GENDERED DIFFERENCES IN THE DIETARY MANAGEMENT AMONG TYPE 2 DIABETES PATIENTS IN PALAKKAD DISTRICT, KERALA

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Dr Amritha Suresh

DECLARATION

I hereby declare that this dissertation titled – **"Gendered Differences in the Dietary Management among Type 2 Diabetes patients in Palakkad District, Kerala"** is a bonafide record of my original research. It has not been submitted to any other university or institution for the award of any degree or diploma. Information derived from the published and unpublished work of others has been duly acknowledged in the text.

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CERTIFICATE

Certified that the dissertation titled - **"Gendered Differences in the Dietary Management among Type 2 Diabetes patients in Palakkad District, Kerala"** is a record of the research work undertaken by Dr Amritha Suresh, in partial fulfilment of the requirements for the award of the degree of Master of Public Health under my guidance and supervision.

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GLOSSARY OF ABBREVIATIONS

No	Abbreviation	Full Form
1	**ADA**	American Diabetes Association
2	**ASHA**	Accredited Social Health Activist
3	**BMI**	Body Mass Index
4	**CD**	Community Development
5	**DALYs**	Disability Adjusted Life Years
6	**DASH**	Dietary Approaches to Stop Hypertension
7	**DPP**	Dipeptidyl Peptidase
8	**DSSQ**	Diabetes Social Support Questionnaire
9	**FPG**	Fasting Plasma Glucose
10	**GLP**	Glucagon-like Peptide
11	**HbA1c**	Glycated Haemoglobin A1c
12	**HCP**	Health Care Provider
13	**ICMR-INDIAB**	Indian Council of Medical Research- India Diabetes
14	**IDDM**	Insulin Dependent Diabetes Mellitus
15	**IDF**	International Diabetes Federation
16	**IEC**	Information, Education, Communication
17	**IHME**	Institute for Health Metrics and Evaluation
18	**MNT**	Medical Nutrition Therapy
19	**NCDs**	Noncommunicable diseases
20	**NIDDM**	Non-Insulin Dependent Diabetes Mellitus
21	**ODK**	Open Data Kit
22	**OGTT**	Oral Glucose Tolerance Test
23	**PDQ**	Personal Diabetes Questionnaire
24	**PG**	Plasma Glucose
25	**QoL**	Quality of life
26	**QOLID**	Quality of Life Instrument for Indian Diabetes patients
27	**SDSCA**	Summary of diabetes self-care activities measure
28	**SGLT**	Sodium-glucose cotransporter
29	**UNESCO**	United Nations Educational, Scientific and Cultural Organisation

ABSTRACT

Background: To effectively manage Type 2 Diabetes, individuals must adopt and master multiple self-management behaviours, including dietary changes, regular exercise, medications and monitoring blood sugar levels. Among these lifestyle modifications, dietary management is often considered the most challenging. Family support can improve dietary management among diabetic patients. Dietary management may be impacted by gender. This study aims to assess the level of family support on dietary management, understand how gendered roles affect dietary management among Type 2 Diabetes patients in Palakkad, Kerala and also to understand the perspectives and practices of Health care providers regarding the capacity of their patients with Type 2 Diabetes to adapt to dietary recommendations and to explore for gendered differences related to the same.

Methods: A Sequential Explanatory study was envisaged which comprised of both quantitative and qualitative methods. The quantitative survey was conducted among 200 patients with Type 2 Diabetes. In depth interviews were conducted among 11 patients and eight Healthcare providers who were involved in delivering dietary advices. A composite outcome variable was created for the purpose of analysis. The proportion of people who received family support for dietary management was estimated. Chi square test and Binary logistic regression were used to test the associations. A thematic analysis was performed for qualitative data of patients and framework analysis for providers and synthesis of findings from the data was attempted.

Results: The proportion of males who practiced optimal dietary management for glycaemic control was 21.1 percent (95% CI: 14.0 – 31.0). The proportion of females who practiced optimal dietary management for glycaemic control was 12.7 percent (95% CI: 7.7 – 20.2). Family support was available to 39 percent of participants for dietary

management. In general, participants with family support had contradictory findings with optimal core dietary modification (24.4 percent participants with family support practiced optimal core dietary modifications as compared to 34.4 percent participants without family support). Sex disaggregated data shows a similar pattern of observations with the distribution much greater in men than women (19 percent of women with family support practiced optimal core dietary modifications as compared to 30.6 percent of men with family support who practiced optimal core dietary modifications). Family support was deemed essential for dietary management from the qualitative interviews. Family support variables were better among males compared to females, the reason being the influence of gendered roles and the difference in the mode of support, which was evident across all sets of data.

Conclusion: The quantitative study did not establish a clear association of family support with dietary management but the qualitative interviews with patients and providers underscored its significance and highlighted the disadvantages of lacking family support. The qualitative results also emphasized the sacrificial character of women in their responsibilities as mothers and wives, which affected their dietary management for glycaemic control. The outcome variable created in the process of this study, based on the standard guidelines could be easily implemented by a trained community health worker. In order to provide gender-sensitive dietary advices, further research on the gendered intricacies of family support as well as developing training programs for dieticians and other healthcare workers are essential.

CHAPTER 1

INTRODUCTION AND REVIEW OF LITERATURE

1.1 Background

Noncommunicable diseases (NCDs), usually known as chronic diseases, are a large group of diseases that last lifelong and are brought on by a combination of genetic, physiological, environmental, and behavioural factors. (World Health Organisation, 2023) Cardiovascular diseases (such as heart attacks and stroke), cancers, chronic respiratory diseases (such as chronic obstructive pulmonary disease and asthma) and diabetes are the main types of NCDs. People in low- and middle-income countries are more severely impacted by NCDs, where 31.4 million NCD fatalities take place worldwide. (World Health Organisation, 2023) According to Noncommunicable diseases progress monitor 2022, NCDs accounts for 66 percent of all deaths in India. (Noncommunicable Diseases Progress Monitor, 2022)

When the body cannot produce enough insulin nor can use the insulin that is produced properly, it develops Diabetes Mellitus, which is a serious, chronic condition. Over 90 percent of diabetes cases worldwide are Type 2 Diabetes. (International Diabetes Federation, 2021) Given that it jeopardizes both socioeconomic development and public health, it is among the most severe public health concerns in the world. (Lin et al., 2020) Although diabetes was once thought to be a disease exclusive to the affluent, epidemiological data now shows that the condition is increasingly prevalent across rural and urban areas of India, particularly among the middle and working classes. (Ramesh and Kosalram, 2023) Diabetes is currently one of the top 10 major causes of

mortality and disability, with a global prevalence of 6.1 percent. (Institute for Health Metrics and Evaluation, 2023)

Type 2 Diabetes can possibly be averted or delayed, and there is also growing evidence that even remission of Type 2 Diabetes may sometimes be possible. (Vázquez et al., 2023) Promoting a way of life that includes a healthy diet, regular exercise, quitting smoking, and maintenance of a healthy body weight is considered to be the cornerstone of Type 2 Diabetes care. (International Diabetes Federation, 2021) Of all the lifestyle changes that people with diabetes need to make, nutrition management is arguably the most challenging and complicated. (Wong et al., 2005) There is adequate proof to conclude that effective methods of self-management improve glycaemic control. The adoption and upkeep of diabetic self-management is influenced by a number of important factors. The personality traits of a diabetic patient, those of a healthcare practitioner, the nature of the patient-provider interaction, and community support are the most crucial among these. (Ravi et al., 2018)

For diabetic patients, family is a crucial source of support. Numerous studies have shown that family support can improve self-care among diabetic patients. (Alexandre et al., 2021; Choi, 2009; Kandel and Wichaidit, 2020; Watanabe et al., 2010) Food becomes a major source of conflict and discussion for households with diabetic members. The entire family may have to work together for effective management of diabetes. However, this is not always feasible, and people with diabetes typically mention commitments to their families, dietary choices, and a lack of family support as the major barriers to their successful self-management. Given the gender-based roles connected with meals and meal preparation, these barriers might even be more severe. (Wong et al., 2005) Therefore, gender may also have an impact on dietary management.

1.2 Literature Review

1.2.1 Definition, Classification and diagnosis of Diabetes Mellitus

“Diabetes is a chronic, metabolic disease characterized by elevated levels of blood glucose (or blood sugar), which leads over time to serious damage to the heart, blood vessels, eyes, kidneys and nerves”. (World Health Organisation, 2023) It emerges as a result of the body's inability to create any, sufficient amounts of, or properly utilise the insulin it does make. An important hormone generated by the pancreas is insulin. Insulin enables circulatory glucose to enter the body's cells, where it can be stored or transformed into energy. Hyperglycaemia, the clinical sign of diabetes, is caused by high blood glucose levels, which occur when there is insufficient insulin or when cells are unable to respond to it. (International Diabetes Federation, 2021)

There are mainly two types of Diabetes- Type 1 Diabetes (Insulin Dependent Diabetes Mellitus-IDDM), Type 2 Diabetes (Non-Insulin Dependent Diabetes Mellitus-NIDDM). Classification of Diabetes Mellitus by WHO specifies other types including Hybrid forms of Diabetes Mellitus (Slowly evolving immune-mediated diabetes of adults, Ketosis prone Type 2 Diabetes), Other specific types (Monogenic diabetes, Diseases of the exocrine pancreas, Endocrine disorders, Drug- or chemical-induced) Gestational Diabetes. (World Health Organization, 2019)

Diagnosis of diabetes is based on plasma glucose criteria, either the fasting plasma glucose (FPG) value or the two-hour plasma glucose (Two-h PG) value during a 75-g oral glucose tolerance test (OGTT) or A1C criteria. (ElSayed et al., 2023)

Table 1.1-Modified diagnostic criteria for diabetes (International Diabetes Federation, 2021)

Test	Diabetes should be diagnosed if ONE OR MORE of the following criteria are met	Impaired Glucose Tolerance should be diagnosed if BOTH of the following criteria are met	Impaired Fasting Glucose Should be diagnosed if THE FIRST OR BOTH of the following are met
FPG	≥7.0 mmol/L (126 mg/dL)	<7.0 mmol/L (126 mg/dL)	6.1 – 6.9 mmol/L (110 – 125 mg/dL)
	OR	AND	AND IF MEASURED
Two-hour PG after 75g oral glucose load (OGTT)	≥11.1 mmol/L (200 mg/dL)	≥7.8 and <11.1 mmol/L (140–200 mg/dL)	<7.8 mmol/L (140 mg/dL)
	OR		
HbA1c	≥48 mmol/mol (equivalent to 6.5%)		
	OR		
Random Plasma Glucose	≥11.1 mmol/L (200 mg/dL)		

1.2.2 Burden of Diabetes Mellitus on the Globe, India and Kerala

Based on figures from the Global Burden of Diseases, Injuries, and Risk Factors Study 2019 (GBD 2021 Diabetes Collaborators, 2023), Diabetes ranked as the eighth most common cause of death and disability worldwide, affecting approximately 460 million individuals in all age groups and nations. A staggering 537 million individuals worldwide were estimated by the International Diabetes Federation (IDF) to have diabetes in 2021.

The IDF Diabetes Atlas (2021) reports that 10.5 percent of the adult population (20-79 years) has diabetes, with almost half unaware that they are living with the condition and shows that by 2045, one in eight adults, approximately 783 million, will be living with diabetes, an increase of 46 percent. Over 90 percent of people with diabetes have Type 2 Diabetes, which is driven by socio-economic, demographic, environmental, and genetic factors.

Table 1.2- Top 10 countries or territories for number of adults (20–79 years) with diabetes in 2021

Rank	Country or territory	Number of people with diabetes (in millions)
1	China	140.9
2	India	74.2
3	Pakistan	33.0
4	United States of America	32.2
5	Indonesia	19.5
6	Brazil	15.7
7	Mexico	14.1
8	Bangladesh	13.1
9	Japan	11.0
10	Egypt	10.9

Source: IDF Diabetes Atlas 2021 | IDF Diabetes Atlas

When it comes to India, it is estimated that approximately 74.2 million adults had diabetes in 2021, and that number is anticipated to rise to 124.9 million by 2045 if

effective prevention strategies are not adopted. (International Diabetes Federation, 2021) According to the Institute for Health Metrics and Evaluation (IHME), in India, 57.92 percent of total Disability Adjusted Life Years (DALYs) was contributed by NCDs in 2019. Recent report from Indian Council of Medical Research- India Diabetes (ICMR-INDIAB) study highlights that 101 million people have diabetes in India with a weighted prevalence of 11.4 percent. (Anjana et al., 2023)

Kerala is significantly in an advanced stage of epidemiological transition when compared to other Indian states. For instance, almost 90 percent of Kerala's premature mortality (mortality among people aged 15 to 69) could be ascribed to NCDs. The four major NCDs (ischaemic heart disease, stroke, chronic obstructive pulmonary disease, and diabetes) account for over a quarter of the total illness burden in DALYs. In Kerala, the prevalence of Diabetes was estimated to be 19.2 percent in 2017. (Sarma et al., 2019)

1.2.3 Pathophysiology of Type 2 Diabetes Mellitus

With Type 2 Diabetes accounting for 90 to 95 percent of all instances of Diabetes Mellitus, it is significantly more frequent than Type 1. Type 2 Diabetes often develops gradually and usually appears after the age of 30, most frequently between the ages of 50 and 60. As a result, adult-onset diabetes is a common term used to describe this illness. That being said, there has been a consistent rise in the number of younger people with Type 2 Diabetes in recent years, some of them being even younger than 20 years. (Guyton et al., 2011)

Unlike Type 1 Diabetes, Type 2 Diabetes is linked to hyperinsulinemia, or elevated plasma insulin levels. This is the result of the pancreatic beta cells compensating for the target tissues' reduced sensitivity to the metabolic effects of insulin, a state known as insulin

resistance. This reduced sensitivity to insulin affects carbohydrate utilisation and storage, which leads to increased blood glucose levels. (Guyton et al., 2011)

1.2.4 Management of Type 2 Diabetes

Type 2 Diabetes is a chronic progressive illness and its management requires comprehensive behavioural and pharmacological measures and is broadly classified as pharmacological and non-pharmacological measures.

Pharmacological management of diabetes mainly include oral anti-hyperglycaemic drugs, insulin therapy and non-insulin injectable therapy. (Indian Council of Medical Research, 2018) Oral anti diabetic drug includes biguanides, sulphonyl ureas, Dipeptidyl peptidase-4 (DPP-4) inhibitors, thiazolidinediones, Sodium-glucose cotransporter-2 (SGLT-2) inhibitors, alpha glucosidase inhibitors and non-sulphonyl urea agents. (Indian Council of Medical Research, 2018) Combining oral anti-hyperglycaemic medications with insulin can aid in achieving effective diabetes control when glycaemic control cannot be reached even after administering maximum tolerable dosage of one or a combination of oral medications. Depending on the individual's blood sugar profile, intermediate acting, long acting, or short acting insulin may be administered at bedtime or in the morning in addition to oral medications at optimal dosages. (Indian Council of Medical Research, 2018) Non-insulin injectable therapy are glucagon-like peptide 1(GLP-1) receptor agonists. The GLP-1 receptor analogues that are now on the market have longer half-lives than native GLP- 1 with ability to lower hyperglycaemia with minimal risk of hypoglycaemia and also aids in weight loss. (Indian Council of Medical Research, 2018)

Non pharmacological management includes promoting a lifestyle that includes a healthy diet, regular physical activity, smoking cessation and maintenance of healthy body

weight which is considered as the cornerstone of Type 2 Diabetes management. Medical Nutrition Therapy (MNT) is another approach which demands the application of behavioural and nutritional sciences along with physical activity. Here, a four-fold strategy is followed; Nutritional assessment encompassing metabolic, nutritional, and lifestyle parameter; Goal-setting that is customised, realistic, doable, and acceptable; Nutritional intervention, which covers nutrition education and developing customized meal plans based on family eating habits and also incorporates age, sex, physical activity levels, body mass index (BMI) and cultural factors of the patient and finally, assessment to determine whether the goals that have been set have been achieved and to implement any changes, if required. (Indian Council of Medical Research, 2018) The ICMR Guidelines for Management of Type 2 Diabetes 2018 also gives information on the daily requirements of carbohydrates, fibre, proteins, fats, salt, alcohol, sweeteners for patients with diabetes as well as the dietary modifications which needs to be made in the presence of complications of diabetes.

