

Factors Contributing to Type 2 Diabetes Mellitus among Patients Attending Longisa County Referral Hospital in Bomet County, Kenya

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Abstract

Background: Diabetes Mellitus (DM) has emerged as a pressing global health problem, contributing to the burden of non-communicable diseases. Recent estimates suggest that around 40% of the global population are affected, with numbers expected to rise. Once viewed largely as a lifestyle-related condition, DM is now understood to stem from a range of genetic, environmental, and socio-economic factors. The World Health Organization (WHO) has called for comprehensive strategies to prevent and manage diabetes and its complications. In Africa, diabetes is a leading cause of death, especially among economically productive age groups. Contributing challenges include weak healthcare systems, delayed diagnosis, and limited treatment access. In Kenya, prevalence reached 3.5% in 2014, and is expected to reach 4.5% in 2025, highlighting a growing need for early detection and effective treatment. Alarmingly, many individuals remain undiagnosed, and more than 5% of diagnosed cases already exhibit complications. National health efforts focus on building healthcare provider capacity and supporting long-term prevention measures. **Objective:** The objective of the study was to establish factors contributing to type 2 diabetes mellitus among subjects residing in Longisa sub-county of Bomet County. **Method:** This was a cross-sectional descriptive study which collected data from a randomized group of 400 subjects. **Result:** Data revealed the following findings: males were 180(45.1%) while females were 220(54.9%). Subjects ranged from 18 to over 60 years of age, while majority were between 40 to 49 years who were 121(30.3%). Regarding marital status, out of 400 subjects, 208 (52%) were married. As regards to the level of education, 81(20.2%) had completed primary education, 161(40.3%) had completed secondary education, while 158(39.5%) had completed tertiary education. Out of 400 subjects, 164(41%) had a history of diabetes in the family. Regarding comorbidities, 82(20.5%) had low blood sugar level, 42 (10.5%) had hearing problems, 76 (19%) had eye problems, while 120(30%) presented with wounds. Regarding life-style factors, 160 (40.1%) were smoking cigarettes, 240(40.2%) were taking alcohol, while 121(30.3%) were taking meals twice a day, and 320 (80.1%) were consuming fatty foods. Again, 280 (70%) consumed enough vegetables and fruits. Regarding exercise, 259 (64.8%) subjects were involved in carrying out daily exercises. **Conclusion:** Type 2 Diabetes Mellitus will continue to afflict individuals unless collective interventions are implemented to scale it down through

community mobilization and education. Changing people's life-style, in reducing obesity, proper nutrition avoiding cigarette smoking and engaging in exercises.

Keywords: Type2Diabetes Mellitus; Lifestyle factors; Physical Activities; Non-Communicable Diseases

Introduction

Type 2 Diabetes Mellitus (T2DM) is a chronic, non-communicable disease that poses significant public health challenges due to its rising prevalence and long-term complications. It is characterized by elevated blood glucose levels resulting from either a deficiency in insulin production, ineffective insulin action, or a combination of both (GAO, Seshasai & Kaptoge, 2010). Although it is often distressing, the adverse outcomes of T2DM can be largely prevented through early diagnosis, effective management, and lifestyle modifications.

According to the Kenyan Constitution (2010) every person is guaranteed the right to the highest attainable standard of health, including access to health care services. Furthermore, it will be possible for Kenya to achieve the Vision 2030 if diseases like T2DM are managed well. Sustainable Development Goals (SDGs) number 3 will only be realized if we curb the increase of chronic conditions like T2DM.

Initially perceived as a lifestyle-related condition, T2DM is now recognized to have multifactorial origins, including genetic, environmental, and socio-economic influences. Simple preventive measures such as healthy eating, regular physical activity, and avoiding tobacco have proven effective in reducing the incidence of the disease.

Globally, the World Health Organization (WHO, 2025) has flagged diabetes as a major contributor to the burden of non-communicable diseases. In Africa, the impact is particularly severe, with T2DM being a leading cause of mortality among individuals in their most productive years. Kenya has not been spared; the national prevalence stood at 3.3% in 2014 and is projected to reach 4.5% by the end of 2026. Rural and semi-urban counties have shown varying prevalence rates between 2% and 16%, depending on the study population and diagnostic criteria used.

