Oshada; Jurnal Kesehatan
https://jurnal-ilcaagam.com/index.php/O/index
Volume 3 Nomor 5, 2026
e-ISSN : 3047-017X
DOI : https://doi.org/10.62872/o.v3i5.640

Lifestyle Profile of Patients with Type 2 Diabetes Mellitus: Dietary Intake and Physical Activity at Kamoning Primary Health Center

Taufiqur Rahman Gaffar [1] ✉, Nindawi [2], Nurkhalila [3], Nuriszakiyah [4], Bonto Tunipalangga [5]
Politeknik Negeri Madura, Indonesia[1,2,3,4,5]
e-mail : *ibadtauf@gmail.com

Input : September 10, 2026
Revised : October 01, 2026
Accepted : October 20, 2026
Published : October 27, 2026

ABSTRACT

Current management of diabetes mellitus prioritizes controlling blood glucose levels, which can be achieved through lifestyle changes, particularly diet and physical activity. However, people with diabetes often have unbalanced diets and low levels of physical activity , contributing to poor blood sugar control. Lack of information about this condition can hinder planning appropriate nutritional and physical activity interventions for people with type 2 diabetes . The purpose of this study was to determine the profile of food consumption patterns and physical activity in Type 2 DM patients at the Kamoning Community Health Center, Sampang Regency. The research design used was descriptive. The population in this study were all Type 2 DM patients who had been registered for treatment at the Kamoning Community Health Center, as many as 80 people, who were taken using the total sampling technique. Data collection used a questionnaire and data analysis used univariate analysis (range). The results showed that most respondents (56.25%) had a food consumption lifestyle profile in the sufficient category, and in physical activity, most (51.25%) respondents had a moderate level of physical activity at the Kamoning Community Health Center, Sampang Regency. The conclusion of this study shows that the profile of external risk factors in Type 2 Diabetes Mellitus patients at the Kamoning Community Health Center, Sampang Regency is in the category of not good and is varied. It is hoped that this study can be a reference material in providing education on healthy ways or styles in diet and physical activity that suit the needs.

Keywords : Physical activity , DM, food consumption patterns, profile

Creative Commons Attribution-ShareAlike 4.0 International License:
https://creativecommons.org/licenses/by-sa/4.0/

INTRODUCTION

Diabetes Mellitus (DM) is a condition associated with metabolic syndrome, characterized by elevated blood glucose levels , commonly known as hyperglycemia. This can be caused by disorders in insulin secretion, insulin function, or both. Chronic diseases such as diabetes mellitus are prone to causing dysfunction that can lead to damage to organs such as the eyes, kidneys, nerves, heart, and blood vessels (Astuti & Aini, 2024). Although type 2 diabetes mellitus is a chronic, incurable disease, blood glucose levels can be controlled through lifestyle changes, particularly diet and physical activity. However, unbalanced diets and low levels of physical activity are still common in type 2 diabetes patients and contribute to poor blood sugar control. Currently, the food consumption and physical activity levels of type 2 diabetes mellitus patients, particularly those undergoing treatment , are unclear . This lack of information about this condition can hinder efforts to plan appropriate nutritional and physical activity interventions for type 2 diabetes sufferers. The uniqueness of this study lies in the simultaneous mapping of both behavioral aspects in type 2 diabetes mellitus patients within the context of primary healthcare services within the Kamoning Community Health Center, Sampang Regency. This approach provides a contextual overview of patient health behavior at the local level, which can serve as baseline data for healthcare providers in determining priorities for education, nutritional counseling, and physical activity promotion as part of type 2 diabetes mellitus management.