The majority of diabetic guidelines advise delaying the initiation of medication until after dietary and lifestyle modifications have been made. Behavioural lifestyle interventions have been found to be more cost effective than interventions with oral anti-hyperglycaemic agents. (Herman et al., 2005) Due to the heterogenous nature of Type 2 Diabetes, each patient should be considered different and unique and should be provided with customized care for effective management of the condition.

Encouraging healthy lifestyle choices, such as increasing physical activity and making dietary modifications, should be prioritized in every situation. In some cases, modifying one's lifestyle would be enough to achieve the desired therapeutic outcomes. Nevertheless,

majority of Type 2 Diabetic individuals will require pharmacotherapy in order to meet their glycaemic objectives. (Indian Council of Medical Research, 2018)

1.2.5 Importance of Dietary management

Although people with diabetes must adopt a number of behaviours to successfully control their illness, eating a healthy diet is a crucial part of diabetes management. (Gerwitz et al., 2023) "*Diet self-management behaviours for diabetes refer to a series of complex diet behaviours adopted by diabetic patients in order to successfully manage their chronic condition themselves*". (Yang et al., 2021) Diabetes patients who can follow nutritional self-care guidelines frequently have better glycaemic control, which reduces the risk of diabetic complications. (Thewjitcharoen et al., 2018)

Studies have shown that the dominant dietary component causing blood sugar surges is carbohydrates and is the primary macronutrient of concern in glycaemic management. Dietary carbohydrate restriction consistently lowers the glucose profile. (Evert et al., 2013; Feinman et al., 2015) A study conducted in Kerala in 2020 indicates that rice, which is the staple diet of South India, was the major source of carbohydrates, as it made up majority of the diet of the study participants. (Kodapally et al., 2022)

People with diabetes frequently claim that maintaining a healthy diet is one of the most challenging components of their diabetes care, and frequently do not adhere to the suggested guidelines. (Gerwitz et al., 2023) Many people are turned off by the thought of going on a "diet" to manage a chronic, lifelong condition like Diabetes because keeping an appropriate diet and knowing what to eat can be difficult.

According to American Diabetes Association (ADA), for many individuals with diabetes, the most challenging part of the treatment plan is determining what to eat as there is no

"one-size-fits-all" strategy for dietary requirements for those with diabetes. (Evert et al., 2013) Individualised dietary plans that follow guidelines and recommendations while accounting for cultural differences, food accessibility and personal preferences are the most effective for both preventing and treating Type 2 Diabetes. (Deed et al., 2015)

As indicated in a study conducted among underserved adults in United States, for 72.2 percent of participants, most often approved self-management activity was replacing sugar at least four to six times a week with low-calorie sweetener. Monitoring portion sizes was the most commonly reported problem-solving technique that was adopted, with 59.6 percent of participants doing so four to six times a week. Controlling everyday desires was the most prevalent obstacle to changing one's diet, as reported by 32.1 percent of participants at least four or six times a week. (Knight et al., 2015)

A diet consisting primarily of fruits, vegetables, and whole grains has the potential to both control and slow the progression of diabetes. Foods that are abundant in simple carbohydrates and highly processed food elevate the risk of diabetes and its precursor conditions. Reducing the intake of trans and saturated fats and replacing them with mono-unsaturated fats are advised, and carbohydrates should not take up more than 55–60 percent of diet calories. (Lazarou et al., 2012)

1.2.6 Few dietary patterns/strategies to manage diabetes

A number of dietary patterns have been recommended and studied for effective management and for maintaining an optimal diet in individuals with Type 2 Diabetes and can be summarised as follows:

1.2.6.1. Mediterranean Diet

The term Mediterranean diet (MedDiet), which was first described by Ancel Keys in 1960s

(Esposito et al., 2010), refers to a general dietary pattern found in over 20 countries that border the Mediterranean Sea. (American Heart Association, 2020) The United Nations Educational, Scientific and Cultural Organization (UNESCO) describes it as a "*social practice based on the set of skills, knowledge, practices and traditions ranging from the landscape to the cuisine, which in the countries of the Mediterranean culture concern the crops, harvesting, fishing, conservation, processing, preparation and, particularly, consumption*". (UNESCO, 2022) Rich in plant foods (vegetables, legumes, and nuts), cereals and whole grains (mostly unrefined), fresh fruit, and olive oil as the main source of fat, this diet is marked by low to moderate intake of dairy products (cheese and yogurt in particular), as well as low to moderate consumption of fish and poultry, some eggs, red meat, and wine, usually consumed with meals. This diet has modest levels of saturated fat (<or = 7–8 percent of energy), while across the region, total fat ranges from >25 percent to <35 percent of energy. (Lewgood et al., 2021)

Results from a systematic review and meta-analysis of association between adherence to MedDiet and risk of diabetes highlights that a significant reduction in risk of diabetes is seen with greater adherence to this diet. (Schwingshackl et al., 2015) A prospective cohort study conducted in 13380 individuals without diabetes in Spain to evaluate the association between incidence of diabetes and adherence to MedDiet reveals that there was a significant reduction in the incidence of Type 2 Diabetes with greater adherence to MedDiet. (Martínez-González et al., 2008)

1.2.6.2 Plant-based diets

Also sometimes known as vegetarian or vegan diet, the fundamental objective of plant-based diets is to consume as much of the high-nutrient plant foods as possible while limiting processed foods, oils, and animal products (such as dairy and eggs). These diets typically

have a strong emphasis on fruits, vegetables, legumes, beans, peas, seeds, almonds, and soybeans. (Lewgood et al., 2021) According to a recent systematic review, people with Type 2 Diabetes Mellitus may have improved glycaemic control if they switch to a plant-based diet. (Johannesen et al., 2020)

1.2.6.3 Low carbohydrate diet

According to ADA, a low carbohydrate diet is one that contains 60–130 g/day of carbohydrate/day and a very low-carbohydrate ketogenic diet is one that contains 20–50 g/day of carbohydrates. (Merrill et al., 2020) This diet pattern emphasises on consuming foods which are low in carbohydrates (such as salad greens, cucumbers, broccoli) and high in proteins (meat, poultry, fish, eggs, cheese) and fats (such as oils, butter). (Evert et al., 2013) Studies indicate that people with Type 2 Diabetes who follow a ketogenic diet shows a considerable improvement in their HbA1c and a decrease in their use of insulin and oral antidiabetic medications. (Dashti et al., 2021)

1.2.6.4 Dietary Approaches to Stop Hypertension (DASH diet)

Even though this approach is mainly to manage hypertension, results from one study implies that fasting blood glucose and HbA1c levels reduced after the adoption of DASH diet among 31 study participants in Iran. (Azadbakht et al., 2011) Another systematic review suggests that the DASH diet can increase one's sensitivity to insulin and in long-term interventions, the DASH dietary pattern might help with glucose management. (Shirani et al., 2013)

1.2.7 Role of Family Support in Diabetes and Dietary management

The healthcare provider and health care system, patient's family and community/working environment are the three main elements of social environment that are known to have an

impact on self-care behaviours in people with Type 2 Diabetes (Wen et al., 2004) and studies have demonstrated that these elements influence a patient's adherence to diet (Yang et al., 2021). Families are especially important for Type 2 Diabetes patients since living habits like food preparation and diet are among the key elements of managing the disease and these choices develop within or are influenced by the family environment. (Choi, 2009) For people with diabetes, family is a crucial source of support. In addition to providing emotional support when needed, families support the patient physically, assist in keeping things organized and structured so that the patient can adopt a healthy lifestyle. (Ravi et al., 2018) *"Family support is the support provided by any family member to a person having a disability, which may include a child, an adult, or a parent"*. (Kandel and Wichaidit, 2020)

Studies have shown that family support can improve self-care among diabetic patients. In a study, patients under 60 years of age who were supported by a family member showed significantly lower HbA1c than those without family support. (Watanabe et al., 2010) Although the Diabetes nutrition recommendations are suitable for the entire family, the food preferences of other family members, including spouses, were often barriers to successful nutrition self-management.

Qualitative studies have helped in highlighting some of the intricate issues regarding the concept of family support. A study conducted in Canada in 2006 reports that most women felt pressured to change their lives without changing those of their families, and only a few talked about their spouses as a source of support. While women spoke of receiving varied support from family members—particularly from other significant women in their lives like daughters, sisters, and friends, men spoke exclusively of their wives as sources of support. (Mathew et al., 2012)

A systematic review conducted to study the barriers and facilitators for Type 2 Diabetes management in South Asians indicates that family support is an important facilitator in adopting and maintaining a diabetic diet. (Sohal et al., 2015) Another study conducted among 380 patients with Type 2 Diabetes in five community health centres in China reports that in addition to providing knowledge and practical forms of help, friends, family, and supporters of patients can also serve as role models for healthy habits, which will increase diet-promoting behaviours. (Yang et al., 2021) Furthermore, social support (the perception and reality of a person receiving care, support, and aid when required from family as well as friends, co-workers, organizations, and their communities) may play a more significant role in diet promotion because people with diabetes may feel more motivated in a supportive social environment, which may motivate them to adopt behaviours that support their diet. Therefore, social support might be a crucial strategy for diabetic patients to uphold their self-management practices and get beyond obstacles. (Yang et al., 2021)

Family support was found to be an important factor of diet and exercise behaviours even in adults aged 55 years and above in a study conducted in Mexico in 2002 (Wen et al., 2004) indicating that family support is crucial for diabetes management, regardless of age. Hence, it is important to include family members as well during diabetes education sessions to make them understand the importance of being supportive of their family member's treatment regimen.

1.2.8 Gendered differences

Understanding the interaction between gender, socioeconomic level, and social integration may help to explain why men and women have varied health and sickness patterns. (Ballantyne, 1999) The experiences of women with diabetes are likely to differ dramatically depending on a number of factors, including gender differences in the social

structure, diagnosis, access to care, follow-up care, medication adherence, lifestyle modifications, and other self-care behaviors. (Shrestha et al., 2013) Women of the house are considered to be the sole caregivers of the house since time immemorial. Women frequently disregard their own health requirements because they are so preoccupied with caring for others. (American Heart Association, 2023)

A systematic review by Suresh and Thankappan in 2019, identified personal barriers like women's lack of time due to their caring role and job schedules, their lack of education, and other health issues in accessing diabetes care. In addition, societal, health system, financial, psychological, and geographic hurdles were other barriers that were identified. (Suresh and Thankappan, 2019)

Another study conducted in Nepal to assess the gender difference in care of Type 2 Diabetes indicates that women were more likely to receive a diagnosis for diabetes while undergoing testing for a different condition, but men were more likely to receive a diagnosis as a result of testing following the onset of symptoms which emphasises how social structures in underdeveloped nations can fluctuate based on gender. (Shrestha et al., 2013) The study also reported that compared to males, women give less importance to their health and symptoms and arrive later for screening or diagnosis. In the context of chronic non-communicable diseases, this gender gap becomes crucial because early detection depends on screening asymptomatic patients. (Shrestha et al., 2013)

A qualitative study conducted in Canada reports that women were considered to be the main person responsible for preparing the family's meals and had to take care of her family’s food preferences as well while maintaining her diet. (Mathew et al., 2012)

Women's needs start to take a backseat to other people's eating habits and they considered the health of their spouse and children superior to that of theirs. (Hepworth, 1999)

A study done in Korea in 2009 discovered that gender influences the association between glycaemic result and family support. Even after other characteristics were taken into account, the beneficial effect of family support on glycaemic result was much greater in men than in women. (Choi, 2009)

Gender disparities in Type 2 Diabetes care access can be lessened, and the obstacles that women encounter in getting care can be addressed, by taking a gender-sensitive approach and carefully considering the sociocultural context when developing and implementing diabetes care programs.

1.2.9 Theoretical approaches

1.2.9.1 Capability approach

An analytical framework for social and individual well-being called the Capability Approach concentrates on people's actual opportunities, or capabilities, to realize the objectives that are important to them or those that they value. (Ferrer et al., 2014) Capability is when a person has a (actual) possibility to do, be or feel something and functioning is when he/she has realised this capability and is, does or feels this something. (Tengland, 2020) The accessible goods and services and the purchasing power to obtain them, conversion factors that denote a person’s ability to turn available goods and services into real opportunities which can be personal (physical impairment) social (social norms, discrimination, power relationships) and environmental (relevant features of the built and physical environment) are what that determines capability. (Robeyns, 2005)

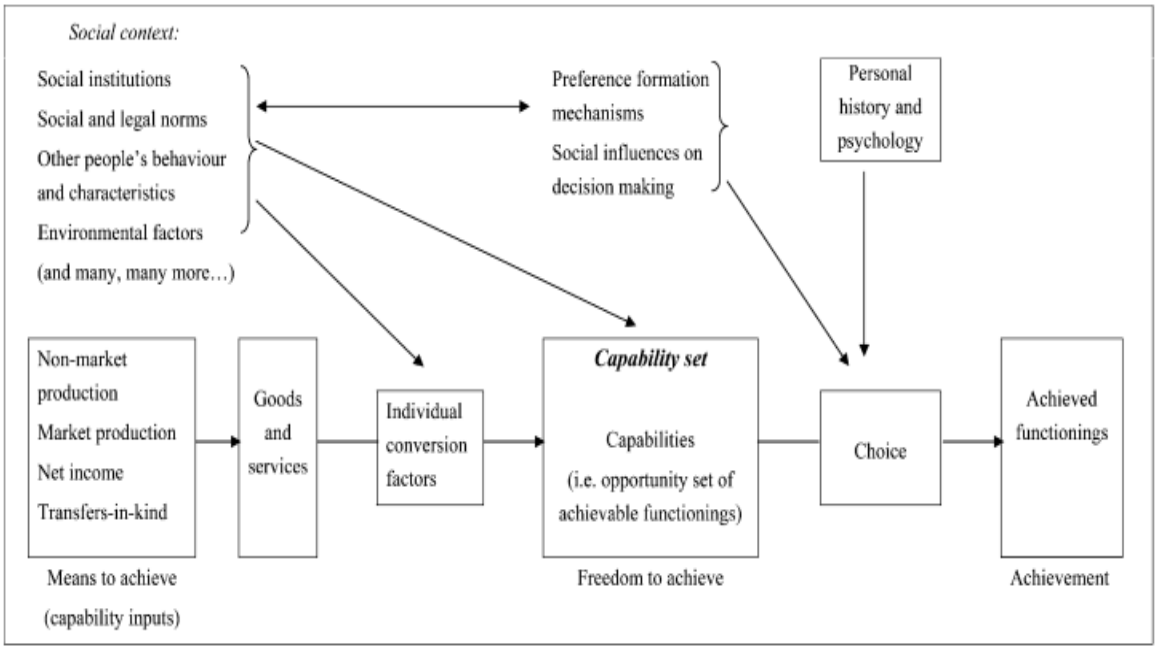

Figure 1.1: A person's capability set, social and personal context (from Robeyns, 2005)

A study done by Ferrer et al. in 2014 used the capability approach framework to assess practical opportunities for healthy diet and activity in a population that was socioeconomically disadvantaged, reports that a wide range of opportunities were identified, which were influenced by differences in local settings, people's physical and mental health, family composition, peer and family support, and individual autonomy. This indicates that capabilities (called opportunities in the study) and in turn functioning are shaped by context. More than 20 percent of the sample experienced limited opportunities due to several factors such as (self-perceived) health literacy, support from friends and family, power dynamics within the household, professional support, societal norms, exhaustion, and depression. These conversion factors can act as barriers which can prevent them from translating capabilities to functioning.