According to the County Health Information System (CHIS, 2025), indicates that in the year 2022, the total number of patients with the disease were 6931, and the year 2023 it had risen to 8454. The figures, in 2024 had increased to 9519. It is an indication that the numbers are increasing in an upward trajectory. It is under this background that this study was undertaken to identify factors contributing to its increase and formulate strategies needed to scale it down.

Literature Review

The prevalence of Type 2 Diabetes Mellitus (T2DM) is rising at an alarming rate, posing significant challenges to society. If this upward trend is not scaled down, it will lead to severe complications such as kidney failure, cardiovascular diseases, and other serious health conditions (ADA, 2000). More so, achieving the vision 2030, and sustainable development Goals will not be achieved. Moreover, managing T2DM demands substantial financial resources due to the long-term health risks associated with the disease. Research indicates that investing in preventive measures for non-communicable diseases including diabetes can yield significant cost savings. For instance, every dollar spent on prevention can save up to twenty dollars in treatment costs. Against this backdrop, it is essential to explore the contributing factors to T2DM to implement effective interventions aimed at reducing its prevalence.

Globally, obesity and family history are recognized as key risk factors in the development of T2DM. Studies among Pima Indians aged 25-44 years reveal that individuals with a BMI greater than 35 and one or two diabetic parents have an annual incidence of diabetes of 3.8%, 6.9%, and 9.2%, respectively (Wing, Venditti et al., 1998). Similarly, Tabitha and Lucia (2003) linked family history with the onset of T2DM, attributing this relationship to genetic predisposition. Given this evidence, it is crucial for communities to adopt preventive strategies to reduce the risk of developing diabetes. However, pinpointing individual risk factors remains complex, as they are

often interconnected and overlapping in their effects.

Extensive research has demonstrated that multiple factors contribute to the development of T2DM, including genetic, environmental, and metabolic influences. Among the most significant determinants are family history, age, obesity, and physical inactivity, which have been consistently associated with the disease. Additionally, other factors merit attention—women with a history of gestational diabetes face a heightened risk of developing T2DM later in life (Barbara, Meg, & Cindy, 2002).

This study sought to build on existing research by examining the key contributors to T2DM within the local context, enabling the development of targeted preventive measures to mitigate its impact on communities.

Socio-Demographics of Diabetes Mellitus

The prevalence of T2DM worldwide is estimated to increase from 382 million for adults from 2013 to 592 million by the year 2035 with more than 80% of cases coming from the developing and under developed countries (Pham and Eggleston, 2015). This global trend is supported by prevalence of diabetes in Vietnam which rose from 2.9% in 2010 to 5.4% in 2013. However, the sample size was small because it was generated from few patients who attended hospitals and therefore may have not represented the Vietnam's large population. This study concluded that progressive increase with age contributes to the development of the disease.

According to a report on National Diabetes Statistics (2017) estimated that 12.2% of US adults of 18 years old and above had diabetes in 2015. Therefore, it supports the hypothesis that advancing in age is a contributing factor to the development of the disease. The study found out that, at current rates, the number of people under age of 20 years with type 2 diabetes could increase by up-to 49% by 2050. This idea was also supported by another study in India which indicates high prevalence of diabetes especially of undiagnosed cases of amongst the adult population most of whom have uncontrolled blood sugar levels. India has the second largest number of cases of diabetes in the world after China in 2015 (Tripathy et al., 2017).

Advance in age has been claimed as one of the risk factors to the development of the disease. As one gets older there is a high chance of developing the condition because of lack of exercise and increase in weight gain. Diabetes continues to increase as a result of rapid cultural and social changes which include: ageing, increasing urbanization, dietary changes, reduced activity and unhealthy behaviors. In this regard, it is noted that age is another factor to occurrence of the disease.

