



# A COMPREHENSIVE DIABETES VULNERABILITY ANALYSIS AMONG THE YOUTH: A CASE STUDY OF THRISSUR CITY

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## Abstract

Health is a function not only of medical care but is the result of socio-economic, educational, consumption, and modifiable behavioral factors. Therefore, to raise the health status and quality of life, a focused approach integrating all these socio-economic aspects needs to emerge to bring about the overall transformation of the attitude of society towards obesity and lifestyle diseases. The hectic lifestyles in cities and lives in cramped buildings lead the urban population to physical and mental handicaps. The young Indian population, comprising 65% of the country, rapidly adapts to a new lifestyle, increasing their risk of diabetes and complications. The 'Kerala Model of Health' has recently started showing several disturbing trends. Although the death rate is low, Kerala has a high incidence of disease compared to other Indian states. Hence, studies termed this situation as "low mortality, high morbidity syndrome". It is interesting to note that lifestyle diseases are highly prevalent in Kerala. Moreover, the incidences of many lifestyle diseases are more than the national average. Kerala is the capital of India when it comes to diabetes. The impact of place and space-related human health and well-being are the most important for risk identification. During the last year, the government hospitals in the city started special NCD clinics for the public. The present study is an attempt to estimate the Vulnerability analysis of Diabetes among youth in Thrissur Municipal Corporation, using the Analytical Hierarchy Process.

**Keywords:** *Diabetes Vulnerability, Lifestyle diseases, Urban Health, Behavioral Risk Factors*

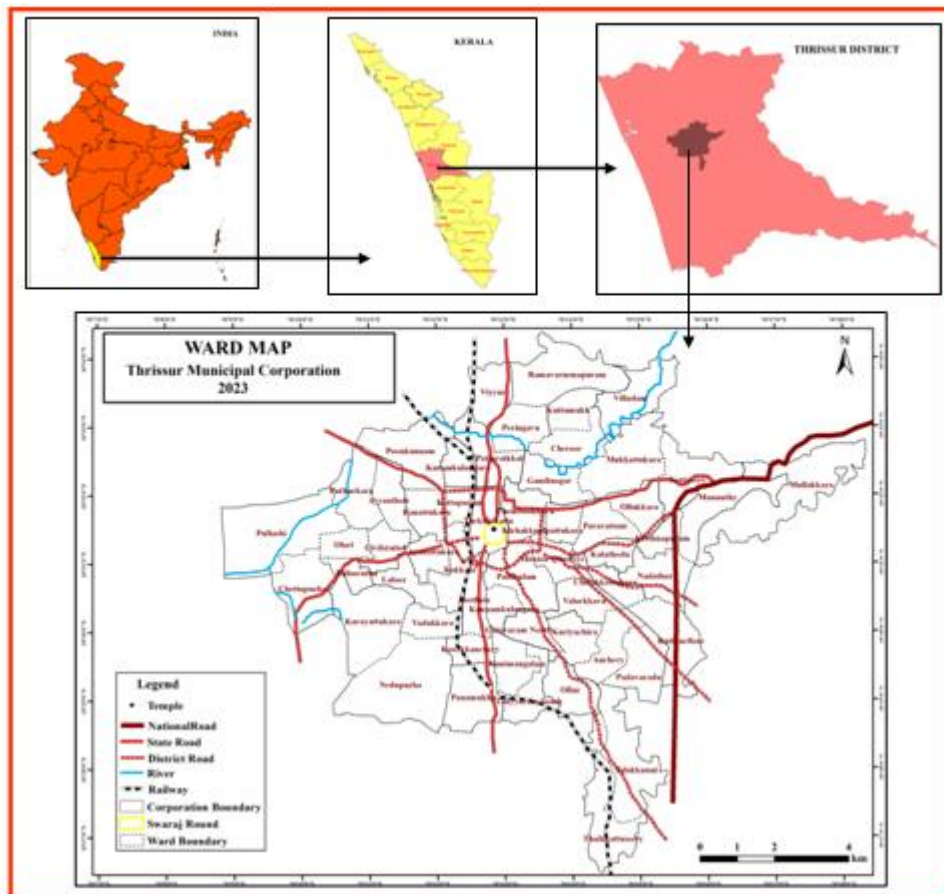
## Introduction

The drivers of urbanization are multiple, interlinked, and complex. Historically, the process has been associated with significant economic and social transformations which brought greater geographic mobility, lower fertility, longer life expectancy, and population aging. Put simply, cities attract people because of the proximity and thus enhanced accessibility, to opportunities (UNDESA,2014). Today, 54% of people live in urban areas. Cities have been growing rapidly like never before in recent years and are set to continue growing – by 2050, 66% of the world's population will be living in urban areas. Along with that, "Urban health" is one of the biggest challenges facing public health in the twenty-first century in terms of the global burden of death and disability that are Non-communicable Diseases. Globally and in developing nations like India, the impact of diabetes is high and rising, primarily due to rising rates of overweight/obesity and unhealthy lifestyles. In India, 77 million people were assessed to have diabetes in 2019, and by 2045. Urban