1.2.9.2 Theory of embodiment

The theory of embodiment, often associated with phenomenology and sociology, posits that our bodies are not just physical entities but also carry social and cultural meanings. According to Nancy Krieger, "*Embodiment is, by definition, a multilevel phenomenon, as it necessarily entails the interplay between bodies, components of bodies, and the world(s) in which the bodies live"*. (Krieger, 2005) Embodiment theory examines how individuals experience and express their identities through their bodies, and how societal norms shape these experiences.

According to estimates based on a study among nationally representative sample of persons aged 18 to 69 years who participated in the National NCD Monitoring Survey, the prevalence of Impaired Fasting Glucose and Diabetes Mellitus was predominant among women. (Mathur et al., 2022) Self-management practices like diet control and physical activity are some of the most practiced initial measures of management. Eating habits, leisure activities, the use and experience of violence, our emotional experiences are all influenced by and dependent upon bodily practices in different ways depending on social norms and financial resources. (Krieger, 2005) Diet is affected by a number of factors of which social support has a major role. Family support had a significantly positive impact on glycaemic results in men compared to women. (Choi, 2009) It is quite evident the actual level of blood glucose is influenced by numerous factors which are interconnected. Gender differences get embodied as good or poor control for either men or women.

1.3 Rationale for the study

This study was aimed at understanding the influence of family support on dietary management among males and females with Type 2 Diabetes. Studies have highlighted the

importance of social support from family members, friends, and other networks for the self-management of diabetes mellitus, in line with proper treatment guidelines and prescriptions from healthcare providers. (Alexandre et al., 2021) Also, previous studies on family support have been conducted in high-income countries, and the findings may not be generalizable to low and middle-income countries. (Kandel and Wichaidit, 2020) India is a country which is urbanising in the blink of an eye and a typical Indian family is mostly a nuclear family with each family member having individualistic preferences for everything, including their diet. The degree of family support offered to diabetic patients in such a family environment must be taken into account and it is also critical to comprehend the impact of this support on how patients self-manage their conditions. In addition, family relations may prevent women in a predominately patriarchal society from engaging in self-management behaviours, but on the other hand, they may prove to be advantageous for men. (Ravi et al., 2018) So, through this study, an attempt was made to understand the influence of family support on dietary management among males and females with Type 2 Diabetes in Palakkad district and also to explore how gendered roles affect dietary management. In addition, an attempt has been made to understand the perspectives and practices of Health care providers regarding the capacity of their patients with Type 2 Diabetes to adapt to dietary recommendations and to explore for gendered differences related to the same.

In this thesis, words male/female or men/women are used to indicate not merely the biological differences but also the gender differences.

1.4 Objectives of the study

1. To assess the level of family support on dietary management among males and females with Type 2 Diabetes in Palakkad district

2. To understand how gendered roles affect dietary management among Type 2 Diabetes patients in Palakkad district

3. To understand the perspectives and practices of Health care providers regarding the capacity of their patients with Type 2 Diabetes to adapt to dietary recommendations and to explore for gendered differences related to the same

CHAPTER 2

METHODOLOGY

2.1 Study Design

A sequential explanatory approach was used. (Creswell and Creswell, 2003) which included a cross-sectional survey of patients with Type 2 Diabetes Mellitus for the quantitative study and in-depth interviews of the patients as well as healthcare providers for the qualitative study. Prior to the initiation of the study, numerous conversations were carried out with people diagnosed with Type 2 Diabetes Mellitus, to better understand the difficulties and challenges they face in effectively managing their diabetes. Many of these conversations pointed to the level of support and its importance, which they received from their spouse or other family members to manage their diet, the difficulties they endure in managing their diet, owing to their responsibilities to take care of the family along with managing the individualistic preferences of each family member, going for work, doing household chores. A purely quantitative study would have been difficult to capture these nuances, so a sequential explanatory approach was proposed to better understand and explain the quantitative findings.

2.2 Study Setting

This was a community-based study which was conducted in Palakkad district, focusing on rural and urban areas of Ottapalam, including Ottapalam Block Panchayat and Ottapalam Municipality. The attributes of Palakkad district and Ottapalam Taluk gathered from the District Census handbook of Palakkad, has been listed in Table 2.1.

Among the five taluks of the district, in Mannarkkad taluk, there was a possibility for Attappady community development (CD) block to be different. Attappady CD block has

the lowest sex ratio (1008). Percentage of scheduled castes population to total population in Attappady CD block is 4.75 while it is 15.67 in Ottapalam CD block. Percentage of Scheduled Tribes population to total population is 42.95, highest among all CD blocks in the district. (Government of India, 2011)

Table 2.1- Attributes of Palakkad district and Ottapalam Taluk (Government of India, 2011)

Attributes	**Palakkad District**		**Ottapalam Taluk**	
Sex ratio	Total	1067	Total	1102
	Rural	1068	Rural	1107
	Urban	1063	Urban	1089
Rural: Urban ratio	3:1		3:1	
Total population	2809934		930692	
Percentage of Decadal Growth 2001-2011	7.4		10.7	
Population density	626.94		1100.13	
Literacy rate	Total	89.3	Total	93.4
	Rural	88.3	Rural	93.1
	Urban	92.5	Urban	94.1

Three Grama panchayats out of the total eight were randomly selected from the block after which six wards out of the total were randomly selected from each Grama panchayat. Seven wards out of total thirty-six wards were randomly selected from the municipality for the study.

2.3 Study Population

The study population involved Type 2 Diabetes patients above 30 years who were diagnosed with diabetes for at least one year as well as Health care providers including Dieticians, Medical Officers, Staff nurses. Participants with end organ damage, severe disabilities or bedridden, pregnant women, non-consenting participants, transgenders, participants who were not able to give informed consent were excluded. Eight participants from each ward that were selected were included in the study.

2.4 Sample size estimation and justification

Sample size was calculated in 'Epi Info' version 7.2.5.0. With 95 percent confidence interval and 80 percent power, alpha of 5 percent, anticipated difference of 29.8 percent in the percentage of family nutritional support received for males and female (82.1 percent for males, 52.3 percent for females (Watanabe et al., 2010), the sample size calculated in Epi Info was 90 (50 women and 40 men, based on the sex ratio of Ottapalam Taluk from 2011 census). (Government of India, 2011) A design effect of two was multiplied which gave a sample size of 180. An additional 10 percent for non-response was also included which gave 198 as the sample size, which was rounded to 200. Final sample was selected based on the Rural: Urban and Male: Female ratio of population figures of Ottapalam Taluk in 2011 census- 110 women (80 rural, 30 urban) and 90 men (64 rural, 26 urban).

- Quantitative study: n = 198, rounded to 200
- Qualitative study: Diabetes Patients: n = eight-twelve

  Health care providers: n = eight-twelve

2.5 Sampling Procedure

The cross-sectional survey was conducted using multistage cluster sampling. The list of Panchayats and their respective wards were obtained from the Local Self Government website of the Government of Kerala. Out of eight Grama Panchayats in Ottapalam Block panchayat, three were selected randomly using computer-generated random numbers. Seven wards were randomly selected from the total of 36 from Ottapalam municipality, and six wards were selected from each randomly selected panchayat. Then, from the randomly selected wards, eight households were selected randomly.

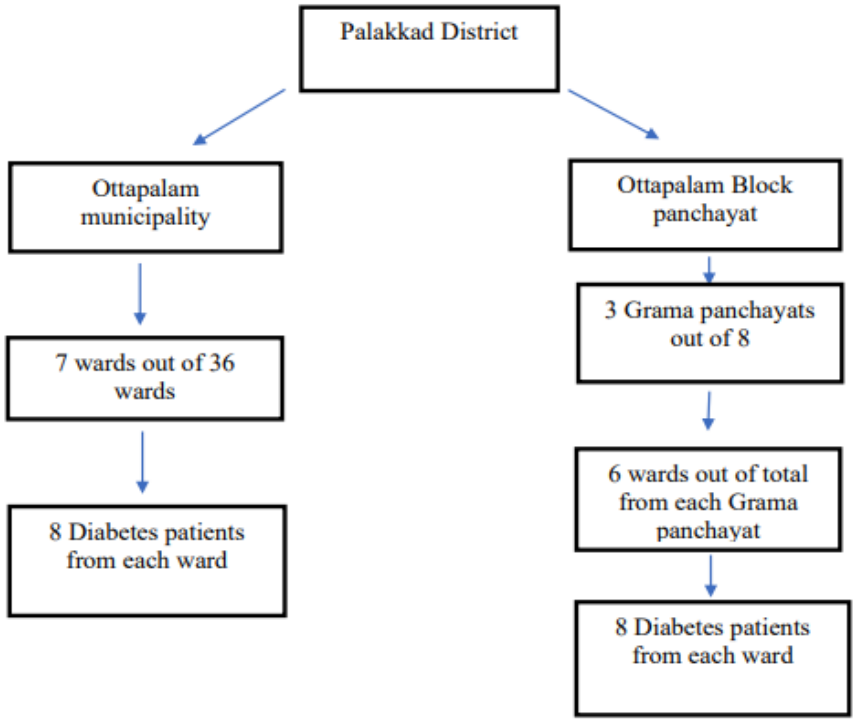

Figure 2.1: Process of sampling

The location was identified in each ward with the help of the ASHA workers of that particular ward, a suitable direction was found and the first household was selected using lottery method by picking a number from one to five. If the Principal Investigator (PI) found a male participant in the household, she started the study with him. In the absence of

a male participant, the PI went forward with the female participant. Every alternate house was visited until the required number of male and female participants from each cluster with Type 2 Diabetes Mellitus who were above 30 years of age were identified. If there were more than one eligible participant in the same household within the proposed age group, selection based on Kish selection grid was planned. After a pilot study in two clusters, this sampling strategy was revisited and simplified.

From the data obtained from the District Census Handbook of Palakkad for 2011 (Government of India, 2011) regarding the Rural and Urban population as well as Sex Ratio of Ottapalam Taluk, the number of females and males to be included from each cluster in urban and rural areas were calculated. Out of the six clusters (wards) randomly selected in Rural area, five females and three males were selected from three clusters and from the rest, four females and four males with Type 2 Diabetes who were above 30 years were selected randomly. (Table 2.2) Out of the seven clusters (wards) randomly selected in Urban area, from two clusters, five females and three males and from the rest, four females and four males with Type 2 Diabetes who were above 30 years were selected randomly. (Table 2.3)

Table 2.2- Sampling strategy –Within Cluster and Household in Rural areas

RURAL1	**Cluster 1**	**Cluster 2**	**Cluster 3**	**Cluster 4**	**Cluster 5**	**Cluster 6**	**TOTAL**
Females	5	5	4	4	4	5	**27**
Males	3	3	4	4	4	3	**21**
RURAL2	**Cluster 1**	**Cluster 2**	**Cluster 3**	**Cluster 4**	**Cluster 5**	**Cluster 6**	
Females	5	4	5	5	4	4	**27**
Males	3	4	3	3	4	4	**21**
RURAL3	**Cluster 1**	**Cluster 2**	**Cluster 3**	**Cluster 4**	**Cluster 5**	**Cluster 6**	
Females	4	4	5	4	5	4	**26**
Males	4	4	3	4	3	4	**22**
TOTAL							**144**

Table 2.3- Sampling strategy –Within Cluster and Household in Urban areas

URBAN	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6	Cluster 7	TOTAL
Females	4	4	4	5	5	4	4	**30**
Males	4	4	4	3	3	4	4	**26**
TOTAL								**56**

Purposive sampling was done for selecting participants from the provider side; the healthcare staff involved in delivering the services (Dieticians, Medical officers, Staff nurses) as well as from the diabetic participants for conducting in-depth interviews. Initial selection of participants from the provider side was based on the practice setting- NCD clinic in Sub divisional/District hospital; prominent private sector hospitals providing comprehensive diabetes specific care; and prominent providers identified from the study area. Further participant selection was based on snowball sampling, by requesting service providers to suggest their peers engaged in diabetes management.

2.6 Data Collection Process

Permissions were secured from the municipality and concerned panchayats. Ward members and ASHA workers were contacted for assistance in locating central locations and visiting houses. The PI independently conducted consenting and data collection. During every household visit, the purpose of the visit and the study was explained and asked whether there was any family member above 30 years of age with Type 2 Diabetes who have been diagnosed for at least one year at the house. After the confirmation of eligible participant in a household, the information sheet was explained. After clarifying their concerns and queries, they were asked to either sign the consent form or put thumb impression. Then only the interview was conducted.

The participants were interviewed based on a structured interview schedule and semi structured questionnaire (for in depth interviews) that was approved by the guide and the assigned reviewer. There was a checklist which the PI kept with herself during her visit at different households which comprised of serial number for each household, total number of males or females available in the household at the time of data collection, their diabetic status and selected participant for data collection. All participants were informed that they may be contacted again, if required. Participants were offered the option of completing the interviews in two sittings if they felt that the interview was long. 11 participants were approached for in depth interviews. Further details on the number of households visited, and participation in the survey are described in Table 2.4.

Table 2.4- Survey participation of Type 2 Diabetes Mellitus patients (>30 years)

Survey Participation	**N**
Number of households visited	**465**
Door locked	58
No diabetes patients present in the house	134
Patients unavailable at the time of survey	59
Patients not willing to consent	8
Bedridden patients	2
Only male diabetes patients available (when female was required)	1
Only female diabetes patients available (when male was required)	2
Incomplete information	1

Eight healthcare providers were contacted and data collection from them was done telephonically. Consent was taken from them by sending an electronic Pdf form of consent form and along with audio recording of the consent at the time of interview. The ICMR National Guidelines for Ethics Committees Reviewing Biomedical & Health Research During Covid-19 Pandemic (Thakur, 2020), which has recommendations for electronic consent through audio recording were followed when the interviews were conducted. Interviews were conducted in Malayalam prioritising the suitability of the interviewee.

2.7 Data collection instruments

Initial exploration was done to check for any standard tools available which could address the study objectives. So, the PI did a literature review using certain terms; (social support) AND (diabetes questionnaire), (diabetes self care questionnaire), (quality of life) AND (diabetes) AND (India). These searches in PubMed Central search engine led to identification of certain tools which had public access like The Diabetes Social Support Questionnaire-Family Version (DSSQ-Family), Personal Diabetes Questionnaire (PDQ), The summary of diabetes self-care activities measure (SDSCA), Quality of Life Instrument for Indian Diabetes patients (QOLID). Only one tool among these was developed in India (QOLID) and a modified version of SDSCA was used in Indian context. Hence, rather than selecting only tool and including all the questions in it for answering the study objectives, it was decided to incorporate only questions from two tools- DSSQ-Family and PDQ.

The other tools, even though were developed and used in Indian context, had questions which were not pertinent to the study context. For example, there were questions which asked for the choice a diabetic person has, in eating their meals away from home when there is a party or buffet or questions which asked for the consumption pattern of high fat

foods like red meat or full fat dairy products. Therefore, these tools were not considered for this study.

After the tool selection was done, initial selection of questions was done from both the questionnaires based on the relevance of the questions to the objectives of the study. The selected questions from both PDQ and DSSQ-Family were sent out to six experts for Face Validity. Out of six, four were from the field of Public Health and Research, one expert is a faculty member at AMCHSS, Trivandrum, one expert is a dietician at a prominent private sector hospital providing comprehensive diabetes specific care. They were asked to read the questions and check for the appropriateness of the questions in the context of Kerala (Palakkad). Quite a number of issues and concerns were raised by them like difficulties that would emerge while appropriately translating the questions as well the response options to Malayalam, grammatical errors and questions that lacked clarity which would be quite complex and perplexing for the participants to understand, issues with response options as few questions had a lot of response options and needed rework. There were also suggestions to split or add more questions as some questions were long and difficult to comprehend as well as to remove questions which seemed to be a repetition of other questions.

After taking into consideration all the expert comments and recommendations, a structured interview schedule was developed in English which was later translated to Malayalam. The survey was conducted using the translated version of the tool. The participants were interviewed, and their responses were recorded using Open Data Kit (ODK) platform. The different sections of the interview schedule are as follows:

Section 1- Participant and Sociodemographic details

This section details the participant's demographics, including age, sex, marital status, spouse's diabetic status, education level, living arrangements, house ownership, ration card colour, occupation, household expenditure, diabetes diagnosis duration, other illnesses, smoking and alcohol use, and digital device usage for managing diabetes.