World Health Organization (WHO, 2021). In 2019, diabetes caused direct deaths in 1.5 million people worldwide, with 48% of these occurring in individuals under the age of 70. Based on a report by the International Diabetes Federation (IDF, 2021), Indonesia has 19.5 million people with diabetes aged 20-79 years and is ranked fifth with the highest number of diabetes cases in the world. It is estimated that by 2045 the number of people with diabetes in Indonesia will reach 28.6 million , remaining in fifth place (Novia et al., 2023). At the East Java regional level in 2023, the number of people with diabetes reached 842,004 people. Specifically, in Sampang Regency, the number of cases reached 9,400 in 2021, spread across various community health centers (Puskesmas) working areas. For example, at the Kamoning Community Health Center in 2022, 813 respondents were diagnosed with diabetes, and data from the Mohammad Zyn Sampang Regional Hospital in 2018 recorded 900 inpatients with diabetes. At the Kamoning Community Health Center, specifically in Sampang Regency , the number of Type 2 Diabetes Mellitus sufferers in 2025 was 596 cases in the last three months .

The main causes of Type II Diabetes Mellitus are the rise in obesity and unhealthy lifestyles, such as poor diet and lack of physical activity. According to Tara (2002), the increase in diabetes mellitus sufferers in Indonesia is due to poor diet and a Westernized lifestyle. Excessive consumption of foods containing carbohydrates, fats, and proteins can also inhibit the pancreas' ability to secrete insulin. If insulin secretion is inhibited, blood sugar levels will increase. Besides diet, physical activity can also trigger Type II Diabetes Mellitus, as patients with

Diabetes Mellitus generally have a lack of activity. Physical activity is crucial for people with Diabetes Mellitus because it can control blood sugar levels. Physical exercise increases glucose utilization by active muscles, directly lowering blood glucose (Nanda et al., 2018). Physical activity is essential for people with Diabetes Mellitus to reduce the risk of Impaired Glucose Tolerance (Ilyas, 2004; Nuraini & Supriatna, 2016). The recommended amount of physical activity is 30 minutes per day (150 minutes per week) at moderate intensity. This activity can be done both at home and at work (Ministry of Health of the Republic of Indonesia, 2017).

Medical treatment alone is not enough to manage type 2 diabetes; lifestyle modifications, such as adopting a healthy diet, are also necessary. A person's choice of the type, amount, and timing of food consumption to meet their body's needs is called their diet. A healthy diet can help manage blood sugar levels and prevent more serious problems. Food types, portion sizes, nutritional balance, and regular mealtimes are all important aspects of meal planning for people with diabetes. Furthermore, physical activity is crucial for the treatment of type 2 diabetes mellitus (T2DM). Exercise has been shown to improve blood sugar regulation, promote weight loss, and increase insulin sensitivity. Daily activities such as walking or regular exercise like jogging and aerobics are examples of this type of activity. It is recommended that individuals with diabetes exercise three to four times a week for at least thirty minutes each day (Kurniasari et al., 2021). Frequent exercise also improves overall fitness and lowers blood sugar levels (Alza et al., 2020).

The background of the researcher in choosing the title is because of the importance of balance between food consumption patterns that determine glucose intake into the body with physical activity carried out, because physical activity plays an important role in removing glucose from the body so that it can maintain normal blood sugar. Meanwhile, the reason for choosing the Kamoning Community Health Center in Sampang Regency as the research location is because it is one of the primary health care facilities that provides services to patients with type 2 Diabetes Mellitus on an ongoing basis. The description of food consumption patterns and physical activity in patients at the Community Health Center level is important to study because health behavior is influenced by social, cultural, environmental characteristics, and habits of the local community. Therefore, the data obtained from the work area of the Kamoning Community Health Center is expected to provide a more contextual empirical picture of the behavior of patients with type 2 Diabetes Mellitus and become the basis for developing education and promotive-preventive interventions that are appropriate to the needs of the local community.

