

Adherence to Dietary Recommendations and Barriers Among Type 2 Diabetic Patients: A Cross-Sectional Study at Ho Teaching Hospital, Ghana

Philippine Esiawonam Deku^{1,2}, Linda Afriyie Gyimah^{2*}, Rita Judith Akunor-Sackey²

¹Department of Home Economics, E.P.C. Mawuko Girls' Senior High School, Ho, Ghana

²Department of Food and Nutrition Education, Faculty of Health, Allied Sciences and Home Economics Education, University of Education, Winneba, Ghana

*Corresponding Author

DOI: <https://dx.doi.org/10.47772/IJRISS.2026.100300042>

Received: 09 March 2026; Accepted: 14 March 2026; Published: 25 March 2026

ABSTRACT

Background: Type 2 Diabetes Mellitus (T2DM) is a growing global health burden, with dietary adherence central to glycaemic management.

Objective: This study investigated adherence levels and barriers to dietary recommendations among T2DM patients at Ho Teaching Hospital, Ghana.

Methods: A cross-sectional survey of 135 patients using a modified Perceived Dietary Adherence Questionnaire was employed.

Results: Adherence was high for avoiding sweets (93.33%) and alcohol (93.33%) but poor for fruits (85.93%) and vegetables (69.63%). Financial constraints (41.48%) were the leading barrier; 71.11% reported at least one barrier. Younger patients faced significantly more barriers ($p = 0.002$).

Conclusion: Targeted dietary education and economic support strategies are urgently needed for T2DM management in Ghana.

Keywords: type 2 diabetes mellitus, dietary adherence, barriers, glycaemic control, Ghana

BACKGROUND

Diabetes mellitus (DM) is a chronic metabolic disorder characterised by elevated blood glucose resulting from impaired insulin secretion, insulin action, or both [1]. Type 2 diabetes mellitus (T2DM), accounting for 90–95% of all DM cases, involves relative insulin deficiency and peripheral insulin resistance, and can lead to serious complications including cardiovascular disease, nephropathy, retinopathy, and neuropathy [2]. Globally, T2DM affects an estimated 537 million adults aged 20–79 years and is projected to rise to 783 million by 2045 [3].

In sub-Saharan Africa, DM prevalence is rising rapidly, with an estimated 24 million adults affected, a figure projected to double by 2045 [3]. Ghana is not insulated from this trend. Community-based studies in Ghana report prevalence rates ranging from 4.7% in urban-rural settings to 13.7% among specific professional groups, with the Ho Municipality recording a rate of 6.9% [4, 5]. Despite this burden, a large proportion of cases remain undiagnosed, underscoring a critical gap in detection and management.

Dietary modification is widely recognised as a cornerstone of T2DM management, alongside pharmacotherapy and physical activity [6]. Adherence to evidence-based dietary recommendations including increased fruit and vegetable intake, reduced consumption of refined carbohydrates, saturated fats, and alcohol is vital for sustained

glycaemic control and the prevention of complications [7]. However, adherence among patients with T2DM is consistently poor, with rates in Ghana ranging from 32.56% to 68.5% across various studies [8]. Barriers including financial constraints, poor knowledge, and social pressures compound the challenge [9].

Evidence on dietary adherence and its determinants among T2DM patients in the Volta Region of Ghana, particularly at Ho Teaching Hospital, remains limited. This study sought to investigate the level of adherence to dietary recommendations and to identify barriers among T2DM patients receiving care at Ho Teaching Hospital.

MATERIALS AND METHODS

Study Design and Setting

A hospital-based quantitative cross-sectional study was conducted between July and September 2023 at the Diabetic Unit of Ho Teaching Hospital, a 241-bed tertiary referral facility serving the Volta Region. The Ho Municipality lies between latitudes 6°20'N and 6°55'N and longitudes 0°12'E and 0°53'E, covering 2,361 km², and borders the Republic of Togo to the east.

Study Population and Sampling

The study population comprised T2DM patients attending the diabetic clinic. Using an estimated population of 200, a margin of error of 5%, and 95% confidence level, a minimum sample of 132 was calculated via the Raosoft online calculator. A final sample of 135 participants was recruited using convenience sampling during scheduled clinic days. Inclusion required confirmed T2DM diagnosis and written informed consent. Non-diabetic patients and those unwilling to participate were excluded.