Section 2- Health related Quality of life using EQ-5D-5L and the Visual Analog Scale

This section was used to assess the health-related quality of life; comprises of five dimensions- Mobility, Self-care, Usual activities, Pain/discomfort, Anxiety/depression (EuroQol Research Foundation, 2024). The Visual Analog Scale is used as a quantitative measure of health as judged by the individual respondent. Permission to use the EQ-5D-5L was obtained prior to the study (See Annexure 5).

Section 3- Perceived Blood glucose control

Satisfaction with their overall blood glucose levels, frequency and means of testing their blood glucose levels and the availability of test reports was recorded in this section.

Section 4- Diet

This section asked for information related to the intake of fruits and vegetables and inclusion of the same and their quantity in the daily diet of the participants.

Section 5- Weight change and Diet change readiness

Details regarding weight loss and meal plan were recorded in this section.

Section 6- Diet knowledge and skills

In this section, participant's diet knowledge and skills were assessed to know about their practices of skipping meals or snacks and taking small portion sizes to cut calories, sugar or fat.

Section 7- Eating Problems

Problems related to overeating and consumption of unplanned snacks were recorded in this section.

Section 8- Diet Barriers

Barriers in following the prescribed diet due to family/friends not being supportive, difficulties faced when away from home, financial issues, festivals/religious events were assessed in this section.

Section 9- Medication use

Details regarding the current treatment and the medications (oral and insulin injections) taken for managing the diabetes were recorded in this section.

Section 10- Medication Barriers

This section covered the barriers and difficulties faced by those who take medications for managing their diabetes.

Section 11- Family Nutrition Support

Questions included in this section were to identify if there was a person who supports the diet therapy of the participant, if yes, how did they support and what the participant felt about the support received.

In-depth interview guidelines for Type 2 Diabetes patients were developed to qualitatively explore and collect data on the diabetes journey of the participant, including their diagnosis, advices received, change in food intake after diagnosis of the participant as well as the family members. Questions were also framed to know about the decision-making power, access to health-related information, financial independence, hindering factors for following their diet and also to assess whether there exists a gendered difference in the roles and responsibilities of men and women and the support they received to follow the dietary advice and to understand their school of thought in regard to this matter and the changes which they would like to see in relation to their diet.

In-depth interview guidelines for Healthcare providers were developed to get an idea on the current guidelines in Kerala for managing hyperglycaemia, their take on dietary advices, also asking them to share a few experiences and encounters with dietary prescriptions, their idea on the existence of gendered differences in the roles and responsibilities of their patients and the family support received for following their advice and the changes they wish to see so that patients are able to modify their diet as required.

2.8 Data entry and analysis

The data was entered into the Open Data Kit (ODK) platform, downloaded into Microsoft Excel, and was analysed using IBM SPSS Statistics-25 for Windows. Univariate analysis was used to summarise the variables. The independent variables were subjected to bivariate analysis using the Chi-square test and significant variables were included for logistic regression analysis.

All qualitative interviews were transcribed verbatim into English. A thematic analysis was undertaken for patient transcripts. Inductive coding was done starting with open coding,

axial coding and then formation of themes. Framework analysis was undertaken for provider transcripts and themes were formed. (Ritchie J and Lewis J, 2003)

2.9 Outcome variable

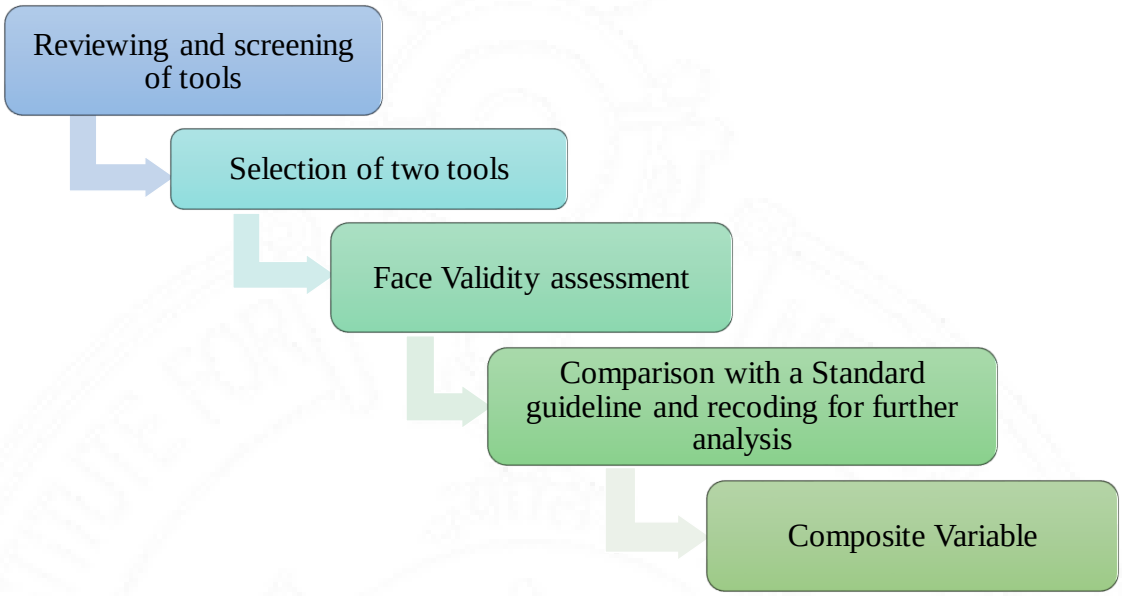

Figure 2.2: Process of creation of the composite outcome variable for the study

The variables were compared with the Standards of Care in Diabetes—2023 Abridged for Primary Care Providers (American Diabetes Association, 2022) by the American Diabetes Association, focusing on evidence-based recommendations relevant to primary care. Feasible recommendations from this source were incorporated, and the variables in the interview schedule were subsequently recoded based on the responses to the questions. This process facilitated the creation of a Composite Outcome variable, '**Dietary modification for glycaemic control**' which encompassed two broad domains: CORE DIETARY MODIFICATION and COMPLEMENTING BEHAVIOURAL MODIFICATION. Optimal Dietary modification for glycaemic control was considered as the outcome variable for this study.

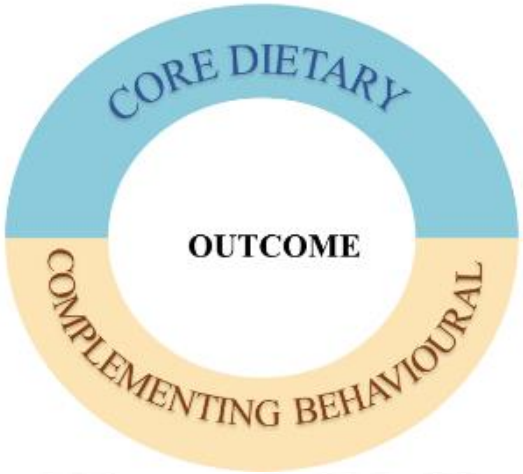

Figure 2.3: Components of Outcome Variable

2.10 Data safety and monitoring

Confidentiality was maintained throughout the process and none other than the PI and the guide had access to identifiable information. Utmost care was taken to maintain adequate privacy while collecting data. Data collection was conducted in private spaces, affording them the necessary privacy to communicate freely. The collected data is stored confidentially under the custody of the PI within an Excel file in a password-protected system. Deidentified data is encrypted and will be stored for at least three years as per ICMR guidelines under password protection.

2.11 Ethical considerations

The Institutional Ethics Committee of Sree Chitra Tirunal Institute for Medical Sciences and Technology, Thiruvananthapuram, Kerala had reviewed the study and gave clearance to conduct the study (SCT/IEC/2158/DECEMBER/2023) (See Annexure 6). Permissions were secured from the respective panchayats and municipalities well in advance (See Annexure 4). Participation was completely voluntary and participants were allowed to withdraw their participation at any point without furnishing a reason. The study's aims,

possible advantages and risks were explained. The interview was conducted only after obtaining informed consent from the participants. The participant's identity and personal information were kept confidential.

CHAPTER 3

RESULTS

This chapter briefly describes the findings of the study in line with the objectives. To achieve the sample size of 200, a total of 465 households were visited. The initial part of this chapter deals with sociodemographic details of the study participants, Health and disease condition related characteristics (health-related quality of life, perceived blood glucose control, diet, weight change and diet change readiness, diet knowledge and skills, eating problems, diet barriers, medication use, medication barriers) and family support. The second part of this chapter deals with the results from the qualitative in-depth interviews of the patients and health care providers.

3.1 Results from Cross sectional survey

3.1.1 General characteristics of study participants

The mean age of the study participants was 59.45 ± 11.8 years with the median age of 59.5 years. The mean age of females was 56.53 ± 10.98 years and that of males was 63.03 ± 12.01. Among the male participants, almost 95 percent were married. Around 60 percent of the participants were Hindus. Almost half the number of participants had highest education level upto secondary school. There were mainly five categories of work that were reported which the participants mainly did and they were divided accordingly. To assess the influence of work on dietary management for glycaemic control, it was further categorised into those who are working and those who are not working (Homemakers, Unemployed and retired). Almost 75 percent of participants were not employed in any form.

Seventy-three participants (36.5 percent) of participants owned pink colour ration cards. Around 96 percent of participants resided in their own houses. Participants were categorised into two according to the ownership of their house. Almost 35 percent of participants resided in houses which were owned by either females or both males and females. The median amount of the approximate household expenditure in the last month was Rs 10,000.

Table 3.1- Sociodemographic details of the participants

Variables	Males (n=90)	Females (n=110)	Total (n=200)
Age groups, n (%)			
<60	33 (36.7)	67 (60.9)	100 (50.0)
≥60	57 (63.3)	43 (39.1)	100 (50.0)
Marital status			
Single	1 (1.1)	3 (2.7)	4 (2)
Married	85 (94.4)	70 (63.6)	155 (77.5)
Divorced/Separated	0 (0)	4 (3.6)	4 (2)
Widowed	4 (4.4)	33 (30.0)	37 (18.5)
Religion			
Hindu	56 (62.2)	63 (57.3)	119 (59.5)
Muslim	33 (36.7)	46 (41.8)	79 (39.5)
Christian	1 (1.1)	1 (0.9)	2 (1.0)
Type of family			
Nuclear	45 (50.0)	54 (49.1)	99 (49.5)
Joint	1 (1.1)	2 (1.8)	3 (1.5)
Extended	44 (48.9)	54 (49.1)	98 (49.0)

Table continued…

Variables	Males (n=90)	Females (n=110)	Total (n=200)
Highest Education level completed			
No formal education	1 (1.1)	2 (1.8)	3 (1.5)
Upto Primary school	30 (33.3)	36 (32.7)	66 (33.0)
Upto Secondary school	39 (43.3)	53 (48.2)	92 (46.0)
Higher secondary/ Certificate/Diploma	12 (13.3)	12 (10.9)	24 (12.0)
Degree and above	8 (8.9)	7 (6.4)	15 (7.5)
Main kind of work			
Homemaker	0 (0)	87 (79.1)	87 (43.5)
Unemployed	38 (42.2)	10 (9.1)	48 (24.0)
Employed- non regular	14 (15.6)	3 (2.7)	17 (8.5)
Employed- regular	28 (31.1)	8 (7.3)	36 (18.0)
Retired	10 (11.1)	2 (1.8)	12 (6.0)
Colour of ration card			
Yellow	2 (2.2)	5 (4.5)	7 (3.5)
Pink	30 (33.3)	43 (39.1)	73 (36.5)
Blue	27 (30.0)	26 (23.6)	53 (26.5)
White	31 (34.4)	31 (28.2)	62 (31.0)
No ration card	0 (0)	5 (4.5)	5 (2.5)
Current housing situation			
Own house	87 (96.7)	104 (94.5)	191 (95.5)
Rented house	3 (3.3)	5 (4.5)	8 (4.0)
Others	0 (0)	1 (0.9)	1 (0.5)

Table continued…

Variables	Males (n=90)	Females (n=110)	Total (n=200)
Ownership of house			
Male member/ Don't know	69 (76.7)	64 (58.2)	133 (66.5)
Female member/ Both	21 (23.3)	46 (41.8)	67 (33.5)
Approximate Household expenditure in the last one month			
< 10000	20 (22.2)	25 (22.7)	45 (22.5)
≥ 10000	70 (77.8)	85 (77.3)	155 (77.5)

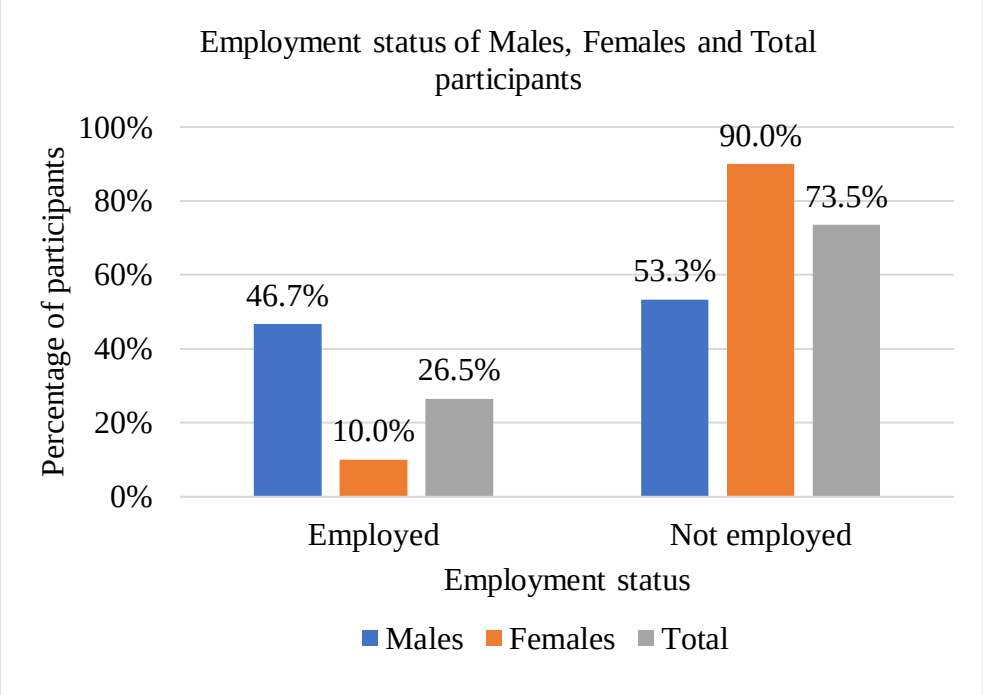

Figure 3.1: Employment status of participants across sex

3.1.2 General health related characteristics

Seventy percent of the participants reported having other illness like hypertension, dyslipidaemia etc in addition to diabetes. Only six percent reported to be current tobacco

users (smoke/smokeless) who were males. Around five percent (nine males) were current alcohol users (those who had consumed alcohol in the last one month).

The variables under health-related quality of life which was measured using EQ-5D-5L was converted to Utility scores as per EQ-5D-5L India Tariffs. The mean utility score obtained was 0.8473, the median was 0.8990 and the scores ranged from -0.02 to 1.0. On grouping the participants according to median score, it was observed that males had a higher quality of life (56.7 percent) as compared to females (35.5 percent). The self-reported health as reported by the participants according to the EQ-5D Visual analog scale showed a mean value of 64.33 ± 15.92. (Median- 65.0)

Table 3.2- General health related characteristics of the participants

Variables	Males (n=90)	Females (n=110)	Total (n=200)
Presence of other illness, n (%)			
No	30 (33.3)	30 (27.3)	60 (30.0)
Yes	60 (66.7)	80 (72.7)	140 (70.0)
Current tobacco users (smoke/smokeless)			
No	78 (86.7)	110 (100.0)	188 (94.0)
Yes	12 (0)	0 (0)	12 (6.0)
Current alcohol users			
No	81 (90.0)	110 (100.0)	191 (95.5)
Yes	9 (10.0)	0 (0)	9 (4.5)

Table continued…

Health related Quality of life			
< 0.8990	39 (43.3)	71 (64.5)	110 (55.0)
≥ 0.8990	51 (56.7)	39 (35.5)	90 (45.0)

3.1.3 Disease condition related characteristics

The median of the duration diagnosed as diabetic for the participants was 10 years. This information was based on records provided by 16 percent of the participants. None of the participants reported using any digital device/application to help them manage their diabetes.