METHODOLOGY

This research uses quantitative descriptive design. This design was chosen because the research aims to explore Food consumption profile and physical activity level in type 2 Diabetes Mellitus patients without considering the influence of other variables . The quantitative method is used because the data collected is in the form of numbers and is processed using descriptive statistics

to obtain frequency distribution and percentages (Pramithasari, 2023). The population in this study were all type 2 Diabetes Mellitus sufferers who had visited and were in the working area of the Kamoning Health Center as many as 80 people , using the total sampling technique. The instruments used in this study used : 1) Food consumption questionnaire (FQQ) . Used to assess the food consumption patterns *of* type 2 DM patients, including food types, meal frequency, and quality of food selection. (Willett, 2013). 2) Physical activity questionnaire (International Physical *Activity Questions)* , a standard instrument used to measure the frequency, duration, and intensity of physical activity of patients in daily life. (Craig, CL, et al. 2003) , 3). Medical record data was used to obtain supporting information such as type 2 DM diagnosis and respondent characteristic data. The variables analyzed univariately include: Respondent characteristics, such as: Food consumption variables, which are categorized as : 1) good, 2) sufficient, 3) insufficient. Physical activity variables, which are categorized into : 1) heavy, 2) moderate, 3) low.

RESULTS AND DISCUSSION

A. Results

1. Gender

Table 1 Distribution of Respondents by Gender

No.	Gender	Frequency	Percentage
1	Man	17	21.25%
2	Woman	63	78.75%
Total		80	100.0%

Based on table 1, the results of the frequency distribution based on the gender of DM sufferers show that the majority of respondents were female , amounting to 63 people (78.75 %).

2. age.

Table 2 Distribution of Respondents Based on Age

No.	Age	Frequency	Percentage
1	<40	18	22.5%
2	40-49	37	46.25%
3	50-59	19	23.75%
4	>60	6	7.5%
Total		80	100.0%

Based on table 2, the results of the study of respondent characteristics based on age show that almost half of the respondents studied were in the 40–49 year age group , namely 37 people (46.25%).

3. Food consumption patterns

Table 3. Tabulation of Respondent Frequency Distribution Based on Food Consumption Patterns

No.	Food Patterns	Frequency	Presentation
1	Good	23	28.75%
2	Enough	45	56.25%
3	Not enough	12	15%
	Total	80	100%

Based on table 3, the frequency distribution of respondents based on food consumption patterns shows that of the 80 respondents, the majority have a food consumption pattern in the sufficient category, namely 45 respondents (56.25%).

4. Physical Activity

Table 4 , Tabulation of Respondent Frequency Distribution Based on Physical Activity

No.	Physical Activity	Frequency	Presentation
1	Heavy	20	25%
2	Currently	41	51.25%
3	Light	19	23.75%
	Total	80	100%

Based on table 4 , the frequency distribution of respondents based on physical activity shows that of the 80 respondents, the majority have moderate physical activity, namely 41 respondents (51.25 %).

B. Discussion

The results of the study showed that most respondents at the Kamoning Community Health Center, Sampang Regency, had a food consumption pattern in the sufficient category . The results of the study showed that the majority of type 2 Diabetes Mellitus (DM) patients in the Community Health Center (Puskesmas) work area had a food consumption pattern in the **adequate category** . This finding indicates that DM management through food consumption aspects remains one of the challenges in achieving optimal blood glucose control. Food consumption patterns are an important component in DM management because the amount, type, quality, and timing of food consumption can affect the glycemic response after meals and overall glycemic control. The American Diabetes Association (ADA) places nutrition therapy as an integral part of diabetes management and recommends a diet tailored to individual needs, with an emphasis on food quality, nutritional adequacy, energy intake, and the patient's metabolic goals. (ADA ,2026). The adequate/inadequate food consumption categories in this study may indicate that some patients have not fully implemented the principles of appropriate dietary management for diabetes. In the context of diabetes, dietary quality is determined not only by sugar restriction, but also by the type of carbohydrate source, the amount or portion of food, meal frequency, fiber consumption, fat quality, and consumption of processed foods and sweetened beverages. The 2026 ADA guidelines recommend increasing the consumption of non-starchy vegetables, whole fruits, nuts, whole grains, and healthier protein sources, as well as limiting sweetened beverages, sweet foods, refined cereals, and ultra- processed foods (ADA, 2026). The findings of this study align with research in Indonesia showing that dietary adherence remains a challenge for type 2 diabetes patients. A study by Simbolon, Triyanti, and Sartika on type 2 diabetes patients at the Pasar Minggu Community Health Center found that only 13.8% of respondents were considered compliant with their diabetes diet. The study also found that gender and duration of diabetes were associated with dietary adherence, with duration of diabetes being the dominant factor in multivariate analysis. This suggests that dietary management is a behavior that is not easily maintained long-term. (Simbolon, YI, Triyanti, & Sartika, RAD , 2019) . Other research in Indonesia also revealed similar problems. A study of type 2 diabetes patients at the Pekauman Community Health Center (Puskesmas) showed that most respondents failed to adhere to dietary recommendations regarding food quantity/portion, food type, and meal schedule. These findings are important because these three aspects are key components of dietary management for diabetes patients. Therefore, the adequate food consumption category in this study may reflect a gap between knowledge about diabetes diets and their application in daily life. **(** Khusna, RP, Pangastuti, HS, & Wicaksana, A. L , 2023) .