In addition, Meg and Barbara (2010) reported that advance in age contributes to the prevalence of the condition. Further demonstrated that those persons with 65 years or older, 18.4 % of all the people in this age group have diabetes. However, in the recent past 8 years ago, the survey has shown that younger adults between the ages of 30-40 have had a surprising 70% rise in type 2 diabetes. Age group of 40-49 years rose a dramatic 40 % of the disease. This prevalence has been attributed to lifestyle patterns that is, excess body weight and little physical activity.

Lifestyle on Diabetes Mellitus

Indeed, it is true that regular exercises promote reduction on development of diabetes mellitus. It promotes overall energy balance, weight control and obesity prevention which will in turn prevents development of the disease. Increase in physical inactivity globally is of great concern, because this will lead to obesity and finally may lead to development of type II diabetes mellitus (WHO, 2016). According to available data in 2010, most of the young adults of age 18 years did not meet the minimum recommended physical activity per week and were classified as insufficiency physically active. Based on this data it supports the report that by 2025 there will be about 422 million people worldwide who will develop type II diabetes mellitus. In all WHO regions and across all country income groups women were less active than men, with 27% of women and 20% of men classified as insufficiently physically active. Lack of exercise is increasingly common among adolescents, with 84% of girls and 78% of boys not meeting minimum requirements for physical activity for this age. The prevalence of physical inactivity is highest in high-income countries where it is almost double that of low-income countries. Being overweight is strongly linked to type 2 diabetes mellitus, despite the global voluntary target to bring to an end the rise in obesity by 2025 (WHO, 2008). Being overweight or obese has increased in almost all countries. Population growth,

lifestyle, and ageing have contributed to increase in type 2 diabetes, but are not exclusively responsible for it.

A family history was associated with higher incidence of T2DM with a greatest risk observed in those children with a bi-parental history of T2DM and those with parental diabetes diagnosis at younger age (<50yrs) - an effect largely confined to maternal family history.

Family History and Type 2 Diabetes Mellitus (T2DM)

Type 2 Diabetes Mellitus (T2DM) is a complex metabolic disorder influenced by both genetic and environmental factors. While heredity alone does not directly cause the disease, individuals with a family history of diabetes are at a significantly higher risk of developing the condition. This increased susceptibility is due to inherited traits that affect insulin function, glucose metabolism, and fat distribution.

Studies have consistently demonstrated the role of family history in the development of T2DM. Research by Torrealva, Martinez et al., (2018) found that individuals with a diabetic parent had 1.5 times higher odds of developing T2DM compared to those without a family history. Similarly, Dahlman, Ryden & Arner (2018) reported that inherited genetic traits are strongly associated with diabetes risk, particularly in relation to adiposity, hypertrophy, and enhanced lipolysis—factors that contribute to insulin resistance and metabolic dysfunction.

However, despite the strong correlation between family history and diabetes risk, Barbara and Meg (2002) argued that specific genes directly linking T2DM to hereditary factors have yet to be identified. This suggests that while genetics play a role, lifestyle and environmental influences remain critical in determining disease onset.

Further evidence from the Framingham Offspring Study (Meigs, Cupples, and Wilson, 2000) highlighted the cumulative effect of parental diabetes on an individual's risk. The study found that individuals with both parents diagnosed with T2DM had a significantly higher likelihood of developing the disease compared to those with only one diabetic parent. This underscores the importance of early screening and preventive interventions for individuals with a strong family history of diabetes.

While genetic predisposition increases susceptibility, lifestyle factors such as diet, physical activity, and obesity play a crucial role in determining whether an individual will develop T2DM. Research has shown that; Obesity and sedentary behavior amplify the genetic risk of diabetes, Healthy dietary habits and regular exercise can significantly reduce the likelihood of disease onset, even in genetically predisposed individuals. Understanding the interplay between genetics and lifestyle is crucial in addressing the growing burden of T2DM. While family history remains a significant risk factor, proactive measures can help mitigate its impact and improve long-term health outcomes.