Table 3.3- Disease condition related characteristics of participants

Variables	Males (n=90)	Females (n=110)	Total (n=200)
Duration of diagnosis, n (%)			
<10 years	34 (37.8)	55 (50.0)	89 (44.5)
≥10 years	56 (62.2)	55 (50.0)	111 (55.5)

3.1.3.1 Perceived Blood glucose control

Sixty five percent of participants reported that they had excellent/good control of their blood glucose levels when asked about their satisfaction with their overall blood glucose control. In order to understand their knowledge of treatment goals (regarding recommended blood glucose levels), participants were asked to tell what they meant by blood glucose control.

The reported answers were grouped into those who did not know the recommended levels and those who thought it was below 200 mg/dL and it was observed that almost 30 percent of participants did not know the recommended blood glucose levels. The usual method adopted by participants for testing their blood sugar levels in the last one year is depicted in Figure 3.2.

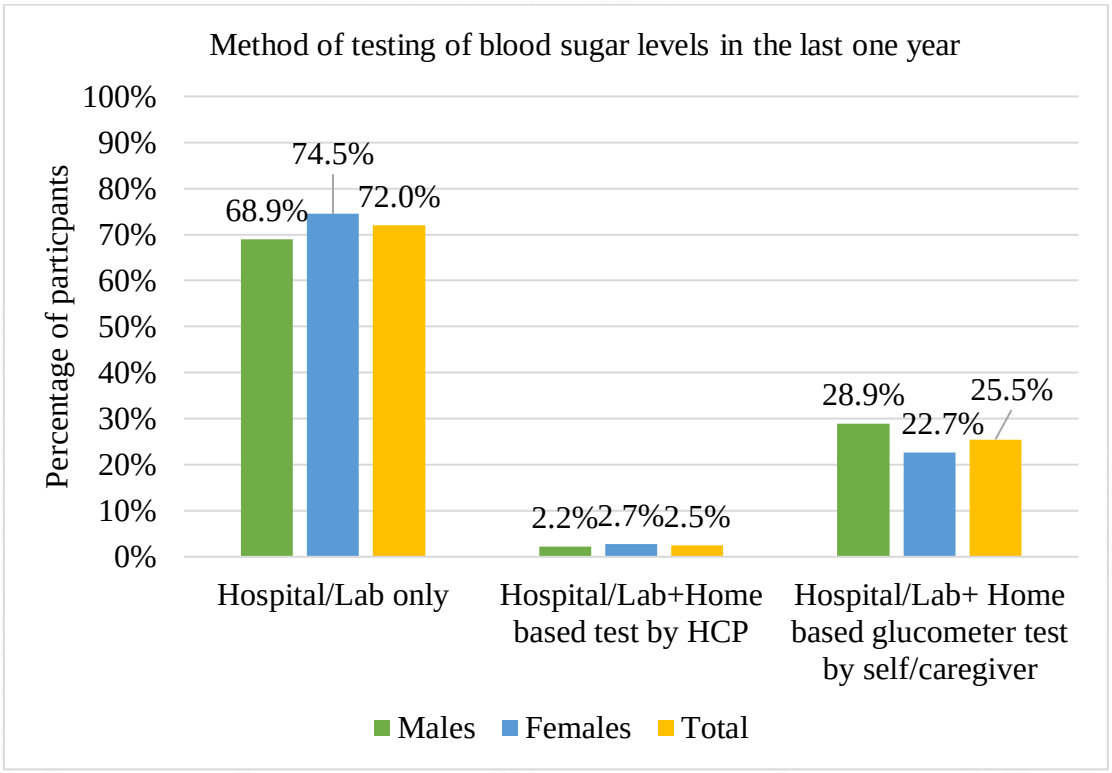

Figure 3.2: Usual method adopted by participants to test their blood sugar levels in the past one year across sex and total participants (*HCP- Health care Provider)

Almost 40 percent of participants reported that they tested their blood sugar once or more than one time per month in the last one year which was used to measure their knowledge of blood glucose testing. A little more than half of the participants had got their blood sugar levels checked and follow up done within the last six months. From the reports of the recent blood sugar levels and recent HbA1c levels, which were held by 54 percent and 10

percent of participants respectively, it was calculated that only 26 percent had their blood sugar levels or HbA1c levels under control.

Table 3.4- Perceived Blood glucose control of participants

Variables	Males (n=90)	Females (n=110)	Total (n=200)
Satisfaction with overall blood glucose control, n (%)			
Some problems/very poor control	26 (28.9)	44 (40.0)	70 (35.0)
Excellent/good control	64 (71.1)	66 (60.0)	130 (65.0)
Knowledge of treatment goals			
Don't know	28 (31.1)	31 (28.2)	59 (29.5)
Below 200 mg/dL	62 (68.9)	79 (71.8)	141 (70.5)
Knowledge of Blood glucose testing			
Occasionally as needed	58 (64.4)	69 (62.7)	127 (63.5)
Once/more than once a month	32 (35.6)	41 (37.3)	73 (36.5)
Follow up in the last 6 months			
Follow up not done	49 (54.4)	45 (40.9)	94 (47.0)
Follow up done	41 (45.6)	65 (59.1)	106 (53.0)
Glycaemic control			
No/Don't know	67 (74.4)	81 (73.6)	148 (74.0)
Yes	23 (25.6)	29 (26.4)	52 (26.0)

3.1.3.2 Diet

The intake of fruits and vegetables were assessed on the basis of the number of days participants consume fruits and vegetables and the results have been demonstrated in the Table 3.5

Table 3.5- Fruits and vegetables intake of participants

Food item	Don't know	1 day	2 days	3 days	4 days	5 days	6 days	7 days
Fruits	1.5	20.5	10.5	20.0	10.5	9.0	1.5	26.5
Vegetables	1.0	0	0	5.5	2.5	6.5	3.0	81.5

Only two percent of participants included green leafy vegetables in their daily diet and among them only 1.5 percent had two handful at least. Almost 83 percent of the participants included other vegetables (excluding potato and tubers) in cooked/chopped/raw form and among them 80 percent had one handful at least. Majority of the participants (97.5 percent) did not include vegetable juice (bitter gourd/cucumber/carrot/ash gourd) in their daily diet. Almost 30 percent of the participants included fresh fruits like mango, banana, papaya, orange, grapes, apple, jackfruit in their daily diet and among them 25 percent of participants had at least one medium size piece. Optimal intake of nutrient dense food was reported by 21.5 percent of participants which was assessed by grouping the quantity of intake of other vegetables and fresh fruits in the daily diet of participants and the details have been reported in the Table 3.6. None of the participants included chopped/cooked/canned fruits or fruit juices in their daily diet.

Table 3.6- Intake of nutrient dense food of participants

Variables	Males (n=90)	Females (n=110)	Total (n=200)
Intake of nutrient dense food, n (%)			
Suboptimal	64 (71.1)	93 (84.5)	157 (78.5)
Optimal	26 (28.9)	17 (15.5)	43 (21.5)

3.1.3.3 Weight change and diet change readiness

A little more than half of the participants had optimal weight control who were trying to lose weight or keep from gaining weight. Forty four percent of participants reported to have experienced weight loss without trying. Thirty six percent of participants had a meal plan which they were trying to follow. Nearly 85 percent of participants were either having a meal plan which they were trying to follow or they were not following a meal plan but were conscious of how food affects their blood sugar and were trying to make some changes. Among those who were not following a meal plan (128 participants), 89 participants (44.5 percent) reported that they were not prescribed a meal plan and others cited various reasons for not following a meal plan, even after prescribed, as demonstrated in the flowchart. Around 30 percent of the participants were prescribed meal plan by a health care provider.

Table 3.7- Weight change and diet change readiness of participants

Variables	Males (n=90)	Females (n=110)	Total (n=200)
Currently trying to lose weight, n (%)			
Suboptimal	32 (35.6)	59 (53.6)	91 (45.5)
Optimal	58 (64.4)	51 (46.4)	109 (54.5)
Weight loss without trying			
No/don't know	59 (65.6)	53 (48.2)	112 (56.0)
Yes	31 (34.4)	57 (51.8)	88 (44.0)
Following a meal plan			
Yes, have a plan and trying to follow	26 (28.9)	46 (41.8)	72 (36.0)
No, not following, but conscious	48 (53.3)	47 (42.7)	95 (47.5)
No, continue the usual way	16 (17.8)	17 (15.5)	33(16.5)
Individualised Meal Plan			
Suboptimal	16 (17.8)	17 (15.5)	33 (16.5)
Optimal	74 (82.2)	93 (84.5)	167 (83.5)
Who prescribed the meal plan			
Not prescribed a meal plan	64 (71.1)	64 (58.2)	128 (64.0)
Family member/Friends/social media/others	5 (5.6)	13 (11.8)	18 (9.0)
Health care provider	21 (23.3)	33 (30.0)	54 (27.0)

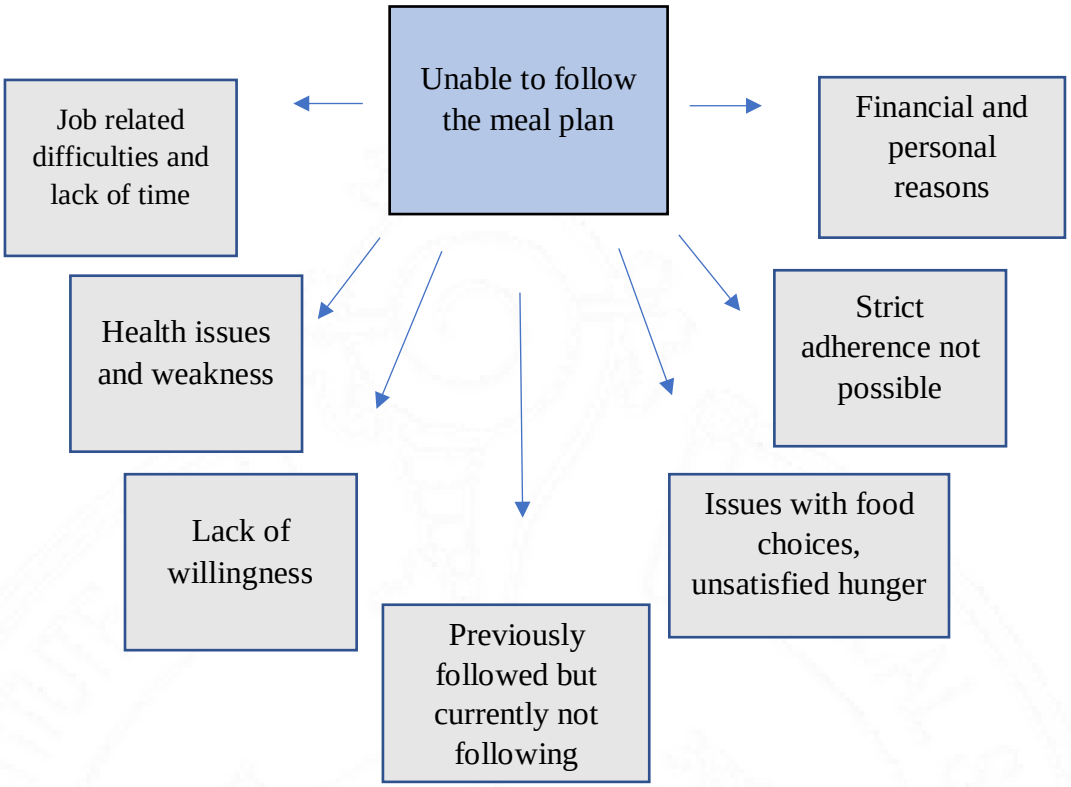

Figure 3.3: Flow chart showing the reasons reported by participants for not being able to follow a meal plan prescribed by a health care provider

3.1.3.4 Diet Knowledge and skills

Only five percent of participants deliberately skipped a meal once or more than once a month to cut calories or fat but almost 83 percent of participants deliberately skipped a snack to cut calories or fat during the past three months. Deliberately taking small portion sizes to cut calories, sugar or fat during the past three months was reported by majority of the participants (91.5 percent). Less than half of the participants (44.5 percent) reported resisting the temptation to eat a food they want once or more than once a month because it was too high in fat, sugar or calories during the past three months. All the four variables were added to create a new variable which described multiple measures adopted for calorie

restriction by participants. Scores were added and grouped into two categories- Suboptimal and optimal. Optimal calorie restriction measures were practised by 40 percent of the participants. The distribution of the same across sex has been demonstrated in Figure 3.4.

Table 3.8- Distribution of Diet Knowledge and skills of participants across sex

Variables	Males (n=90)	Females (n=110)	Total (n=200)
Deliberately skip a meal to cut calories or fat, n (%)			
Never	89 (98.9)	101 (91.8)	190 (95.0)
Once a month or more	1 (1.1)	9 (8.2)	10 (5.0)
Deliberately skip a snack to cut calories or fat			
Never	17 (18.9)	18 (16.4)	35 (17.5)
Once a month or more	73 (81.1)	92 (83.6)	165 (82.5)
Deliberately take small portion sizes to cut calories, sugar or fat			
Never	10 (11.1)	7 (6.4)	17 (8.5)
Once a month or more	80 (88.9)	103 (93.6)	183 (91.5)
Resist temptation to eat a food as it is too high in fat, sugar or calories			
Never	54 (60.0)	57 (51.8)	111 (55.5)
Once a month or more	36 (40.0)	53 (48.2)	89 (44.5)

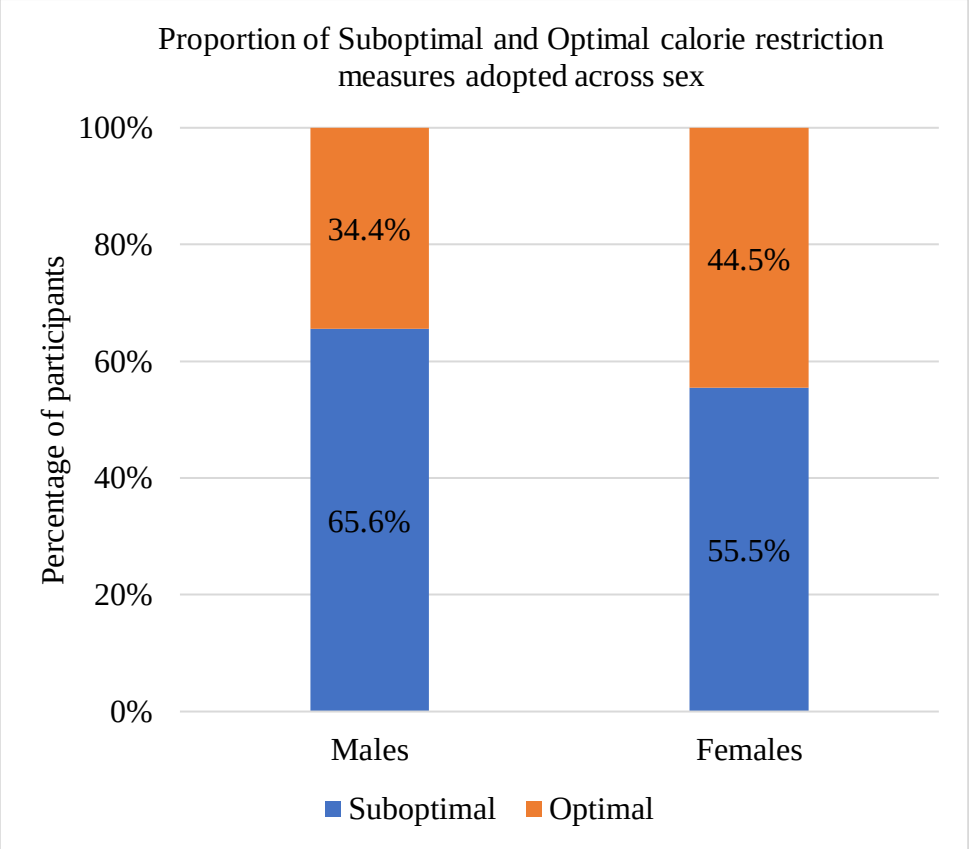

Figure 3.4: Calorie restriction measures adopted by participants to during the past three months across sex

3.1.3.5 Eating Problems

Almost 70 percent of participants reported to have not overeaten during the past three months. Eighty percent of participants reported to have not eaten unplanned snacks or made unhealthy food choices during the past three months. The two variables were combined to describe the practices of preventing disordered eating and was grouped into two- Suboptimal and Optimal practices of preventing disordered eating. The distribution of the same has been depicted in Figure 3.5.