In the context of primary care, this situation suggests that a one-time education about "do's and don'ts" may not be sufficient. Patients need practical and ongoing education about local food choices, portion sizes, meal schedules,

substitutions for foods high in sugar or refined carbohydrates, and how to adapt their diet to their family's economic circumstances and habits.

This is in line with the ADA 2026 recommendations which emphasize that nutritional therapy for diabetes must be individualized, taking into account cultural preferences, patient abilities, health literacy, access to healthy foods, and barriers to behavioral change (ADA, 2026). The findings of this study have important implications for diabetes care at community health centers. The largely adequate food consumption pattern categories indicate the need to strengthen diabetes self-management education and management. Support (DSMES **)** , particularly in the nutritional aspect. Education should not only be provided in the form of general counseling, but should be directed at measurable behavioral changes. Interventions can be carried out through individual nutritional counseling, regular dietary monitoring, the use of sample menus based on local foods, education on the 3J principles (type, amount, and schedule), and family involvement. This approach is increasingly important because the goal of nutrition therapy is not simply to reduce sugar consumption, but to help patients achieve glycemic targets, maintain a healthy weight, and prevent diabetes complications. ADA 2026 recommends individualized medical nutrition therapy and emphasizes the active involvement of patients and healthcare professionals in developing meal plans. (ADA, 2026)

The results of the above study are strengthened by the results of exploration of indicators that are measuring tools and support the data in this study from questionnaire question no. 3 of the meal schedule indicator and daily eating habits, showing that most/not all of the total number of DM sufferers answered "yes" which stated I eat three times a day, which shows that a regular eating pattern has been partially implemented by type 2 DM sufferers . In theory, a three-times-a-day eating pattern is recommended because the body requires regular energy and nutrient intake to carry out metabolic functions, maintain energy balance, and support body growth and health. Ministry of Health of the Republic of Indonesia. (2024). *Fill My Plate, A Guide to Daily Balanced Nutritional Needs* . Jakarta: Ministry of Health of the Republic of Indonesia. According to researchers , the habit of eating three times a day is a very good eating pattern because it can help the body get enough energy every day. By eating regularly, the body becomes healthier, less tired, and is able to carry out daily activities more optimally. In addition, the three-day diet times a day can also help maintain concentration and physical fitness in the long term.

The results of the study showed that only the majority of respondents at the Kamoning Community Health Center answered “yes” to questionnaire question number 10 of the food type indicator such as high fiber , namely consuming vegetables such as luffa, tomatoes, cucumbers, carrots, vegetables, protein, sugar and caisin as much as one small bowl at each meal. In theory, regular consumption of vegetables is highly recommended because vegetables contain vitamins, minerals, and fiber that the body needs to maintain digestive health, increase endurance, and prevent various diseases. World Health Organization. (2026) .. According to researchers , the habit of consuming

vegetables at every meal is a very good habit and should be maintained because it can help maintain body health, improve digestion, and make the body feel fresher in carrying out daily activities.