areas are extremely complex environments in which many environmental, social, cultural, and economic factors impact individual and population health (Vlahov D, 2007). Also, the economies of proximity associated with dense populations can reduce the costs of delivering infrastructure and services, which can complement health. However, Urban living exposes individuals to numerous health-threatening risk factors. One of the most prominent features of urbanization is its effect on lifestyle. Changing food habits, physical activity, work patterns, smoking, alcohol consumption, leisure-time activities, and travelling patterns can influence health. Many of these factors are associated with an increased risk of diseases such as type 2 diabetes (Tellnes G., 2005). We must understand the local admixture of social factors and cultural determinants to identify where individuals and populations are vulnerable to diabetes.

## Study Area

The city of Thrissur, situated in the central Kerala, is well-known for being the state's "Cultural Capital." The city of Thrissur, with has a circular and radial pattern of growth, has grown up around a 65-acre mound called the Thekkinkadu Maidan, where Lord Siva's temple, devoted to Vadakkumnathan. Thrissur Municipal Corporation is the fourth municipal corporation to be established. As per URDPFI Guidelines, Thrissur city falls under the category of Medium town (Population 1, 00,000 to 5, 00,000). The Mayor of Thrissur Municipal Corporation is in charge of running the city. As per the demographic statistics of 2011, the city was divided into 52 administrative wards/divisions, from which the Municipal Corporation Council members are chosen for terms of five years. The number of wards was expanded to 55 in the latter part of 2012. According to 2011 census, the total population of Kerala State, Thrissur District and Thrissur Municipal Corporation are 3.34 crores, 31.21 lakhs and 3, 15,957 respectively. Thrissur Municipal Corporation shares 10.12% of population of Thrissur District and the district population shares 9.34% of Kerala state. The population density of Thrissur Municipal Corporation area is higher when compared to that of district and state values with a gross density of 3115 persons per sq.km. The maximum number of people is in the age group 45-55, which indicates a higher number of aged population in the future and the need for better planning interventions for the elderly. The higher number of people in the age group of 20-30 years shows the human resource potential of the city. The high literacy rate of city (97%) is a result of the continuous efforts taken by pioneers/ social reformers/ kings/ rulers/ elected governments working towards an educational revolution.



Location map of the study area

## Methods and Methodology

Both Qualitative and Quantitative methods were used for this analysis. In-depth individual interviews with government officials, and doctors and participatory observations are the major qualitative-level methods used in the study. It also helps to understand the behavioural risk factors existing in the city, planning failures, and involvement of government interventions in the health sector. Quantitative methods like the Analytical Hierarchy process help to find out the vulnerability of lifestyle diseases especially Diabetes among the youth in the city. Both these methods were helpful for the identification of major health risk factors that impact diabetes in the city. For Quantitative analysis, 210 samples were collected randomly from the school and college students in the study area. Each parameter was analysed using survey responses and literature reviews. These parameters are taken for the studies based on various works of literature which explain how these factors influence Diabetes Mellitus based on the intensity of factor ranking given. The calculation metrics of the comparison matrix and relative score of each parameter and normalized and the weight values in the standardized pair wise comparison matrix were calculated with the help of Excel software. The consistency ratio was calculated by dividing CI (consistency index) with RI (Random Index) value ( $CI/RI$ ). RI is the constant value taken for ten parameters which can be changed based on the parameter taken, which is lesser than 0.10. Firstly, CR (consistency ratio) is calculated for each parameters individually and then each of the parameters are given a weighted value.