Diabetes-Related Comorbidities

Type 2 Diabetes Mellitus (T2DM) is frequently linked to a spectrum of comorbid conditions that can either precede its onset or emerge as complications post-diagnosis. Comorbidities are typically classified as either macrovascular or microvascular. Macrovascular conditions include cardiovascular diseases such as myocardial infarction, stroke, peripheral arterial disease, hypertension, and ischemic heart disease. Microvascular conditions, on the other hand, affect smaller blood vessels and include diabetic neuropathy, nephropathy, retinopathy, diabetic foot ulcers, and limb amputation in severe cases.

Recent research has shown that some comorbidities may contribute to the development of T2DM, rather than simply being consequences of it. Chronic illnesses such as obesity, hypertension, dyslipidemia, and non-alcoholic fatty liver disease (NAFLD) share underlying metabolic disturbances and insulin resistance pathways, increasing the risk for T2DM (Nowakowska et al., 2019; Khachikyan et al., 2023). For instance, a cohort analysis by Veradigm (2023) reported that nearly 75% of individuals diagnosed with T2DM had at least one pre-existing comorbidity, with 44% presenting two or more.

In terms of prevalence, microvascular comorbidities are often more common than macrovascular ones. Liu et al., (2010) found that 54% of diabetic patients experienced microvascular complications, while 27% had macrovascular issues. A similar study in China revealed close prevalence rates: 33.7% for microvascular and 33.4% for macrovascular complications (Zhang et al., 2011). These findings highlight the need for early identification and management of comorbidities as part of T2DM prevention and care.

Understanding the role of comorbidities is therefore essential for fulfilling the study's objectives to determine contributing factors to T2DM and to inform development of targeted interventions at Longisa County Referral Hospital. An integrated approach to patient care addressing both T2DM and related comorbidities can enhance treatment effectiveness and reduce disease burden within rural populations such as those in Bomet County.

In Kenya, diabetes is among the top non-communicable diseases (NCDs), contributing significantly to hospital admissions and mortality. The prevalence of diabetes in Kenya is estimated at 3.3%, with projections indicating a rise to 4.5% by 2026. However, two-thirds of diabetic patients remain undiagnosed, posing a major challenge to healthcare systems. The Kenya National Diabetes Strategy emphasizes the need for early detection, improved healthcare access, and cost-effective interventions, particularly in rural areas where healthcare infrastructure is limited. However, rural populations face unique risk factors, including low socioeconomic status, limited awareness, and financial constraints, making diabetes management more challenging.

Materials and methods

A cross-sectional descriptive study was conducted among 24,904 subjects who were attending for Type 2 Diabetic Mellitus care at Longisa County Referral Hospital. The study used convenient sampling, using Fisher's et al, formular (1984) to select the prospective subjects who were over 18 years of age and consistently attending the diabetic clinic at the hospital for a period of six months. The sample size yielded 378 subjects. Due to attrition the number was adjusted to 400 subjects which was convenient to work on.

Ethical consideration

Permission to conduct the research study was obtained from the university's ethical research committee. Again, those who participated in the study gave informed consent and confidentiality was maintained throughout the study period. Ethical research committee from Longisa County Referral Hospital was granted before data collection.

Results

Socio-demographics of the subjects

Gender distribution shows that a slightly higher proportion of T2DM patients are female (54.9%) compared to male (45.1%). This suggests that more women than men are seeking treatment for T2DM in Bomet County, potentially pointing to gender-specific health seeking behaviors or prevalence rates. In terms of age distribution, the majority of patients were between 40-49 years age (30.3%), followed by those aged 30-39 years (20.2%) and 50-59 years (20.2%). Additionally, a considerable portion (19.2%) of the patients were above 60 years old. These findings suggest that middle-aged and older adults were mostly affected by T2DM, with the disease being most prevalent among individuals in their 40s. This information is reflected in table 1.

As regards to marital status, 84(21%) were single. 208 (52%) were married, and 68 (17%) divorced, while 40 (10%) were widowed. Married couples formed majority of the study subjects. In terms of education, the largest group of subjects, 40.3% had completed secondary education, suggesting that a substantial portion of the population has attained a high school level of education. However, 39.5% of the subjects had pursued tertiary education, indicating a significant number of individuals had obtained higher education qualifications such as university degrees or vocational training. The remaining 20.2% of the subjects had completed primary education, reflecting a smaller segment of the population with basic educational attainment. The study showed that the subjects were well enlightened in education. See in table 2.