The results of the study showed that only a majority of respondents at the Kamoning Community Health Center answered “yes” to questionnaire number 7, “I process vegetables, carbohydrates, and proteins using moderate amounts of salt and fat. ” In theory, moderate use of salt and fat when processing food is recommended because it can help maintain heart health, blood pressure, and body weight, while ensuring balanced nutritional intake. World Health Organization. (2026). According to researchers , the habit of preparing food with reasonable amounts of salt and fat is an excellent practice because it can support a healthy lifestyle, maintain body energy, and prevent the risk of long-term disease.

The results of the study showed that the majority of respondents at the Kamoning Community Health Center in questionnaire number 5. "I consume foods that contain a lot of protein, such as tofu, tempeh, eggs, and meat ," answered "yes." In theory, protein is very important for the body because it plays a role in building and repairing tissue, supporting muscle growth, and producing enzymes and hormones needed by the body. World Health Organization (2026) . According to researchers , the habit of consuming protein-rich foods is a good eating pattern and should be implemented regularly because it can help maintain body health, increase endurance, and support daily activities to be more optimal. Thus, the results of this study can be seen as a reflection of gaps in the nutritional management of type 2 DM patients at the primary care level. These findings can serve as a basis for Community Health Centers (Puskesmas) to strengthen dietary screening and regular nutritional counseling. Future research can be developed to analyze the relationship between food consumption patterns and fasting blood glucose or HbA1c levels, while also incorporating other factors such as physical activity, medication adherence, duration of DM, nutritional status, education level, income, stress, and family support. The initial conclusion from the findings of this study indicates that food consumption patterns are an important aspect that requires attention in the management of type 2 DM patients at the primary care level. The proportion of patients with food consumption patterns that are still in the sufficient category indicates a gap in the application of diabetes dietary management principles. This condition has the potential to complicate the achievement of optimal glycemic control, especially if characterized by the consumption of low-quality carbohydrates, high-sugar foods or drinks, inappropriate portion sizes, and irregular meal schedules. Therefore, DM management at Puskesmas needs to strengthen nutritional interventions that are individualized, sustainable, and take into account socio-cultural characteristics and the patient's ability to implement dietary changes.

2 Physical Activity

The results of the study showed that most respondents at the Kamoning Community Health Center in Sampang Regency had a moderate level of physical

activity , such as carrying children or pushing carts, which was documented from the respondents' answers to number 7 of the questionnaire answering "yes". This means that most respondents with type 2 diabetes mellitus (DM) in the Kamoning Community Health Center (Puskesmas) in Sampang Regency have moderate levels of physical activity. This finding indicates that most respondents still engage in physical activity in their daily lives, whether through work activities, household chores, walking, or other activities. However, moderate physical activity cannot be directly interpreted as respondents having performed optimal physical activity for controlling blood glucose levels. This is because the metabolic benefits of physical activity are determined not only by its category, but also by the frequency, duration, intensity, type of activity, and continuity of the activity. Physical activity plays an important role in controlling glucose levels in type 2 DM patients. During physical activity, muscle contractions increase glucose uptake by muscles through a mechanism involving the translocation of glucose transporter type 4 (GLUT4) to the cell membrane. This mechanism allows glucose to enter muscle cells and be used as an energy source. Regular physical activity can also increase insulin sensitivity, thereby helping the body use glucose more effectively. Conversely, insufficient physical activity and high levels of sedentary behavior can lead to low energy expenditure and contribute to insulin resistance. The findings of this study are in line with scientific evidence that physical activity is an important part of managing type 2 diabetes. The American Diabetes Association (ADA) Standards of Care 2026 recommends that most adults with type 2 diabetes engage in at least 150 minutes of moderate-to-vigorous aerobic activity per week, performed on at least 3 days per week and no more than 2 days in a row without activity. Physical activity is also recommended to be combined with resistance training 2–3 times per week according to individual conditions. (ADA, 2026)