## Results and Discussions

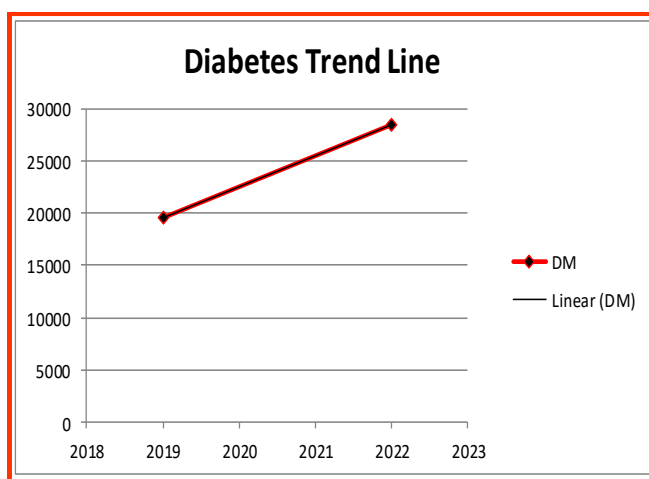
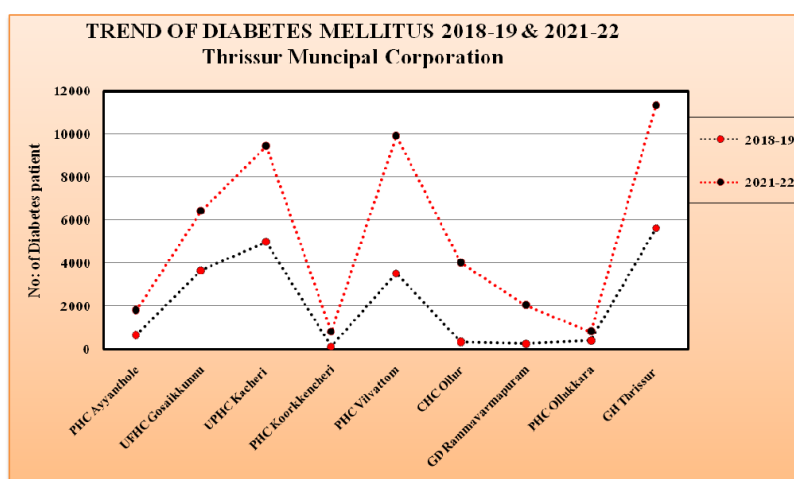
### 3. Diabetes Vulnerability Analysis among Youth in Thrissur City

In 2019, there were more than 9,000 diabetes patients and in 2022 it went up to more than 16,000. Several studies have shown that there is a very little rural-urban disparity in the distribution of NCD patients in Kerala. The prevalence of life style diseases in the city has risen from 3.1% in 2019 to 5% in 2022.

From the statistical data and questionnaire survey responses collected from 8 public health centres and General hospital in Thrissur, it is understood that there has been an increase in the number of people

consulting with lifestyle diseases in the city. According to staff nurses in health care institutions, more than 75% of the total registered OPs were seeking treatment for lifestyle diseases. The highest numbers of patients arriving on the NCD OP days, were more than 200, approximately. There are more people who report heart-related problems and other mental stress. Many new clinics have been started within the last 2-3 years which is a result of an increase in lifestyle diseases. It shows an increased prevalence of diabetes among adolescents, children and elders. Medical officers point out that over-reliance on fast food, lack of adequate exercise, lack of time and space, and lack of physical and health literacy are the main reasons. The general hospital medical officer says that, "A girl aged about the age of 21 to 22 told about her physical concerns, but all the symptoms she described were those of a diabetic patient. But the girl asked how she could possibly be diabetic at her age!"

This is due to a lack of knowledge about such diseases. Therefore, health education is very important. In 2022, less than 30,000 people reached government health institutions with Diabetes alone. More than half of the total population (More than 1,50,000) is frequently dependent on hospitals for lifestyle diseases /NCD. As this has become one of the most important issues, the medical officers suggest that urban planners should emphasize on creating healthy spaces as a remedy.



Trend and existing scenario of diabetes mellitus along the Thrissur urban population from 2018-19 to 2021-22.

Hypertension and diabetes are more common in the age group of 50 to 60. Within the aging population, diabetics are in balance with regular screenings and way of life alterations to some extent. For this they follow diet regiments and engaging in physical activities. One of the main challenges to engage in physical exercises, are the crowded and unsafe urban environment. This is often evident from the individual semi-structured interviews conducted with the daily comers in Thekkinkadu ground. People who control their diabetes with medicines and continuous screening are always a diabetic vulnerable population. But another interesting fact pointed out by the staff nurses at public health centers says that "The number of elderly people between 18 and 30 years of age consulting with diabetic symptoms and newly diagnosed in the camps are increasing than before". A PHC in Ayanthol records that in 2022, more than 120 people in this age group came for treatment in that year. Based on this statement, a sample of 210 students (15-25) were taken from the schools and colleges under the jurisdiction of the Corporation. These youth students spend time in the urban spaces and 98% of them are permanent residents in Thrissur.