Data Collection Instrument

A structured, closed-ended questionnaire with three sections was administered. Section one captured sociodemographic and health-related data. Section two used a modified 16-item Perceived Dietary Adherence Questionnaire (PDAQ), adapted from Asaad et al. [10] and Raj et al. [11], scored on a 4-point Likert scale. Participants were classified as having good adherence if they consumed recommended healthy foods (vegetables, fruits, oily fish, skimmed milk) five to six days per week, or avoided unhealthy foods (sweets, full-fat dairy, fast foods, alcohol) completely or rarely. Section three comprised a 17-item barrier questionnaire adapted from Bekele et al. [12], Bai and Kumari [13], Ghimire [14], and Mohammed and Sharew [15].

Data Analysis

Data were coded, cleaned, and entered into Microsoft Excel, then exported to IBM SPSS Statistics version 26. Descriptive statistics were used for categorical and continuous variables. Pearson correlation examined associations between demographic characteristics and dietary adherence. Chi-square tests assessed associations between demographic variables and perceived barriers. Odds ratios (OR) with 95% confidence intervals were computed. Statistical significance was set at $p < 0.05$.

Ethical Considerations

Ethical approval was obtained from the Ho Teaching Hospital Research and Ethics Committee (Protocol No.: HTH-REC (16) FC_2023). Written informed consent was obtained from all participants. Anonymity and confidentiality were maintained throughout.

RESULTS AND DISCUSSION

Sociodemographic and Health-Related Characteristics

A total of 135 T2DM patients participated, predominantly female (74.81%) with a mean age of 59.48 ± 12.79 years (Table 1). The majority were older than 60 years (49.63%), self-employed (52.59%), and earned between

GH¢500–1,000 monthly. Over half were married (53.33%), and 96.30% identified as Christian. Nearly 38% had lived with diabetes for 6–10 years.

Table 1: Sociodemographic and health-related characteristics of study participants (n = 135)

Item	Frequency	Percentage (%)
Age Category (years)		
<40	10	7.41
40–60	57	42.96
>60	66	49.63
Gender		
Male	34	25.19
Female	101	74.81
Marital Status		
Married	72	53.33
Widowed/Widower	42	31.11
Single/Divorced/Separated	21	15.56
Educational Status		
None/Primary	35	25.93
JHS	48	35.56
SHS	20	14.81
Tertiary	32	23.70
Occupation		
Self-Employed	71	52.59
Pensioner	28	20.74
Unemployed	22	16.30
Employed (Public/Private)	14	10.37
Average Monthly Income (GH¢)		
< 500	17	12.59
500–1000	40	29.63
1001–2000	18	13.33
> 2000	26	19.26
Diabetes Duration (years)		
< 1 year	5	3.70
1–5 years	41	30.37
6–10 years	51	37.78
> 10 years	38	28.15

Data are reported as frequency and percentage. JHS – Junior High School; SHS – Senior High School.

The female preponderance in this study is consistent with the established epidemiological pattern of T2DM in Ghana and sub-Saharan Africa [2]. Females are at higher risk due to lower physical activity levels, increased visceral adiposity and associated insulin resistance, and the lasting metabolic sequelae of gestational diabetes, all of which promote progression to T2DM [16]. The older age profile of participants aligns with evidence that T2DM risk rises with age due to declining muscle mass, weight gain, and reduced physical activity [17]. A significant inverse correlation was observed between age and alcohol consumption ($r = -0.832, p < 0.001$), which likely reflects increased disease awareness and complications consciousness among older patients with longer diabetes duration consistent with findings by Bellary et al. [18].

Dietary Adherence

Table 2 summarises adherence patterns across 14 dietary parameters. Participants showed strong adherence to avoiding sweets and chocolates (93.33%), desserts (94.81%), and alcohol (93.33%). However, poor adherence

was particularly pronounced for fruit intake (85.93% poor adherence), vegetable consumption (69.63%), fast food avoidance (82.96%), and oily fish intake (54.07%). Nearly all participants failed to consume skimmed or non-dairy milk (99.26% and 98.52%, respectively).