The results of research at the Kamoning Community Health Center which showed the dominance of moderate physical activity can be understood in the context of people's daily activities. Physical activity is not only in the form of structured exercise, but also includes activities at work, walking, housework, gardening, and other activities. WHO emphasizes that physical activity can come from recreation, transportation, work, and household chores. To achieve significant health benefits, adults are recommended to do 150–300 minutes of moderate-intensity aerobic activity per week, or the equivalent in vigorous-intensity activity. (World Health Organization. 2020). Interventions at the community health center level can be directed at education on easy-to-implement physical activities, such as walking, diabetes exercises, active household activities, gardening, or strength training according to the patient's abilities. Increasing these activities should be done gradually and take into account the patient's clinical condition and diabetes complications.

CONCLUSION

Based on the research results, it can be concluded that external risk factors in type 2 Diabetes Mellitus (DM) patients in the working area of the Kamoning Community Health Center, Sampang Regency show variations in diet and physical activity. Most respondents have a diet in the adequate category, namely 45 people (56.25 %), while physical activity is mostly in the moderate category, namely 41 people (51.25%). These findings indicate that there are still aspects of health behavior that need to be considered in the management of type 2 DM, especially optimizing diet and increasing regular physical activity as part of efforts to control external risk factors.

REFERENCES

Alza, Y., Arsil, Y., Marlina, Y., Novita, L., & Agustin, ND (2020). Physical Activity, Disease Duration and Blood Sugar Levels in Type 2 Diabetes Mellitus (DM) Patients. *Jurnal Gizido* , *12* (1), 18–26.

American Diabetes Association Professional Practice Committee for Diabetes. (2026). Facilitating positive health behaviors and well-being to improve health outcomes: Standards of Care in Diabetes—2026. *Diabetes Care, 49* (Supplement 1).

American Diabetes Association Professional Practice Committee for Diabetes. (2026). Glycemic goals, hypoglycemia, and hyperglycemic crises: Standards of Care in Diabetes—2026. *Diabetes Care, 49* (Supplement 1), S132–S149.

Astuti, L., & Aini, L. (2024). The Relationship between Family Support and Diet Compliance of Type 2 Diabetes Mellitus Patients at the Internal Medicine Clinic of Siti Khadijah Islamic Hospital, Palembang. *Malahayati Nursing Journal* , *6* (2), 689–699.

Collins, S.P., Storrow, A., Liu, D., Jenkins, C.A., Miller, K.F., Kampe, C., & Butler, J. (2021). *Tabulation of Data* . 167–186.

Feni Novita, S. (2021). *The Effect of Diabetes Mellitus Self-Management on the Risk of Complications in Diabetes Mellitus Patients at the Siwalankerto Community Health Center, Surabaya City* . Hang Tuah Health College, Surabaya.

Ilyas, E. (2004). *Integrated Management of Diabetes Mellitus* (2nd ed.). Department of Internal Medicine, Faculty of Medicine, University of Indonesia.

International Diabetes Federation. (2021). *IDF Diabetes Atlas* (10th ed.). International Diabetes Federation.

Indonesian Ministry of Health. (2017). *Regular Physical Activity Prevents Hypertension, Diabetes, and High Cholesterol* . Let's Be Healthy, Ministry of Health.

Khusna, RP, Pangastuti, HS, & Wicaksana, AL (2023). Dietary adherence and the associated factors among Indonesian patients with type 2 diabetes: What should we be concerned about? *Frontiers of Nursing, 10* (4), 427–436.

Kurniasari, MD, Karwur, F., Rayanti, RE, Dharmana, E., Rias, YA, Chou, KR, & Tsai, H.-T. (2021). Second-Hand Smoke and Its Synergistic Effect with a Body Mass Index of >24.9 kg/m ^{2} in Increasing the Risk of Gout Arthritis in Indonesia. *International Journal of Environmental Research and Public Health* , *18* (8), 4324.

