa M, Somannavar S, Datta M. A simplified Indian diabetes risk score for screening for Undiagnosed diabetic subjects. *J Assoc Physicians India* 2005; 53: 759-63.
 16. Jeyaseeli VA, RG, Mathivanan D, Prabakaran PA. Assessment of the risk of type 2 diabetes mellitus among a rural population in south India using the Indian diabetic risk score. *Cureus* 2023; 15: e41880.
 17. Thapa S, Kayastha P, Mishra DK. Assessment of risk of type 2 diabetes among adults of Banepa Municipality, Nepal: community based cross-sectional study. *Int J Travel Med Glob Health* 2020; 8: 31-6.
 18. Patil RS and Gothankar JS. Assessment of risk of type 2 diabetes using the Indian Diabetes Risk Score in an urban slum of Pune, Maharashtra, India: a cross-sectional study. *WHO Southeast Asia J Public Health* 2016; 5: 53-61. DOI: 10.4103/2224-3151.206555.
 19. Jain M, Kumar V, Jain M, Garg K, Shekhawat R, Gupta PK. Indian diabetes risk score (IDRS) as a strong predictor of diabetes mellitus: a cross-sectional study among urban population of Jhalawar, Rajasthan. *Indian J Community Health* 2022; 34: 60-6.
 20. Nagalingam S, Sundaramoorthy K, Arumugam B. Screening for diabetes using Indian diabetes risk score. *Int J Adv Med* 2016; 3: 415-8. DOI: 10.18203/2349-3933.ijam20161102.
 21. Charles A, Ra BA, Priya S. Risk assessment of type II Diabetes mellitus using Indian Diabetic Risk Score among adults in a tertiary care hospital, Tamil Nadu- a cross sectional study. *J Community Health* 2024; 49: 334-42
 22. Gupta S and Chakraborty A. Vulnerability toward the development of diabetes mellitus type 2 among adults from a rural community of West Bengal, India. *J Health Sci* 2022; 738-45, DOI: <https://doi.org/10.1108/JHR-08-2020-0320>
 23. Sastry NP, Deshmukh JS, Ekre KR et al. Risk assessment of type 2 diabetes among the adult population using Indian Diabetes Risk Score: a community-based cross-sectional study in Central India. *Int J Community Med Public Health* 2024; 11: 4816-22. Available from: <https://www.ijcmph.com/index.php/ijcmph/article/view/13104>
 24. Gupta S and Chakraborty A. Vulnerability toward the development of diabetes mellitus type 2 among adults from a rural community of West Bengal, India. *J Health Res* 2022; 36: 738-45. DOI: <https://doi.org/10.1108/JHR-08-2020-0320>
 25. Bala S, Pandve H, Kamala K et al. Performance of Indian diabetic risk score as a screening tool of diabetes among women of industrial urban area. *J Family Med Prim Care* 2019; 8: 3569-73.