Factors	Category	Frequency(N)	Percentage(%)
Gender	Male	180	45.10%
	Female	220	54.90%
Age Group	18-29	40	10.10%
	30-39	81	20.20%
	40-49	121	30.30%
	50-59	81	20.20%
	>60	77	19.20%

Table 1: Socio-Demographic Characteristics T2DM Patients.

Factors	Category	Frequency (N)	Percentage (%)
Marital Status	Single	84	21.00%
	Married	208	52.00%
	Divorced	68	17.00%
	Widowed	40	10.00%
Education Level	Primary	81	20.20%
	Secondary	161	40.30%
	Tertiary	158	39.50%

Table 2: Distribution of participants based on marital status and education level.

This table presents the distribution of participants based on their marital status and education level.

Family History and Complications Associated with Diabetes mellitus

About 41% of the patients report having a family history of diabetes. This highlights the role of genetic predisposition as a significant factor in the development of T2DM, indicating that many of the patients may be at higher risk due to inherited factors.

The complications associated with diabetes were another crucial aspect of the findings. Approximately, 30% of the patients reported suffering from wounds, 20.5% had low blood sugar levels, and 19% had eye problems. Additionally, 10.5% experienced hearing problems. These complications underscore the severe health impacts of unmanaged or poorly managed diabetes, with many patients facing multiple health problems related to the disease.

Discussion

The findings of this study align with research by Kyrou et al. (2020), which identified age, ethnicity, family history, and socioeconomic status as key risk factors for Type 2 Diabetes Mellitus (T2DM). The study particularly emphasized that low socioeconomic status significantly increases diabetes risk, highlighting the importance of targeted interventions.

A review published in the IDOSR Journal of Biochemistry, Biotechnology, and Allied Fields (2024) confirmed that dietary modifications, physical activity, and behavioral interventions play a critical role in preventing and managing T2DM. These findings support the conclusion that exercise improves insulin sensitivity and lowers BMI, making it a vital component in diabetes management. Likewise, the European Society of Cardiology (Simonenko, 2020) emphasized self-management education and lifestyle modifications, including nutrition and exercise, as key strategies in diabetes care. This aligns with the study's findings on nutritional education and physical activity.

Sami et al., (2025) explored the genetic basis of diabetes, identifying HLA class II genes as significant risk factors. This supports the conclusion that genetic predisposition plays a crucial role in diabetes development. Additionally, a study by Mathew & Aminamol

(2024) highlighted familial patterns and ethnic variations in genetic susceptibility to T2DM, reinforcing the observation that individuals with a family history of diabetes are at higher risk.

A study by Nowakowski et al., (2019) analyzed comorbidity patterns in T2DM patients, finding that obesity, hypertension, and cardiovascular diseases were prevalent. These findings support the conclusion that comorbid conditions complicate diabetes management and require comprehensive intervention strategies. This study agrees with our findings.

Contradictory perspectives also emerged in the literature. A study published in JSTOR (Calhoun, Vorderstrasse & Chang, 2019) challenged the assumption that age and marital status are strong predictors of diabetes risk, instead highlighting dietary intake as a more significant factor. Further, IDOSR Journal of Biochemistry, Biotechnology, and Allied Fields (2024) argued that lifestyle modifications alone may not be sufficient to prevent diabetes, emphasizing the need for pharmacological interventions alongside behavioral changes. Similarly, IJFMR suggested that genetic predisposition alone is not a strong predictor, as environmental and lifestyle factors play a more significant role.

These studies provide both supporting and contrasting viewpoints, suggesting that demographic, lifestyle, genetic, and comorbidity factors may not always be as strongly linked to T2DM risk and progression as previously thought.

Conclusion

In conclusion, this study has provided valuable insights into diabetes prevalence, risk factors, and management approaches which would be used to scale down the rising episodes of type 2 diabetes mellitus.

Conflict of interest

We declare that there is no conflict of interests as pertained to this study.

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