### 3.1 Identified Risk factors for Diabetes

Physical inactivity and sedentary behaviour have been identified as major or important modifiable risk factors for diabetes. Physical activity helps control blood sugar, weight, and blood pressure, and can help raise "good" cholesterol and lower "bad" cholesterol. It can also reduce the risk of diabetes. But increasing urban sprawl creates unsafe neighbourhoods that reduce opportunities for physical activity. Traffic congestion is common here during peak hours. The incidence to traffic accidents on the streets is also a rising health concern. Lack of cycling and workability facilities, availability of street light facilities, and safety in the core of the city are major challenges for encouraging physical activities. From the sample survey it can be understood that there are more people who eat some kind of fast food daily, 90 percent of students follow unhealthy diets or eat outside restaurant/bakery foods. What makes this situation even more dangerous is that physical activity among them is decreasing, along with the absence of healthy greens in

their diet. 83 % of sample population do not pay much attention to their diet. The controlled usage of sugar and salt can only be seen in the elderly diabetic population. Young people use their smart phones more frequently for social media, games, and other forms of amusement, as well as for communication and educational justifications. Concerns about young people's emotional and bodily health are brought up by excessive mobile phone use. Excessive cell phone usage is associated with depression, anxiety, and loneliness, and higher stress levels. It negatively affects the stress management capacity of the young population. An increase in high blood pressure will also add up to the probability of diabetes. Smoking is largely considered as a social behaviour by the young adults as a method of stress relief. Smoking was identified to have an influence on stress and subsequent relief from it. Stress was reported to be due to family problems, and associated symptoms such as headaches, sleeplessness, and feeling depressed. Many young adults were resorting to smoking as a relief from their stress, depression, and tensions. Low health literacy is common and associated with a lack of diabetes knowledge, self-efficacy and self-care behaviours among the youth.

### 3.2 Identification of Diabetes Vulnerability factor using AHP Method

AHP is a multiple-criteria methodology focused on the need for complex problems to be organized into a hierarchical system of basic elements such as objectives, criteria, and alternatives. In this study, our goal is to assess the diabetes vulnerability of the young population in Thrissur Corporation. Our assessment is based on different modifiable behaviour factors. We have evaluated alternatives such as vulnerability, and vulnerable factor that most influence the diabetes in future. The comparison metrics table was created according to Saaty's pair wise comparison scale. It includes a 1 to 5 ranking that denoted Equally important (1), Moderately more important (2,3), Strongly more important (4,5).

Table 1. Comparison matrix and the relative score of each parameter

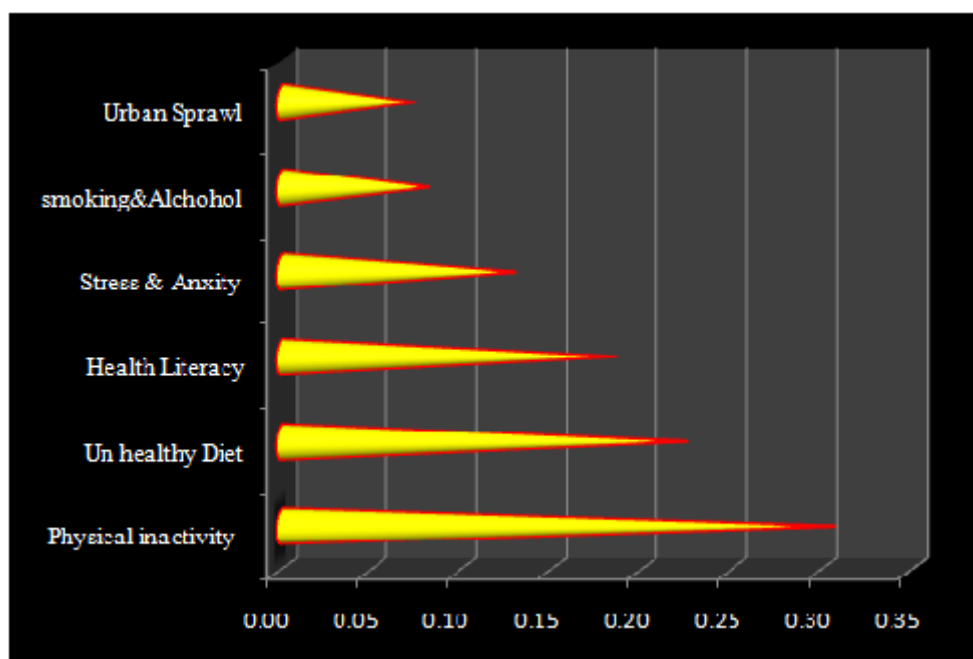
	Physical inactivity	Unhealthy diet	Health Literacy	Stress management	Smoke & Alcoholic habit	Urban sprawl
Physical inactivity	1	1	4	3	3	3
Un healthy Diet	1	1	1	3	3	2
Health Literacy	1/4	1	1	3	3	2
Stress Management	1/3	1/3	1/3	1	3	3
Smoke & Alcoholic habit	1/3	1/3	1/3	1/3	1	2
Urban Built Environment	1/3	1/2	1/2	1/3	1/2	1