Table 2: Level of dietary adherence among T2DM patients at Ho Teaching Hospital (n = 135)

Dietary Parameter	Poor Adherence n (%)	Good Adherence n (%)
Eating vegetables	94 (69.63)	41 (30.37)
Eating fruits	116 (85.93)	19 (14.07)
Eating oily fish	73 (54.07)	62 (45.93)
Eating fast foods	112 (82.96)	23 (17.04)
Skimmed milk consumption	134 (99.26)	1 (0.74)
Non-dairy milk consumption	133 (98.52)	2 (1.48)
Eating salty foods	53 (39.26)	82 (60.74)
Eating sweet pastry/cake	18 (13.33)	117 (86.67)
Eating sweets/chocolate	9 (6.67)	126 (93.33)
Drinking sugary beverages	25 (18.52)	110 (81.48)
Full-fat spread use	18 (13.33)	117 (86.67)
Full-fat milk	34 (25.19)	101 (74.81)
Processed meat consumption	26 (19.26)	109 (80.74)
Alcohol intake	9 (6.67)	126 (93.33)

Data are reported as frequencies with corresponding percentages.

The high rate of poor fruit and vegetable consumption in this study (85.93% and 69.63% respectively) is alarming given that plant-based diets rich in fibre, vitamins, and antioxidants are fundamental to T2DM glycaemic management and secondary prevention of cardiovascular complications [7]. These figures exceed those reported in Northwest Ethiopia (49.4% and 56.1% respectively; Tirfie et al. [19]) and the Tamale Metropolis in Ghana (13.4%; Mogre et al. [20]). Seasonality, affordability, and limited access to fresh produce in the Ho Municipality likely contribute to these gaps.

The low adherence to oily fish consumption (54.07%) is nutritionally significant, as omega-3 fatty acids in oily fish are cardioprotective and anti-inflammatory properties especially relevant in T2DM patients at heightened cardiovascular risk. Conversely, the poor avoidance of fast foods (82.96% consuming them) contrasts with findings by Mogre et al. [20], where only 1.6% of Ghanaian patients reported such intake. This discrepancy may reflect the urban food environment of Ho, where readily available, inexpensive fast-food options compete with home-prepared, diet-appropriate meals. Eating saturated fat-rich fast foods promotes dyslipidaemia and atherosclerosis which are key drivers of diabetic cardiovascular complications [21].

Adherence was notably high for avoiding sweets, chocolates, and sugary beverages, consistent with other studies [21]. This may reflect the effectiveness of patient education in communicating the link between sugar consumption and hyperglycaemia, a concept more intuitively grasped by patients than the subtler harms of saturated fat or inadequate fibre intake. A weak but significant positive correlation was found between treatment length and fruit consumption ($r = 0.183$, $p = 0.034$), suggesting that longer engagement with healthcare services incrementally improves adherence in certain dietary domains. Similarly, processed meat consumption was positively correlated with educational level ($r = 0.198$, $p = 0.021$) and negatively with income ($r = -0.199$, $p = 0.021$), indicating that lower-income patients may paradoxically consume more processed meat possibly as an affordable protein source.

Barriers to Dietary Adherence

Over two-thirds of participants (71.11%) reported at least one barrier to dietary adherence. Of those experiencing barriers, 51.04% reported multiple barriers, 25.00% reported two, and 23.96% reported a single barrier. Table 3 presents the distribution of specific barriers.

Table 3: Barriers to dietary adherence among T2DM patients at Ho Teaching Hospital (n = 135)

Barrier	Frequency	Percentage (%)
Financial constraints	56	41.48
Eating out at restaurant	42	31.11
Difficulty during social/work events	35	25.93
Poor self-control	22	16.30
Personal food preference	24	17.78
Lack of appetite for recommended diet	19	14.07
Too busy schedule	17	12.59
Unavailability of sugar-free products	17	12.59
Negative influence of others	12	8.89
Stress	10	7.41
Lack of knowledge/diet education	7	5.19
Family dislikes recommended foods	8	5.93
Diet takes too long to prepare	3	2.22
Unable to remember recommended diet	2	1.48

Data are reported as frequencies with corresponding percentages.

Financial constraint was the most frequently cited barrier (41.48%), consistent with findings from Ethiopia [22] and Ghana [8]. Although no statistically significant association was found between income level and barriers ($p = 0.331$) in this study, the economic context of Ghana characterised by rapidly rising food prices and high inflation makes affordability a structurally embedded challenge.

The average monthly income of GH¢500–1,000 reported by the majority of participants is insufficient for consistent purchase of recommended fresh foods such as fruits, vegetables, and oily fish. Providing dietary guidance that incorporates low-cost, locally available healthy food alternatives is critical for this population [23].

Eating out (31.11%) and difficulty adhering during social or work events (25.93%) were the second and third most common barriers respectively. These findings reflect broader cultural dynamics in Ghana, where food plays a central social role in events, funerals, and community gatherings; contexts in which diabetes-appropriate meals are rarely available.