Table 3.9- Distribution of Eating problems of participants across sex

Variables	Males (n=90)	Females (n=110)	Total (n=200)
Frequency of overeating, n (%)			
Never	58 (64.4)	77 (70.0)	135 (67.5)
Once a month or more	32 (35.6)	33 (30.0)	65 (32.5)
Frequency of eating unplanned snacks/making unhealthy food choices			
Never	73 (81.1)	87 (79.1)	160 (80.0)
Once a month or more	17 (18.9)	23 (20.9)	40 (20.0)

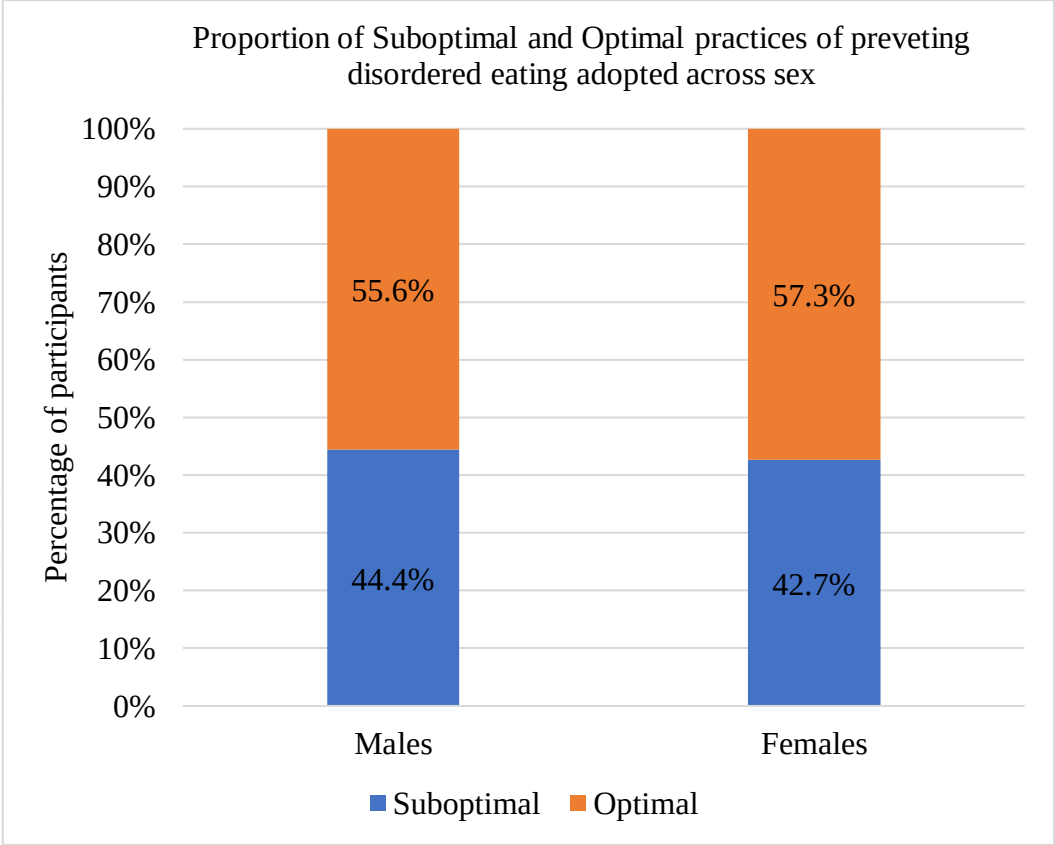

Figure 3.5: Practices of preventing disordered eating adopted by participants to during the past three months across sex

3.1.3.6 Diet Barriers

Majority of the participants (94.5 percent) reported that they never experienced eating problems because family tempted or were not supportive of their efforts to eat right during the past three months.

Forty percent of the participants reported to have had the tendency occasionally/often/always to reduce their control over what they ate during special occasions like festivals. Almost 65 percent of the participants did not find or rarely found it difficult to follow their dietary advice during festivals or other religious events. Other diet barriers like eating away from home, being too busy or food being expensive were also rarely reported. Proportions pertaining to these variables are reported in Table S.1 (See Annexure 1)

3.1.3.7 Medication Use

Almost 93 percent of participants reported following Allopathy treatment for their diabetes management, followed by Indian System of medicine (3.5 percent). Only 37.5 percent of the participants opted for Government/public hospital (including Health Sub Centre/Primary Health Centre/Community Health Centre) for their regular diabetes treatment.

Almost 93 percent of the participants were prescribed medications for their diabetes by their doctor and among them 57.5 percent took Oral hypoglycaemic agents and 1.5 percent took complementary and alternative medicines. Forty participants (20 percent) were prescribed insulin shots for their diabetes. Nearly 70 percent and 15 percent of the participants were supposed to take these medicines and insulin twice a day respectively. The actual frequency of taking medications and insulin by the participants were grouped

together as Medication behaviour of the participants and the details are given in Table 3.10. Almost 85 percent of the participants showed a positive medication behaviour by either taking both medicine and insulin as prescribed by never missing or missing them couple times a month or less.

Table 3.10- Distribution of Medication use of participants across sex

Variables	Males (n=90)	Females (n=110)	Total (n=200)
Actual frequency of taking medicines, n (%)			
Miss a dose once a week or more/almost every day/never take/not prescribed	13 (14.4)	17 (15.5)	30 (15.0)
Do not take/never miss a dose/miss dose once or couple times a month or less	77 (85.6)	93 (84.5)	170 (85.0)
Actual frequency of taking insulin			
Never take/miss a shot once a week or more/almost every day	2(2.2)	2(1.8)	4 (2.0)
Not prescribed/never miss a shot/miss once or couple times a month or less	88 (97.8)	108 (98.2)	196 (98.0)
Medication behaviour			
Suboptimal	14 (15.6)	19 (17.3)	33 (17.5)
Optimal	76 (84.4)	91 (82.7)	167 (83.5)

3.1.3.8 Medication Barriers

Among those prescribed with medications, participants reported having faced barriers in taking medications when away from home (on vacation, business trips, restaurants) during the past three months and the details have been demonstrated in Table S.2 (See Annexure 1). Financial barriers were reported by 2.5 percent of the participants for not taking the prescribed medicines and insulin. Nearly two percent of participants reported self-management of medication as a reason for missing their medications.

3.1.4 Family Support

Nearly 26 percent of the participants' spouse was diabetic. Any person to support or advise diabetic diet therapy was available to 39 percent of the participants. Among those who had someone to support or advise (78 participants), spousal support was reported by 26 percent of the participants.

Table 3.11- Distribution of family support of participants across sex

Variables	Males (n=90)	Females (n=110)	Total (n=200)
Spouse Diabetic			
No	67 (74.4)	82 (74.5)	149 (74.5)
Yes	23 (25.6)	28 (25.5)	51 (25.5)
Any person to support/advise diabetic diet therapy, n (%)			
No	54 (60.0)	68 (61.8)	122 (61.0)
Yes	36 (40.0)	42 (38.2)	78 (39. 0)

Table continued…

Variables	Males (n=90)	Females (n=110)	Total (n=200)
Supporting person			
Spouse	33 (36.7)	19 (17.3)	52 (26.0)
Family member-male	1 (1.1)	11 (10.0)	12 (6.0)
Family member- female	2 (2.2)	12 (10.9)	14 (7.0)

3.1.5 Distribution of components of the outcome variable- Dietary Management for glycaemic control

The proportion of **males** who practiced an optimal core dietary modification for the purpose of glycaemic control was **34.4 percent** (**95% CI: 25.5 – 45.0**). The proportion of **females** who practiced an optimal core dietary modification for the purpose of glycaemic control was **27.3 percent** (**95% CI: 20.0 – 36.3**).

Table 3.12- Distribution of components of Core dietary modification across sex

Variables Core Dietary modifications	Males (n=90)	Females (n=110)	Total (n=200)	p value
Individualised Meal Plan, n (%)				
No	16 (17.8)	17 (15.5)	33 (16.5)	0.660
Yes	74 (82.2)	93 (84.5)	167 (83.5)	
Calorie Restriction measures				
Suboptimal	59 (65.6)	61 (55.5)	120 (60.0)	0.147

Table continued…

Variables	Males (n=90)	Females (n=110)	Total (n=200)	p value
Core Dietary modifications				
Optimal	31 (34.4)	49 (44.5)	80 (40.0)	
Intake of nutrient dense food				
Suboptimal	64 (71.1)	93 (84.5)	157 (78.5)	0.021
Optimal	26 (28.9)	17 (15.5)	43 (21.5)	
Prevent Disordered eating practices				
Suboptimal	40 (44.4)	47 (42.7)	87 (43.5)	0.807
Optimal	50 (55.6)	63 (57.3)	113 (56.5)	

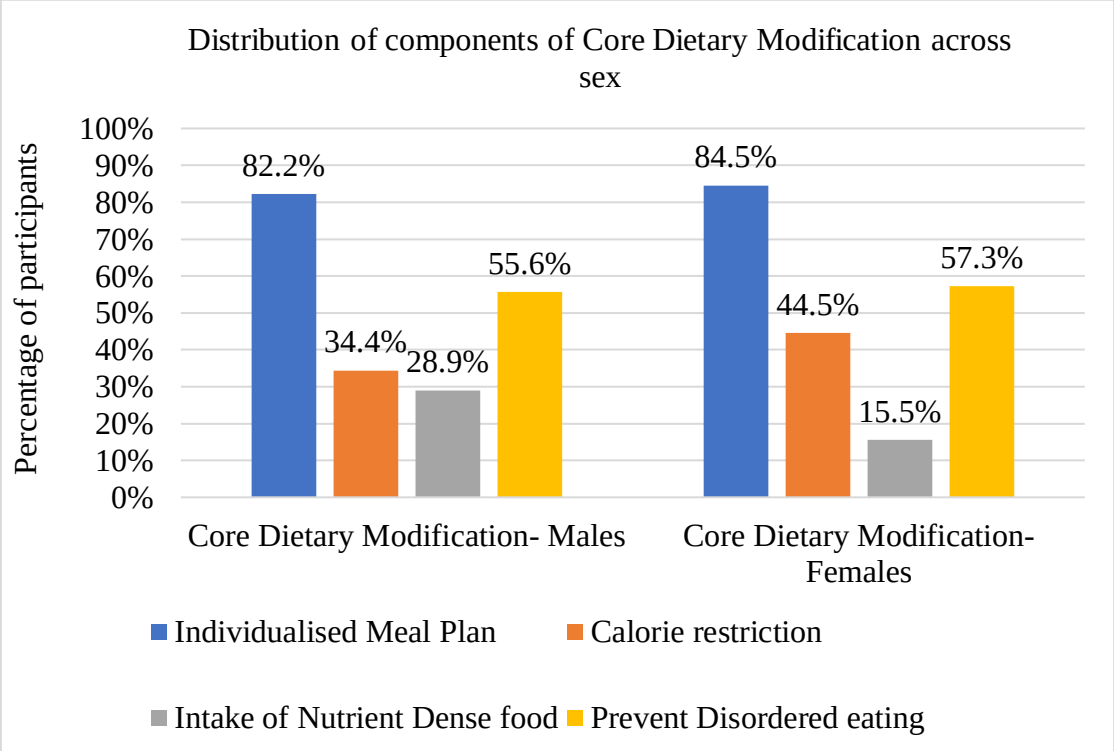

Figure 3.6: Distribution of components of Core Dietary Modification across sex

Table 3.13- Distribution of components of complementing behavioural modification across sex

Variables	Males (n=90)	Females (n=110)	Total (n=200)	p value
Complementing behavioural modifications				
Weight Control, n (%)				
Suboptimal	32 (35.6)	59 (53.6)	91 (45.5)	0.011
Optimal	58 (64.4)	51 (46.4)	109 (54.5)	
Medication behaviour				
Suboptimal	14 (15.6)	19 (17.3)	33 (17.5)	0.745
Optimal	76 (84.4)	91 (82.7)	167 (83.5)	
Knowledge of blood glucose testing				
Suboptimal	58 (64.4)	69 (62.7)	127 (63.5)	0.802
Optimal	32 (35.6)	41 (37.3)	73 (36.5)	
Knowledge of treatment goals				
Suboptimal	28 (31.1)	31 (28.2)	59 (29.5)	0.651
Optimal	62 (68.9)	79 (71.8)	141 (70.5)	

The proportion of **males** who practiced an optimal complementing behavioural modification for the purpose of glycaemic control was **50.0 percent (95% CI: 39.5 – 59.6)**. The proportion of **females** who practiced an optimal complementing behavioural modification for the purpose of glycaemic control was **44.5 percent (95% CI: 35.6 – 54.0)**. This has been demonstrated in the Figure 3.7

The proportion of **males** who practiced the final outcome which is Dietary Management for glycaemic control was **21.1 percent (95% CI: 14.0 – 31.0)**. The proportion of **females** who practiced who practiced the final outcome was **12.7 percent (95% CI: 7.7 – 20.2)**. [p value - 0.112]

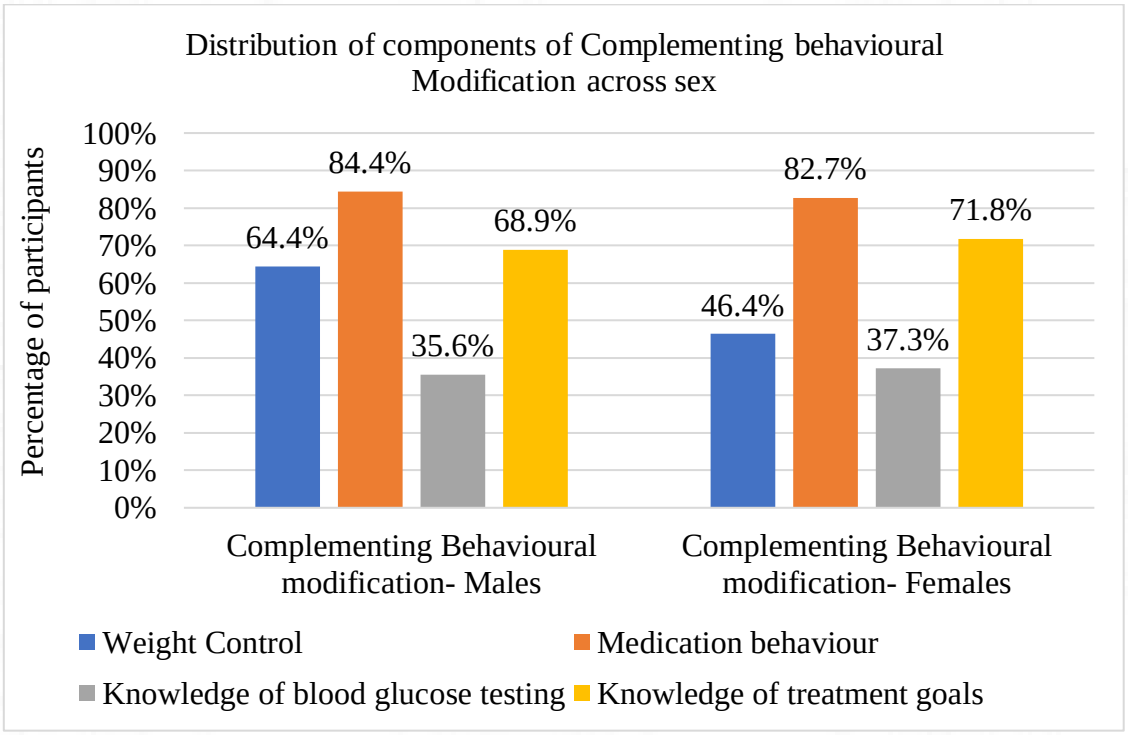

Figure 3.7: Distribution of components of Complementing behavioural Modification across sex

3.1.6 Distribution of participants according to their Socio-economic status, who practised optimal core dietary behaviour, Complementing behavioural modifications as well as dietary modification for glycaemic control across sex

Even though no observed difference in the core dietary modification as well as complementing behavioural modification among males of the two socioeconomic strata, core dietary modification was calculated to be better among females of lower socioeconomic strata as compared to females in the higher socioeconomic strata but vice versa in the complementing behavioural modification. The proportion of males and females who belonged to the higher socioeconomic strata had better Dietary modification for glycaemic control.