Lestari, L., Zulkarnain, Z., & Sijid, SA (2021). Diabetes Mellitus: Review of Etiology, Pathophysiology, Symptoms, Causes, Examination Methods, Treatment Methods, and Prevention Methods. *Proceedings of the National Biology Seminar* , *7* (1), 237–241. https://doi.org/10.24252/psb.v7i1.24229

Making, DK, Detha, AIR, Lada, CO, Roga, AU, & Manurung, IFE (2023). Analysis of Type 2 Diabetes Mellitus Risk Factors in Residents in the Working Areas of Waepana and Riung Community Health Centers in Ngada Regency in 2023. *Indonesian Nursing Journal of Education and Clinic* , *3* (4), 259–278.

Maulani, EY, & Susilowati, E. (2017). *The Relationship between Physical Activity and Diet with Blood Sugar Level Control in Type 2 Diabetes Mellitus Patients at Fatimah Islamic Hospital, Banyuwangi* . Putera Indonesia Pharmacy Academy, Malang.

Nanda, OD, Wiryanto, B., & Triyono, EA (2018). The Relationship between Compliance with Antidiabetic Medication and Blood Sugar Level Regulation in Female Diabetes Mellitus Patients. *Amerta Nutrition* , *2* (4), 340–348.

Notoatmodjo, S. (2018). *Health Research Methodology* . EGC.

Novia, R., Arisman, Y., Zega, ADY, & Irwanto, R. (2023). The Correlation Between Adherence To A Low-Carbohydrate Diet and Decreased Blood Sugar Levels In Patients With Diabetes Mellitus Type II At Grandmed Lubuk Pakam Hospital. *Journal of Public Health and Nutrition (Jkg)* , *5* (2), 253–258.

Nuraini, HY, & Supriatna, R. (2016). The Relationship between Diet, Physical Activity, and Family History of Disease and Type 2 Diabetes Mellitus. *Journal of Public Health Sciences* , *5* (1), 5–14.

Nuzulla, NH (2022). Overview of Fast Food Consumption and Physical Activity in Outpatients with Type 2 Diabetes Mellitus at RSNU Tuban. *Thesis* , 5–9. http://eprints.ums.ac.id/id/eprint/105566

Simbolon, YI, Triyanti, & Sartika, RAD (2019). The factors associated with dietary adherence in type 2 diabetes mellitus patients at Pasar Minggu Primary Health Care in 2018. *Community Health Journal, 5* (3), 110–117. https://doi.org/10.25311/keskom.Vol5.Iss3.336

Sudayasa, IP, Rahman, MF, Eso, A., Jamaluddin, J., Parawansah, P., Alifariki, LO, Arimaswati, A., & Kholidha, AN (2020). Early Detection of Risk Factors for Non-Communicable Diseases in the Community of Andepali Village, Sampara District, Konawe Regency. *Journal of Community Engagement in Health* , *3* (1), 60–66.

Tara, E. (2002). *Smart Book of Diabetes Mellitus Therapy* . Tara Media.

Triyolanda, A. (2023). *Compiled by: andala triyolanda nim p0 0320120002* .

Wahyuningrum, R., Wahyono, D., Mustofa, M., & Prabandari, YS (2020). Problems Related to Type 2 Diabetes Mellitus Treatment: A Qualitative Study. *Indonesian Journal of Clinical Pharmacy* , *9* (1), 26.

World Health Organization. (2020). *WHO guidelines on physical activity and sedentary behavior* . Geneva: World Health Organization. ISBN 978-92-4-001512-8.

World Health Organization. (2021). *Global Report On Diabetes Mellitus – Epidemiology Diabetes Mellitus – Prevention and Control. 3. Diabetes, Gestational. 4. Chronic Disease. Public Health* I. .

World Health Organization. (2026). *Healthy diet* . Geneva: World Health Organization