Ayele et al. [24] reported 39.0% of Ethiopian participants finding it difficult to adhere during social events, while 32.4% of patients at Agogo Presbyterian Hospital in Ghana cited eating outside the home as a key reason for poor adherence [25]. The social function of food, communicating emotion and maintaining relationships means that dietary restriction in social settings can feel socially exclusionary, reducing motivation to adhere [26].

Notably, only 5.19% cited lack of dietary knowledge as a barrier which is substantially lower than the 82% and 52.3% reported in earlier studies [13, 25]. This may reflect the relative effectiveness of nutrition education at Ho Teaching Hospital, or it may suggest that knowledge is not the binding constraint, rather, the ability to act on that knowledge given financial, social, and logistical limitations. This distinction has important implications for intervention design: education-alone strategies will be insufficient if structural barriers remain unaddressed.

Association Between Sociodemographic Characteristics and Barriers

Table 4 presents the chi-square and odds ratio analysis of sociodemographic predictors of adherence barriers. Age was the only variable significantly associated with barriers ($p = 0.002$). Patients aged 40–60 years had 2.75 times the odds of experiencing barriers compared to those above 60 years (OR = 2.75; 95% CI: 1.24–6.12, $p = 0.013$).

All patients under 40 years reported barriers (100%). Gender, marital status, educational level, occupation, income, and family type were not significantly associated with barriers (all $p \geq 0.05$).

Table 4: Association between sociodemographic characteristics and perceived barriers to dietary adherence

Variable	Barrier n (%)	No Barrier n (%)	OR (95% CI)	p-value
Age Category				
<40 years	10 (100.0)	0 (0.0)	—	—
40–60 years	47 (81.0)	11 (19.0)	2.75 (1.24–6.12)	0.013
>60 years (Ref)	39 (58.2)	28 (41.8)	Ref	
Gender				
Male	27 (79.4)	7 (20.6)	—	0.201
Female	68 (67.3)	33 (32.7)	—	
Educational Status			—	0.191
Marital Status			—	0.648
Occupation			—	0.544
Average Income			—	0.331
Family type			—	0.573

OR = Odds Ratio; CI = Confidence Interval. Significance set at $p < 0.05$.

The inverse relationship between age and barriers where younger patients face significantly more challenges reflects the complex biological, psychological, and social pressures of managing a chronic disease in younger adulthood. Younger adults are more likely to be in employment, raising families, and managing competing life priorities that make consistent dietary modification difficult [27]. Older patients, who have typically lived longer with the disease, may have developed stronger routines, better disease acceptance, and more time for self-care. The finding that no other demographic variable was significantly associated with barriers contrasts with studies in Kenya [28] and Ghana [8], where income and household factors predicted adherence possibly reflecting the relative socioeconomic homogeneity of this sample.

CONCLUSION

This study revealed a heterogeneous pattern of dietary adherence among T2DM patients at Ho Teaching Hospital. Adherence was strong for avoiding sugar-rich foods and alcohol but critically poor for fruits, vegetables, oily fish, and fast-food avoidance. Financial constraints, social eating pressures, and younger age were the most significant barriers. These findings highlight that dietary non-adherence in this context is driven not by ignorance but by structural and social factors that require multi-level interventions. Healthcare systems must move beyond nutrition education alone toward integrating economic enablement strategies, culturally sensitive dietary counselling, and stronger social support systems. Future research should explore the efficacy of low-cost dietary substitution strategies and the role of community health workers in sustaining dietary adherence among T2DM patients in Ghana.

Declarations

Ethical Approval: Obtained from Ho Teaching Hospital Research Ethics Committee (Protocol No.: HTH-REC (16) FC_2023). Informed written consent was obtained from all participants.

Availability of Data: Available from the corresponding author upon reasonable request.

Competing Interests: None declared.

Funding: No external funding was received.

Data Availability Statement: Data cannot be shared publicly because it contains sensitive identifying information. However, data are available from the Ethics Committee through the corresponding author for researchers who meet the criteria for access to confidential data.

Authors' Contributions: Conceptualisation: P.E.D., L.A.G., R.J.A.S. Methodology: P.E.D., R.J.A.S. Formal analysis: L.A.G., P.E.D. Writing – original draft: P.E.D. Writing – review and editing: P.E.D., L.A.G., R.J.A.S. All authors approved the final version.