Not every criterion would be equally important. As a consequence, the relative priorities (Weights) for the parameters are calculated in the second phase of the AHP process.

Table 2. Normalized and the weight values in the standardized pair - wise comparison metrics

	Physical inactivity	unhealthy diet	Health literacy	Stress management	Smoking & Alcohol	Urban sprawl	Priority	Weight
Physical inactivity	0.31	0.24	0.55	0.28	0.22	0.23	1.84	0.31
Un healthy Diet	0.31	0.24	0.13	0.28	0.22	0.15	1.34	0.22
Health literacy	0.08	0.24	0.13	0.28	0.22	0.15	1.11	0.19
Stress Management	0.10	0.08	0.05	0.09	0.22	0.23	0.78	0.13

Smoking & Alcohol	0.10	0.08	0.05	0.03	0.07	0.15	0.49	0.08
Built environment	0.10	0.12	0.07	0.03	0.04	0.08	0.44	0.07
Sum							6.00	<b>1.00</b>



Normalized and the weight values in the standardized pair - wise comparison metrics

While analysing the table, it is clear that more vulnerable factors influencing to diabetes among youth is the physical inactivity (0.31), and Unhealthy diet (0.22). It is because lack of health literacy (0.19) along the generations.

To get a collection of values called weighted sum, add the values in each row. As shown in Table 2., divide the elements of the weighted sum vector by the corresponding priority of each criterion calculate the average of the values from weighted sum divided by priority this value is called  $\lambda_{max}$ .

Now calculate the consistency index.

$$(CI) CI = (\lambda_{max} - n) / (n-1)$$

$$\lambda_{max} = \text{Average of the values from weighted sum} / \text{priority}, n = \text{Number of parameters} (n = 10)$$

$$\lambda_{max} = 39.45/6 = 6.57$$

Therefore,

$$CI = (6.57 - 6) / (6 - 1) = 0.11$$

Now the consistency ratio defines as:

$$CR = CI / RI$$

$$CR = 0.11/1.24 = \mathbf{0.09}$$

Since this value 0.09 for the proportion of inconsistency CR is less than 0.10. So, we can simply say that the ranking given are accurate. Health-promoting lifestyle is very less among the students (Youth) according to this study. The students do not have an acceptable level of physical activity and awareness about diabetes. So they are highly vulnerable to diabetes and other related diseases in the future, especially the female population. This method also helps in the identification of highly vulnerable risk factors of diabetes which is physical inactivity and unhealthy diet among the youth participants. The Master Plan of Thrissur 2031, lays

out the uses of the land-such as housing, offices, businesses, industries, administrative areas, schools, hospitals, roads and streets, open spaces, etc., keeping the future projected development pattern of a city in mind. Urban planning concepts are static, inadequate for addressing dynamic urban living problems. The master plan's critical challenge is addressing forecasted population growth and infrastructural needs, as actual population growth outpaces projections, disrupting development proposals. The governance is now focused on physical transformations. Therefore, the master plan only focus on transportation, traffic, etc. and the weak data-driven governance system related to the health sector for NCDs leads to the existing planning failures.

## Conclusion

Thrissur as a cultural and highly literate city that enables greater access to health services and improved water and sanitation infrastructure, leading to some improvements in health. Thrissur city serves as a service provider and has to cater to a wide range of the population, as people from various parts of the district depend on the city for medical aid and treatment. However, urban settings may also be associated with more sedentary, stressful lifestyles and consumption of less nutritious food. Such conditions increase the incidence of lifestyle diseases among urban dwellers. It is clear from the surveys conducted as part of this study that more urban health risk is among the youth in the city. Modifiable risk factors such as unhealthy diet, physical inactivity, smoking, and increasing urban built environments create modern behavioural patterns are the major concerns. Health literacy influences health outcomes through knowledge acquisition, self-efficacy, and self-care behaviours. Local government officials and departments need to take a leading role; Voluntary and private sectors need to be partners in the planning and implementation of an active living strategy, along with community participation to achieve a healthy city.

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