

*Analyzing Malnutrition as a leading Cause of ... Raphael, S. U., Et. al. (2025)*

## Analyzing Malnutrition as a Leading Cause of High Diabetic Mortality Rates in Otukpo Local Government Area of Benue State, Nigeria

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### Abstract

*The population of people living with diabetes is on the increase due to broad knowledge of the disease and self-improve life style of people living with type 2 diabetes however malnutrition is a known complication to these set of persons especially the elderly due to economic situations, loss of appetite and over feeding. the study aims at to evaluate the nutritional status of diabetes patients using global leadership initiative on malnutrition. A total of 343 patients with type 2 diabetics were included in the study the malnutrition status was using the GLIM and clinical parameters including albumin and total leukocyte (TLC4. moderate malnutrition was observed in 55% of and severe malnutrition in 30% of the population sample. Among the factors associated with nutritional status were BMI ( $p < 0.01$ ) and presence of CAD (DM complications) ( $p = 0.015$ ) as per the correlation with nutritional status ( $r = 0.351$ ;  $p < 0.01$ ) it was concluded that there exists high level of malnutrition among the sample population.*

**Keywords:** Diabetes, Malnutrition, Mortality, Undernutrition, Overnutrition

### Introduction

Malnutrition is an imbalance between the nutrients the body needs to function and the nutrients it gets. This also can mean undernutrition or over nutrition. one can be malnourished from an overall lack of calories, protein, vitamin and or mineral deficiency, and may have more calories than what the body needs. The body needs a variety of nutrients, and in certain amounts, to maintain its tissues and its many functions. Malnutrition happens when the nutrients it gets don't meet these needs. It May occur from an overall lack of nutrients, or an abundance of some kinds of nutrients or lack of other kinds. Even the lack of a single vitamin or mineral can have serious health consequences on body. On the other hand, having an excess of nutrients can also cause problems. Malnutrition can mean undernutrition or over nutrition. Macronutrient overnutrition. Occurs When the body has an excess of protein, carbohydrate and/or fat calories to use, it stores them away as fat cells in the adipose tissue Macronutrient Under Nutrition can be called protein-energy undernutrition, it is a deficiency of macronutrients: proteins, carbohydrates and fats. Children and elders who may not be able to advocate for themselves are especially at risk and may need closer attention paid to their diet and health condition. (Yang et al. 2024). Macro Nutrient Under Nutrition can also be called protein-energy undernutrition, it is a deficiency of macronutrients: proteins, carbohydrates and fats. Macronutrients are the main building blocks of diet; the body relies on it to produce energy to maintain itself. Without them or even just one of them these macro nutrients the body begins to fall apart, breaking down tissues and shutting down nonessential functions or stopping some functions of the cells Micro nutrient are vitamins and minerals

*Diabetes mellitus (DM) is a fearsome health condition today in our community due to its recent high mortality rate, it is a serious metabolic disorder accompanied by high glucose levels in the blood due to insufficient production of insulin, malfunctioning of the produced insulin and or a combination of both. it is a chronic metabolic disorder that is characterized by elevated blood glucose levels, and the body's ability to produce or respond to insulin is impaired Diabetes is a leading cause of mortality and morbidity globally, characterized by several severe complications such as kidney failure, cardiovascular diseases, amputations, and blindness. With more than 400 million adults affected worldwide, diabetes mellitus is a chronic public health challenge, especially in the developing countries, where the prevalence is on the increase*