Acknowledgements: The authors thank the management and staff of the Diabetic Unit of Ho Teaching Hospital for their support.

REFERENCES

1. American Diabetes Association. (2022). Standards of medical care in diabetes — 2022. *Diabetes Care*, 45(Suppl. 1), S1–S264. <https://doi.org/10.2337/dc22-Sint>
2. Kautzky-Willer, A., Leutner, M., & Harreiter, J. (2023). Sex differences in type 2 diabetes. *Diabetologia*, 66(6), 986–1002. <https://doi.org/10.1007/s00125-023-05891-x>
3. International Diabetes Federation. (2021). *IDF Diabetes Atlas (10th ed.)*. IDF.
4. Bawah, A. T., Ngambire, L. T., Abaka-Yawson, A., Anomah, A., Kinanyok, S., & Torny, H. (2021). A community-based prevalence of type 2 diabetes mellitus in the Ho municipality of Ghana. *Journal of Public Health*, 29, 403–409. <https://doi.org/10.1007/s10389-019-01182-z>
5. Issah, S., Aseidu, M., Danquah, A., Akwaa, O., & Kadir, A. (2022). Undiagnosed type 2 diabetes mellitus prevalence and associated risk factors in an urban and rural metropolis in Ghana. *Journal of Nutrition and Metabolic Disease Care*, 8, 062.
6. Dawite, F., Girma, M., Shibiru, T., Keefelew, E., Hailu, T., & Temesgen, R. (2023). Factors associated with poor glycemic control among adult patients with type 2 diabetes mellitus in Southern Ethiopia: A case-control study. *PLOS ONE*, 18(3), e0276678. <https://doi.org/10.1371/journal.pone.0276678>
7. Eshete, A., Lambebo, A., Mohammed, S., Shewasinad, S., & Assefa, Y. (2023). Effect of nutritional promotion intervention on dietary adherence among type II diabetes patients in North Shoa Zone, Amhara Region: Quasi-experimental study. *Journal of Health, Population and Nutrition*, 42(1), 1–10. <https://doi.org/10.1186/s41043-023-00368-2>
8. Doglikuu, B. I. D., Abdulai, A., Yaseri, M., Shakibazadeh, E., Djazayery, A., & Mirzaei, K. (2021). Association of household socioeconomic status, neighbourhood support system and adherence to dietary recommendation among persons with T2DM in Ghana. *BMC Public Health*, 21(1), 1–8. <https://doi.org/10.1186/s12889-021-10449-y>
9. Al-Salmi, N., Cook, P., & D'Souza, M. S. (2022). Diet adherence among adults with type 2 diabetes mellitus: A concept analysis. *Oman Medical Journal*, 37(2), e361. <https://doi.org/10.5001/omj.2022.26>
10. Asaad, G., Sadegian, M., Lau, R., Xu, Y., Soria-Contreras, D. C., Bell, R. C., & Chan, C. B. (2015). The reliability and validity of the Perceived Dietary Adherence Questionnaire for people with type 2 diabetes. *Nutrients*, 7(7), 5484–5496. <https://doi.org/10.3390/nu7075231>
11. Raj, S. P., & Sridhar, M. G. (2018). Perceived dietary adherence and barriers among type 2 diabetes mellitus patients. *International Journal of Health Sciences and Research*, 8(2), 14–19.
12. Bekele, H., Asefa, A., Getachew, B., & Belete, A. M. (2020). Barriers and strategies to lifestyle and dietary pattern interventions for prevention and management of type-2 diabetes in Africa: Systematic review. *Journal of Diabetes Research*, 2020, 1–12. <https://doi.org/10.1155/2020/1536518>
13. Bai, R. R., & Kumari, R. (2020). Perceived dietary adherence and its barriers to dietary recommendations among type 2 diabetes mellitus patients. *Innovative Journal of Nursing and Healthcare*, 6(3), 1–5.
14. Ghimire, S. (2021). Barriers to diet and lifestyle modification in type 2 diabetes patients and their perspectives on problem solving: A qualitative study. *Journal of Diabetes Research*, 2021, 5556842. <https://doi.org/10.1155/2021/5556842>
15. Mohammed, S. H., & Sharew, N. T. (2019). Dietary practice and its associated factors among type 2 diabetes patients in Southeast Ethiopia. *BMJ Open Diabetes Research & Care*, 7(1), e000729. <https://doi.org/10.1136/bmjdr-2019-000729>
16. Ciarambino, T., Crispino, P., Leto, G., Mastrolorenzo, E., Para, O., & Giordano, M. (2022). Influence of gender in diabetes mellitus and its complications. *International Journal of Molecular Sciences*, 23(16), 8850. <https://doi.org/10.3390/ijms23168850>