Table 3.14- Distribution of participants according to their Socio-economic status, who practised optimal core dietary behaviour, complementing behavioural modifications as well as dietary modification for glycaemic control across sex

Category	N	Core diet n (%)	Complementing Behaviour n (%)	Dietary modification for glycaemic control n (%)
Non-Poor Male	58	20 (34.5)	29 (50.0)	14 (24.1)
Poor Male	32	11 (34.4)	16 (50.0)	5 (15.6)
Non-Poor Female	62	14 (22.6)	34 (54.8)	9 (14.5)
Poor Female	48	16 (33.3)	15 (31.2)	5 (10.4)
Total	**200**	**61 (30.5)**	**94 (47.0)**	**33 (16.5)**

3.1.7 Association between Quality of life and Dietary modification for glycaemic control

Optimal Quality of life (QoL) was observed among males who practiced Optimal Dietary modification for glycaemic control as compared to those who did not. There was not much difference in the quality of life observed among females who practiced Dietary modification for glycaemic control and those who did not.

Table 3.15- Quality of life and dietary modification for glycaemic control across sex

Dietary modification for glycaemic control		QoL above median (%)	Total (n)
Males	**Suboptimal**	38 (53.5)	71
	Optimal	13 (68.4)	19
	Total	51 (56.7)	90
Females	**Suboptimal**	34 (35.4)	96
	Optimal	5 (35.7)	14
	Total	39 (35.5)	110

3.1.8 Association between Control of blood glucose levels and Dietary modification for glycaemic control

Control of blood glucose levels was observed to be better among males (57.9 percent) and females (42.9 percent) who practiced optimal Dietary modification for glycaemic control when compared to those who did not.

Table 3.16- Blood glucose control and dietary modification for glycaemic control across sex

Dietary modification for glycaemic control		Control n (%)	Total (n)	p value
Males	**Suboptimal**	12 (16.9)	71	< 0.001
	Optimal	11 **(57.9)**	19	
	Total	23 (25.6)	90	
Females	**Suboptimal**	23 (24.0)	96	0.191
	Optimal	6 **(42.9)**	14	
	Total	29 (26.4)	110	

3.1.9 Association between Family support for dietary modification and Optimal Core Dietary modification

No statistically significant association (p value- 0.131) was obtained between family support and optimal core dietary modification. Among those who had family support, optimal core dietary modification was practiced by 24.4 percent of participants.

Table 3.17- Family support for Optimal Core Dietary modification

Family Support n (%)	Core Dietary modification		Total (n)
	Suboptimal	Optimal	
No	80 (65.6)	42 (34.4)	122

Table continued…

Yes	59 (75.6)	19 (24.4)	78
Total	139 (69.5)	61 (30.5)	200

Family nutrition support was assessed by 12 questions among those who reported the availability of a person who supports or advises their diabetic diet therapy. The response options were grouped into those who received support less frequently and those who received support either once a day or several times a week. The details of different family support variables among males and females who practiced optimal core dietary modification are given in Table S.3 (See Annexure 1). In general, family support variables were better for males as compared to females. Support in the form of Encouraging to eat the right foods, Joining in eating the same foods, Eating at the same time, Praising or showing their appreciation for following diet and Telling not to eat something that should not be eaten were significantly different among females who practised and those who did not practice Optimal Core Dietary modification.

3.1.10 Perception of the support received from family for dietary management

Among those who reported to have received support or advise for diabetic diet therapy, 49 participants (24.5 percent) reported that they appreciate their support and follow their advice, 27 (13.5 percent) reported that they just appreciate their support but do not always follow their advice and two participants (1.0 percent) reported that they appreciate their support but sometimes feel emotional barriers.

3.1.11 Factors related to Optimal Dietary modification for glycaemic control

Optimal Dietary modification for glycaemic control was considered as the outcome variable. Bivariate analysis was done to find out the factors associated with Optimal Dietary modification for glycaemic control. P value less than 0.1 was considered significant. All predictor variables which exhibited alpha value less than 0.1 on bivariate analysis was taken for building a model. At the bivariate level, a significantly higher proportion of persons with optimal dietary modification for glycaemic control was found in those being married, having higher education level, and having a meal plan prescribed by a health care provider, while having mobility issues or anxiety/ depression was associated with a lower proportion of persons with optimal dietary control. Only the variables 'Who prescribed a meal plan' and 'mobility' were retained in the multivariate modelling but these also were not significant at the level $p < 0.05$ (See Annexure 1)

3.2 Summary of the Qualitative Analysis

3.2.1 Results of In-depth interviews with patients

A separate interview guideline was followed to gain insights into the participant's journey with diabetes, and how they have been able to or trying to manage it. Questions were also included to understand and explore on the existence of gendered differences in the roles within the household which could have had an influence in their dietary management for diabetes control.

A total of 11 participants were interviewed. The profile of the participants who participated in the in-depth interview is given in Table 3.18.

Table 3.18- Profile of the participants for In-depth interviews

Participant ID	Sex	Age (years)	Marital status (spouse diabetic)	Ration card colour	Duration of diagnosis (years)
PA0101	F	66	Married (No)	Blue	5
TH0101	M	56	Married (No)	Pink	8
KV2209	F	51	Married (Yes)	White	5
CH0903	M	60	Married (No)	White	10
CM1106	M	59	Married (No)	White	7
PR0904	F	67	Married (No)	No RC	7
TC0602	M	62	Married (No)	Blue	12
KE0604	F	53	Widow	White	6
PP0101	M	78	Married (Yes)	Blue	10
AM0303	F	72	Widow	White	14
PZ0101	F	34	Married (Yes)	No RC	12

* RC- Ration Card

1. Food is shaped by family's preferences and personal choices

People felt there was a need to navigate between food preferences of the family members juggling both the expectations and desires of their family members while also considering individualized perspectives and recognising its impact on one's body. So, "Food" was not merely a dish prepared and served; it encompassed deeper significance.

2. Determining factors that influence the selection of dietary management strategies for diabetes

Participants adopted various strategies which depended on their responses to the diagnosis and their utilisation of existing knowledge. Quantities and routine were mentioned by participants and they primarily used strategies of restriction, substitution and additions.

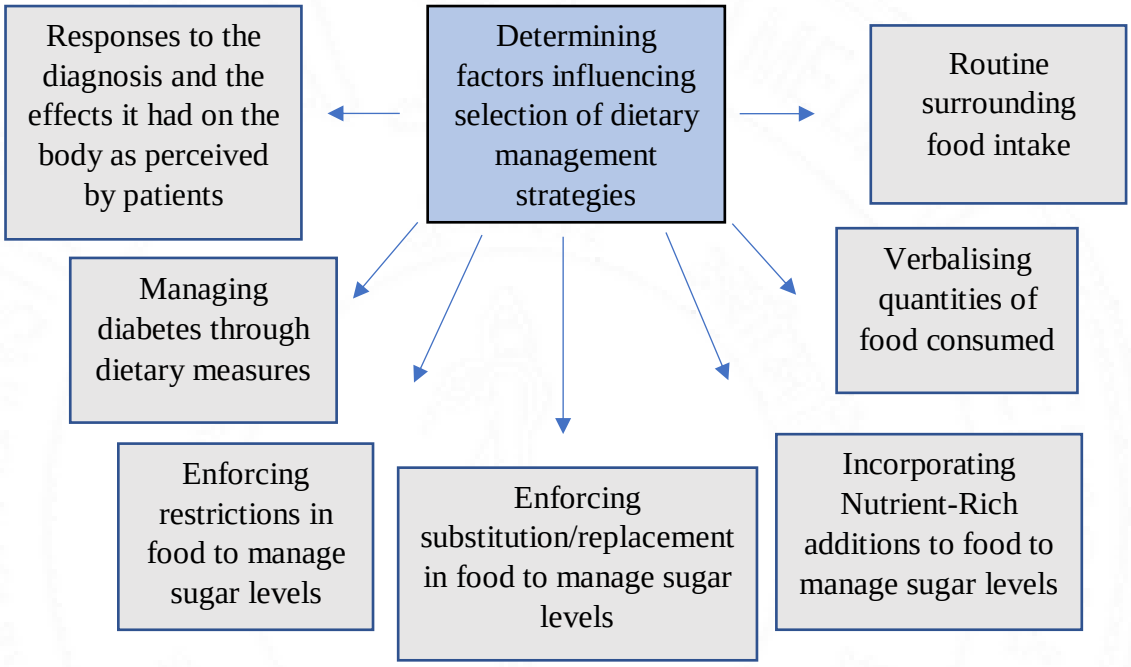

Figure 3.8: Determining factors that influence the selection of dietary management strategies for diabetes

3. Drivers of dietary management in Diabetes

Agency and autonomy within the household, support from spouse and other family members, as well as presence of other illness among participants served as key drivers of dietary management in diabetes.

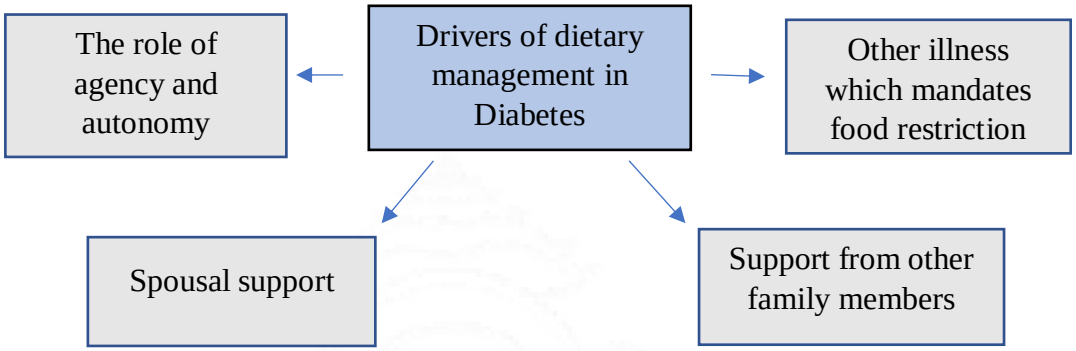

Figure 3.9: Drivers of dietary management in Diabetes

4. Challenges in Dietary management

Food control was considered the primary challenge in managing their diabetes by many participants. Barriers emerged in various forms for participants, either hindering their ability to follow their intended meal plan or preventing them from making dietary changes to manage diabetes.

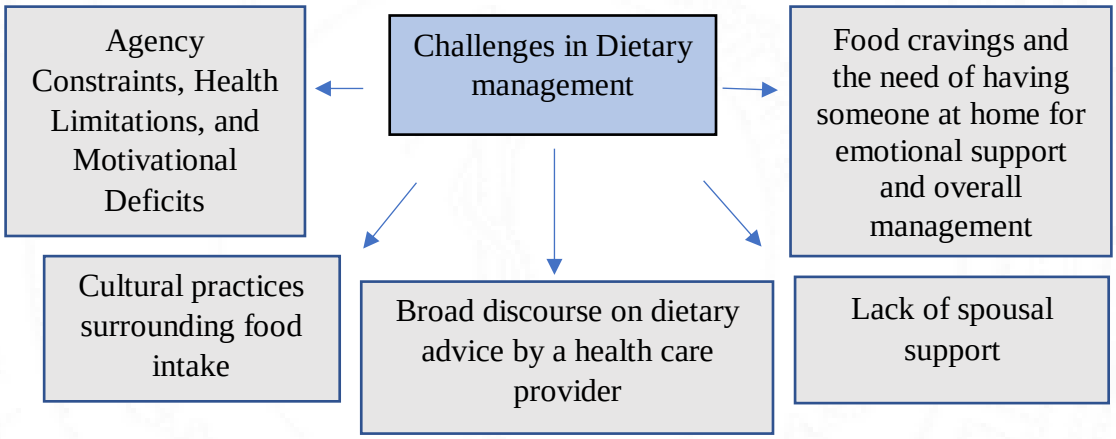

Figure 3.10: Challenges in Dietary management

5. Exercise as a form of behavioural modification

Participants engaged in physical exercises as a behavioural modification strategy to complement the dietary management efforts. However, they encountered barriers such as health issues or motivational deficits.

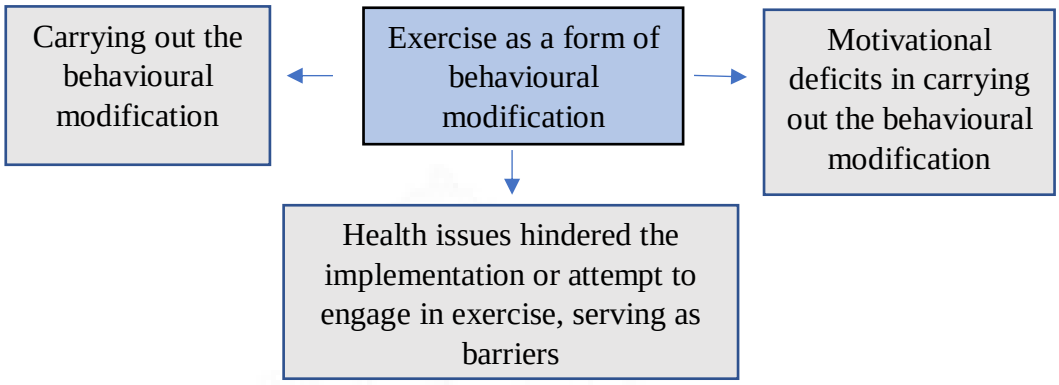

Figure 3.11: Exercise as a form of behavioural modification

6. Medications for management

Some participants demonstrated good knowledge about medication and its dosages as well as treatment goals. However, adherence to prescribed medications varied among participants and comparing sugar levels with others sometimes exacerbated the situation.

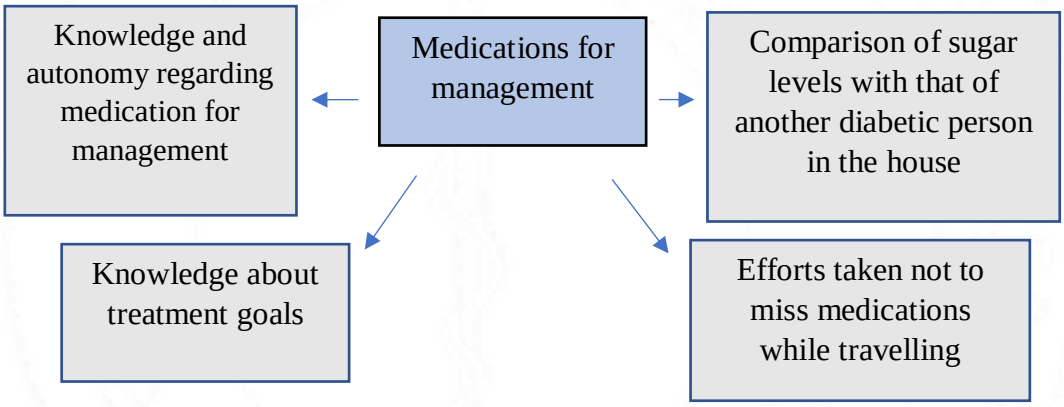

Figure 3.12: Medications for management

7. Gendered roles and differences

Gendered roles within the household were evident from the discourse with participants ranging from subtle patronisations to financial authority. While differences in the level of support received by both genders were observed, there was also an evident transition in gender dynamics, indicating shifting roles and expectations within household.