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Recent research has made significant strides in developing new medications and drug classes to improve blood sugar control in individuals with both Type 1 and Type 2 diabetes. These advancements include medications that target different physiological pathways to achieve better glucose control while minimizing side effects such as weight gain or hypoglycemia. GLP-1 Receptor Agonists have shown significant improvements in glycemic control, weight reduction, and even a reduction in cardiovascular events (Jones *et al.*, 2025). Researchers are exploring combination therapies involving GLP-1 receptor agonists and other classes of diabetes medications, such as SGLT-2 inhibitors, to further blood glucose management and reduce risks associated with comorbidities (Smith *et al.*, 2024). SGLT-2 inhibitors have demonstrated significant benefits not only in blood sugar control but also in reducing the risk of heart failure, kidney disease, and major cardiovascular events in individuals (Tan *et al.*, 2023). Gene therapy and cellular approaches to diabetes treatment are currently in the experimental stages but offer significant promise in terms of long-term management and potential cures. These therapies aim to modify or replace dysfunctional genes or cells involved in glucose regulation. Gene editing technologies, such as CRISPR-Cas9, are being explored as potential tools for correcting the genetic mutations that cause diabetes. (Lee *et al.*, 2024). Beta Cell Regeneration: Research is ongoing to address challenges such as immune rejection and the ability to maintain functional beta cell populations in vivo. Wearable Technologies and Digital Health tools have transformed diabetes management, allowing for real-time monitoring of blood glucose levels and enhanced decision-making for both patients and healthcare providers. Continuous Glucose Monitoring (CGM) systems are now widely used by individuals with diabetes to track blood glucose levels throughout the day and night. These devices provide continuous, real-time data that allows individuals to make immediate adjustments to their diet, exercise, and insulin therapy. CGM systems are being integrated with artificial intelligence (AI) to predict future glucose trends, further enhancing personalized diabetes management (Davis *et al.*, 2024). Artificial pancreas systems, also known as closed-loop systems, are an emerging technology that combines an insulin pump with a continuous glucose monitor. These systems automatically adjust insulin delivery based on real-time glucose data, mimicking the function of a healthy pancreas (Foley *et al.*, 2023).

While medication and technological innovations are critical in diabetes management, lifestyle interventions remain the cornerstone of diabetes prevention and control. Recent research has emphasized the role of diet, exercise, and behavior modification in preventing and managing diabetes. Personalized Nutrition and Diet Plans: For example, a study by (Wu *et al.*, 2024) demonstrated that a plant-based diet rich in fiber, whole grains, and healthy fats can improve insulin sensitivity and reduce the risk of Type 2 diabetes. Additionally, intermittent fasting and time-restricted eating have gained attention as potential strategies to improve metabolic health and manage Type 2 diabetes. These approaches are being studied for their effects on insulin resistance, weight loss, and glucose control (Chen *et al.*, 2025). Physical activity is another key component in both the prevention and management of diabetes. Exercise helps improve insulin sensitivity, aids in weight management, and reduces the risk of cardiovascular complications. (Henderson *et al.*, 2023). The role of mental health and behavior modification in diabetes management is increasingly recognized. Research has shown that psychological factors such as stress, depression, and anxiety can negatively impact blood glucose levels and complicate diabetes management. Prevention research has gained significant momentum in recent years, with a focus on preventing the onset of Type 2 diabetes in high-risk populations. One of the most notable findings in diabetes prevention is the effectiveness of lifestyle interventions, particularly in individuals with prediabetes. The Diabetes Prevention Program (DPP) trial, which showed that weight loss through diet and exercise could prevent or delay the onset of Type 2 diabetes, has influenced many national and global prevention strategies. Current research is exploring ways to enhance the accessibility and scalability of these interventions, particularly through digital health platforms and community-based programs (Patterson *et al.*, 2023). In addition to lifestyle interventions, pharmacological agents such as metformin are being studied for their potential to prevent Type 2 diabetes in individuals with prediabetes. Research into other preventive medications, including GLP-1 receptor agonists and SGLT-2 inhibitors, is ongoing (Roberts *et al.*, 2025).

Emerging research in the management and prevention of diabetes has resulted in exciting advancements in medication, technology, lifestyle interventions, and prevention strategies. The future of diabetes care is moving toward a more personalized, precision-based approach, with greater emphasis on early intervention, innovative therapies, and patient empowerment. While challenges remain, the continued progress in these areas offers hope for better outcomes for individuals living with diabetes and for the prevention of the disease in high-risk populations.