17. Yan, Z., Cai, M., Han, X., Chen, Q., & Lu, H. (2023). The interaction between age and risk factors for diabetes and prediabetes: A community-based cross-sectional study. *Diabetes, Metabolic Syndrome and Obesity*, 16, 85–93. <https://doi.org/10.2147/DMSO.S388415>
18. Bellary, S., Kyrou, I., Brown, J. E., & Bailey, C. J. (2021). Type 2 diabetes mellitus in older adults: Clinical considerations and management. *Nature Reviews Endocrinology*, 17(9), 534–548. <https://doi.org/10.1038/s41574-021-00512-2>
19. Tirfie, M., Birhanu, Z., Mengistie, B., & Amsalu, S. (2020). Dietary practices and associated factors among type 2 diabetes mellitus patients in Northwest Ethiopia: A cross-sectional study. *Journal of Diabetes Research*, 2020, 3534272. <https://doi.org/10.1155/2020/3534272>
20. Mogre, V., Abanga, Z. O., Tzelepis, F., Johnson, N. A., & Paul, C. (2021). Adherence to and factors associated with self-care behaviours in type 2 diabetes patients in Ghana. *BMC Endocrine Disorders*, 17(1), 1–8. <https://doi.org/10.1186/s12902-017-0169-3>
21. Portela, R. A., Silva, J. R. S., Nunes, F. B. B. F., Lopes, M. L. H., Batista, R. F. L., & Silva, A. C. O. (2022). Diabetes mellitus type 2: Factors related to adherence to self-care. *Revista Brasileira de Enfermagem*, 75, e20210260. <https://doi.org/10.1590/0034-7167-2021-0260>
22. Boshe, B. D., Yimar, G. N., Dadhi, A. E., & Bededa, W. K. (2021). The magnitude of non-adherence and contributing factors among adult outpatients with diabetes mellitus in Dilla University Referral Hospital, Ethiopia. *PLOS ONE*, 16(3), e0247952. <https://doi.org/10.1371/journal.pone.0247952>
23. Landa-Anell, M. V., Melgarejo-Hernández, M. A., García-Ulloa, A. C., Del Razo-Olvera, F. M., Velázquez-Jurado, H. R., & Hernández-Jiménez, S. (2020). Barriers to adherence to a nutritional plan and strategies to overcome them in patients with type 2 diabetes mellitus. *Endocrinología, Diabetes y Nutrición*, 67(1), 4–12. <https://doi.org/10.1016/j.endinu.2019.02.010>
24. Ayele, A. A., Emiru, Y. K., Tiruneh, S. A., Ayele, B. A., Gebremariam, A. D., & Tegegn, H. G. (2021). Level of adherence to dietary recommendations and barriers among type 2 diabetic patients: A cross-sectional study in an Ethiopian hospital. *Clinical Diabetes and Endocrinology*, 4(1), 1–7. <https://doi.org/10.1186/s40842-018-0054-7>
25. Akumiah, P. K., Lamptey, R., & Ankomah, S. E. (2017). Adherence to dietary regimen among type 2 diabetic patients at Agogo Presbyterian Hospital, Ghana. *International Journal of Research in Medical Sciences*, 5(12), 5212–5218. <https://doi.org/10.18203/2320-6012.ijrms20175397>
26. Beverly, E. A., Ritholz, M. D., Wray, L. A., Chiu, C. J., & Suhl, E. (2018). Understanding the meaning of food in people with type 2 diabetes living in northern Appalachia. *Diabetes Spectrum*, 31(1), 14–24. <https://doi.org/10.2337/ds17-0003>
27. Salama, M., Biggs, B. K., Creo, A., Prissel, R., Al Nofal, A., & Kumar, S. (2023). Adolescents with type 2 diabetes: Overcoming barriers to effective weight management. *Diabetes, Metabolic Syndrome and Obesity*, 16, 693–711. <https://doi.org/10.2147/DMSO.S365529>
28. Jepkemoi, R., Kyalo, C., & Mutisya, R. (2021). Factors influencing dietary adherence among type 2 diabetes patients attending Kenyatta National Hospital, Nairobi, Kenya. *African Journal of Health Sciences*, 34(2), 115–129.