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### **Research Objectives**

The study aims to analyze malnutrition in diabetic patients in Otukpo local Government area specifically to investigate the level/ extent of diabetic complications that arise as a result of

1. Under nutrition (lack of macronutrient/ micro nutrients) in diabetic patients
2. Over nutrition (excess of micro and macro nutrients) in diabetic patients
3. Effect of mal/ under nutrition on diabetic patients

### **Research Hypothesis**

The study examines the following hypothesis by analyzing their correlation with diabetic mortality.

1. lack of macronutrient/ micro nutrients) in diabetic patients
2. (excess of micro and macro nutrients) in diabetic patients
3. Effect of mal nutrition on diabetic patients

### **Scope of Study**

The study is restricted getting information from the different primary health care in otukpo local government about both male and female adult living with diabetes It also focuses on getting information from health care workers with at least 5 Years' experience in treating and managing diabetic patients

### **Significance of the Study**

This study will create Awareness of the effect of malnutrition in diabetic patients as the economy of the system becomes more difficult, this study will give insights that inform policies and programs to improve diabetes care and reduce mortality rates. The findings from this study can contribute to broader efforts to address diabetes management challenges across otukpo and other similar settings. The body needs certain nutrient in variable amounts, but it does Many people are mildly deficient in certain vitamins and minerals from a lack of variety in their diet. (Zang *et al.*, 2017) The World Health Organization has recently added that the definition of malnutrition recognizes the detrimental health effects that can be caused by excessive consumption of nutrients. This includes the effects of overweight and obesity, which are strongly associated with a list of non-communicable diseases (NCDs). nutrient overnutrition. Occurs When the body has an excess of protein, carbohydrate and/or fat and oils vitamins and minerals to use, it stores them away as fat cells in the adipose tissue. But when the body runs out of tissue for storage, the fat cells themselves have to grow. Enlarged fat cells are associated with chronic inflammation and with a host of metabolic disorders that follow These can lead to NCDs such as diabetes mellitus, coronary artery disease and stroke. The body can actually have overdose on vitamin and mineral supplements. More research is needed to explain how this happens and how much is too much of a certain vitamin or mineral. In general, micronutrient over nutrition is uncommon and doesn't occur from diet alone. But mega doses of certain supplements taken, it can have toxic effects. In its broadest sense, malnutrition can affect any one, more so with people living with diabetes. Lack of knowledge of nutrition, lack of access to a variety of foods, sedentary modern lifestyles and economic disadvantages are all common contributors to malnutrition. Certain populations such as Poor and low income needs these knowledge as to use resources within their reach to strike a balance in diet.

### **Methodology**

#### **Research Design**

The socio demographic and anthropometric data was collected using the proforma in the health care Centre. The malnutrition was assessed using global leadership initiative on malnutrition for evaluating weight changes and oral nutritional intake. It is a two steps process by first identifying one phenotypic and one etiologic criterion and second assessing the severity of malnutrition as moderate and severe based on the phenotypic criterion, the patients were grouped according to the overall findings into well-nourished moderately nourished severe malnourished.

#### **Data Collection Method**

This assessment was carried out by a certified nutritionist within 24 to 74 months in the health center, the level of albumin and total lymphocyte count were measured for the assessment of nutritional risk, an independent t-test was used to analyze the association of continuous variables likewise for categories including gender diabetics associated details and nutrition parameters p value < 0,05 was considered significant



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### Study Area

This research was conducted in Otukpo local government area, Benue State, located in central Nigeria. Otukpo is a semi-urban area with a population characterized by diverse ethnic groups and socio-economic backgrounds. The area has limited healthcare facilities and infrastructure, which may contribute to health challenges, including diabetes management and prevention (National Population Commission, 2022).

### Study population

The study population comprised of a total of 100 diabetic patients receiving care in Otukpo healthcare facilities, healthcare providers, and local policymakers.

### Results and Findings

**Table 1. Demographic Characteristics of Participants**

Age distribution	66% (45-65 yrs)	34 % above 25 yrs	
Gender	45% male	55% female	
Education	44% Secondary	26% Tertiary	30% primary
Occupation	30% farmers	45% traders	25% White collar jobs
Marital status	73% married	22% single	5% widowed

**Table 2. Clinical Characteristics of the Enrolled Diabetic Patients**

BMI (body mass index) categories	Under weight	54
	Normal	20
	Overweight	17
	Obese	9
Socioeconomic Factor	Average	12
	Good	34
	Poor	54
Smoking Status	Smoker	23
	Non smoker	76
Past Medical History	Hypertension	66
	Cardiovascular disease	12
	Stroke / cerebrovascular disease	13
	Foot ulcer	2
	Chronic kidney disease	14
	Dyslipidemia	23
	Dm Medication	Both
	Insulin	34
	Oral hypoglycemic	33
	No medication	Nil
Dm Complication	Nephropathy	34
	Coronary artery disease	36
	Cerebrovascular disease	14
	Peripheral vascular disease	16

## Discussion of Findings

### Demographic Analysis

**Age Distribution:** The majority of diabetic patients (66%) were between the ages of 45 and 65 years, with a significant proportion (34%) above 65 years.

**Gender:** Of the diabetic patients, 55% were female and 45% were male.

**Education:** 44% of the patients had completed secondary school education, while 26 % had attained tertiary education.

**Occupation :** Most of the diabetic patients were farmers (30%) or traders (45%) a smaller proportion (25%) engaged in white-collar jobs.

**Marital Status:** 73% of the patients were married, and the remaining 27% were either single or widowed.



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### **Clinical Characteristics of the Enrolled Diabetic Patients**

Using the GLIM diagnostic criteria total of 55% of the sample population were identify as moderately mal nourished, 35% are severely malnourished and 15% were well nourished an equal proportion were distributed in male and female among the phenotypic criterion was weight loss accounting to 78.6 % followed by muscle mass of 53% and BMI 14%. The nutritional statuses were assessed through the SGA 35% of the total population were Severely malnourished, 55% were well malnourished and 15% were well nourished. The mean BMI significantly declined with the malnutrition status it was observed that the diabetic patients with normal status had mean BMI of 23.3 +/- 5.2, followed by 21.4 +/- 6.23 among those with moderate malnutrition while 19.92 +/- 4.69 among patient with severely malnutrition , a significant association was observed between the nutritional status and component of who nutritional screening tool (p<0.001) most of the severely ill cases and those with reduced nutritional intake were mildly /moderately malnourished

### **Conclusion**

The nutritional value diabetic patients in this study was diagnosed using the GLIM is an evolving diagnostic tool based on global criteria that take into consideration different characteristics of malnutrition including body mass index and body weight 28 the prevalence rate of malnutrition among hospitalized patients was found to be 37% using the GLIM criteria. Nutritional management is a cornerstone of diabetes care, with a focus on controlling blood glucose levels, preventing complications, and improving overall health. A balanced approach that includes choosing the right types of carbohydrates, increasing fiber intake, moderating protein and fat consumption, and incorporating key vitamins and minerals can help individuals with diabetes achieve better glycemic control. Additionally, adopting heart healthy dietary patterns such as the Mediterranean or plant-based diets can further support long-term diabetes management. Ultimately, diabetes care is individualized, and a comprehensive approach that includes education, behavioral strategies, and personalized nutrition is essential for optimizing health outcomes Emerging research in the management and prevention of diabetes has resulted in exciting advancements in medication, technology, lifestyle interventions, and prevention strategies.

### **Recommendation**

The future of diabetes care is tilting toward a more personalized, precision-based approach, with much emphasis on early innovative therapies, intervention, and patient empowerment. Choosing the right food intake and maintaining the right meal timing will arrest to a great extent the complications that come with type 2 diabetes

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