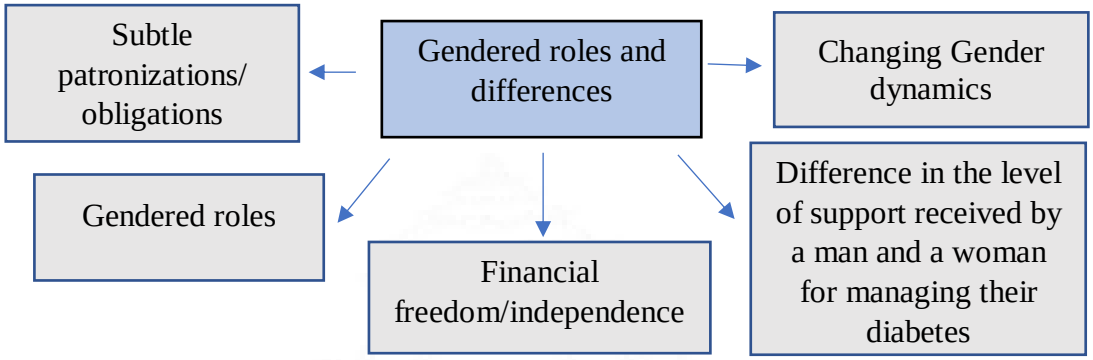

Figure 3.13: Gendered roles and differences

List of themes and subthemes that emerged from the inductive thematic analysis is given in Annexure 1.

3.2.2 Results of In-depth interviews with providers

The healthcare staff involved in delivering the dietary advices to diabetes patients were contacted and interviewed telephonically and a separate interview guideline was followed for the same. A total of eight participants were interviewed. A framework analysis adopted to organise provider narratives into themes deemed relevant to the study objectives.

1. Perspectives and Practices- Diabetic diet related

Providers accommodate diverse dietary requirements of patients through practices that ranged from individualised meal plans tailored to factors like work, living condition, other comorbidities to utilising IEC (Information, Education, Communication) materials to provide advice. Given that not all patients are able to adhere to these meal plans due to various reasons, adjustments are often made during follow up visits to ensure effective management.

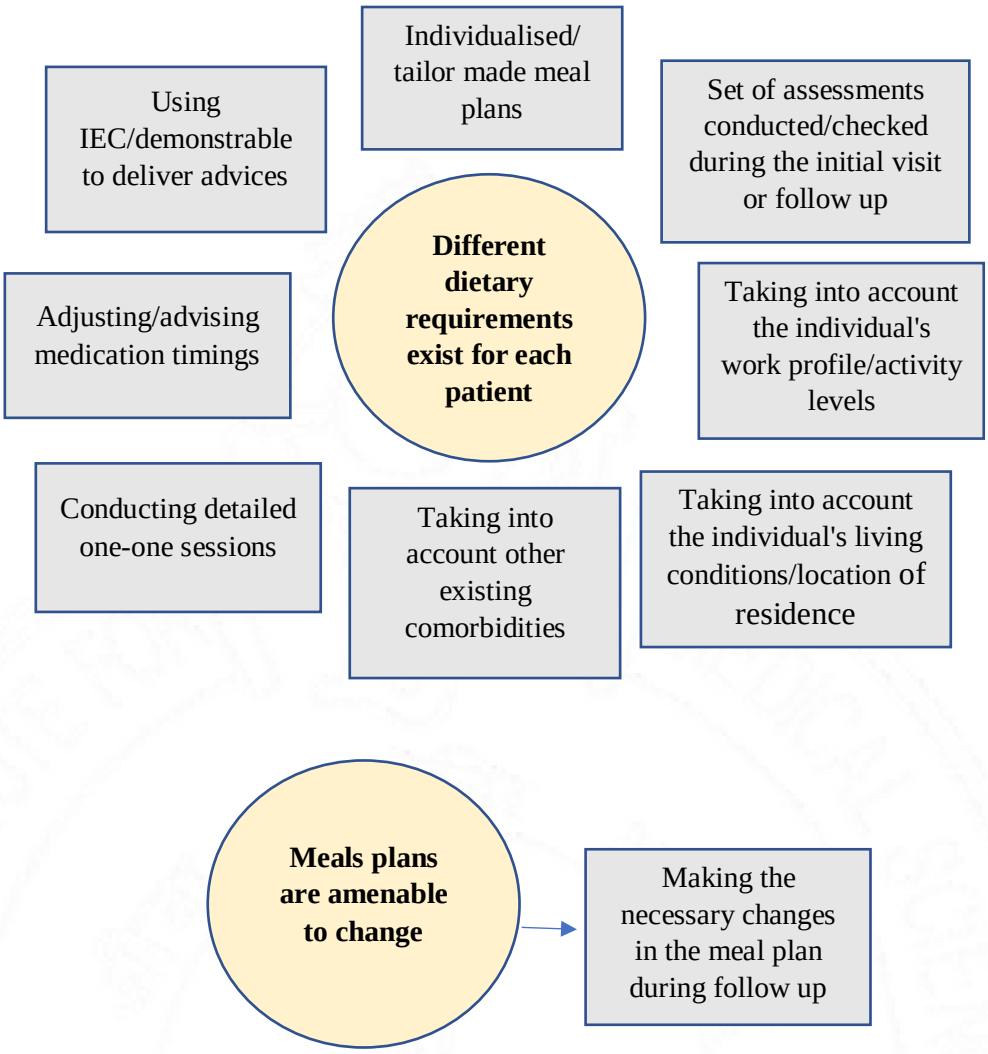

Figure 3.14: Perspectives and Practices- Diabetic diet related

2. Perspectives and Practices- Patient characteristics which influence dietary management

Effective dietary management requires consideration of various factors like patient psychology, accessibility, availability, affordability of food items, as well as existing misconceptions and negative impact of social media. Addressing a careless attitude following diagnosis was important for achieving positive health outcomes.

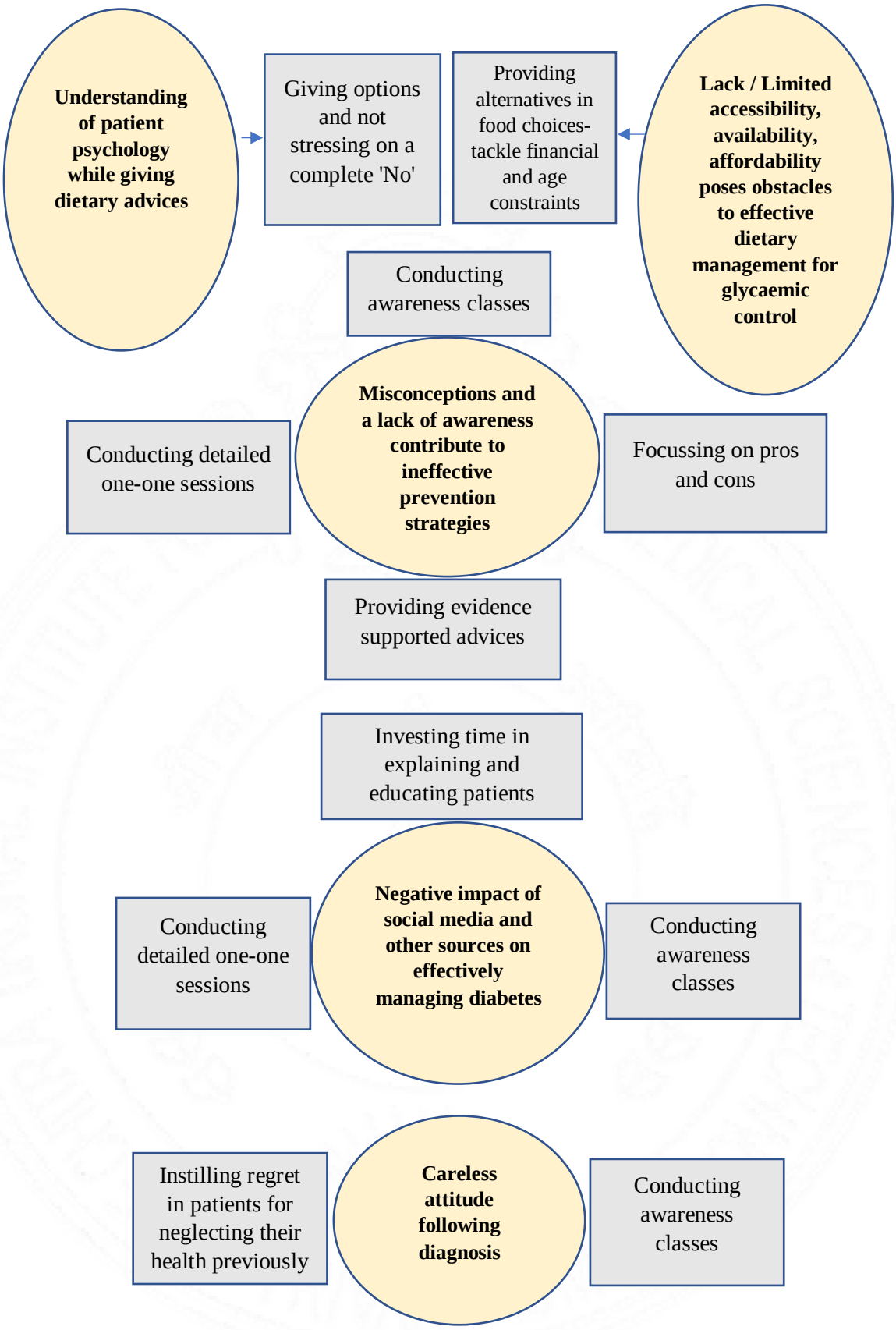

Figure 3.15: Perspectives and Practices- Patient characteristics which influence dietary management

3. Perspectives and Practices -Importance of follow up and the role of a dietician

Providers emphasised the importance of follow ups for effective diabetes management. To ensure this, practices like mandating the visits to health centres were employed allowing for necessary corrections and adjustments to the management plan. To address the lack of importance given to dieticians and diabetes educators, mandatory meetings with dieticians were enforced for patients.

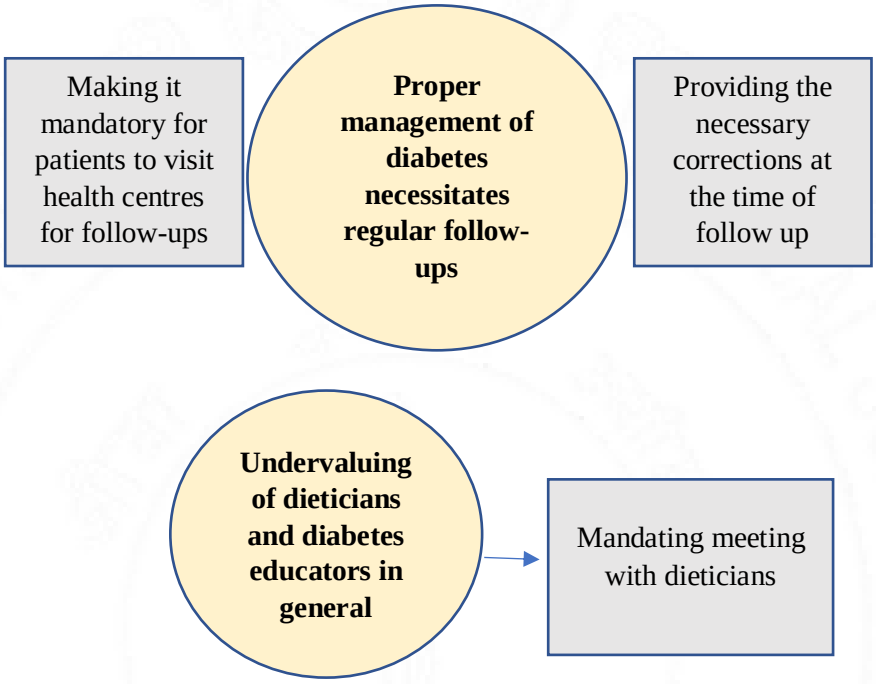

Figure 3.16: Perspectives and Practices -Importance of follow up and the role of a dietician

4. Perspectives and Practices- Family support and compromising nature of women related

Effective dietary management relied on adequate family support and the lack of which made providers offer alternate food choices and involve family members during counselling. Women's compromising nature affected their dietary management,

necessitating further measures such as including of co-workers during counselling to ensure comprehensive support.

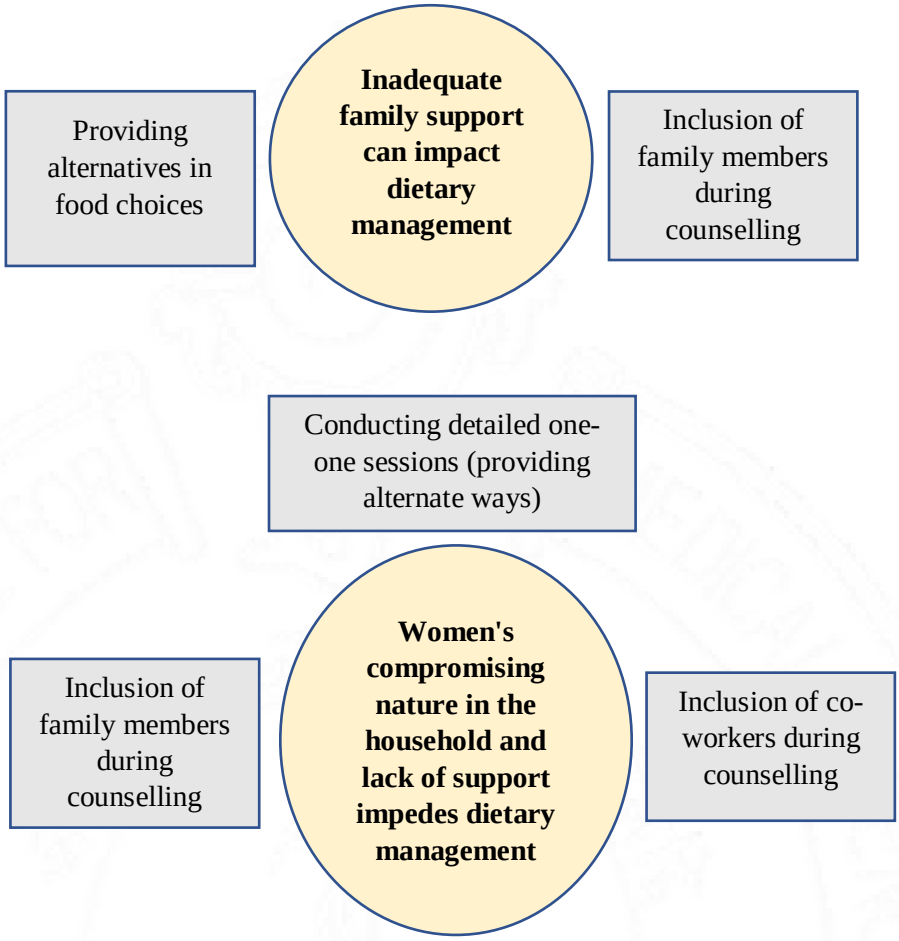

Figure 3.17: Perspectives and Practices- Family support and compromising nature of women related

5. Perspectives and Practices- Gendered differences and changing gender dynamics

Gender disparities existed in the efforts and opportunities available for dietary management for glycaemic control. Detailed sessions were conducted to address these differences to ensure equitable support and guidance for both males and females. A shift in gender roles was also observed by providers, with couples increasingly sharing responsibilities and complimenting each other in managing diabetes

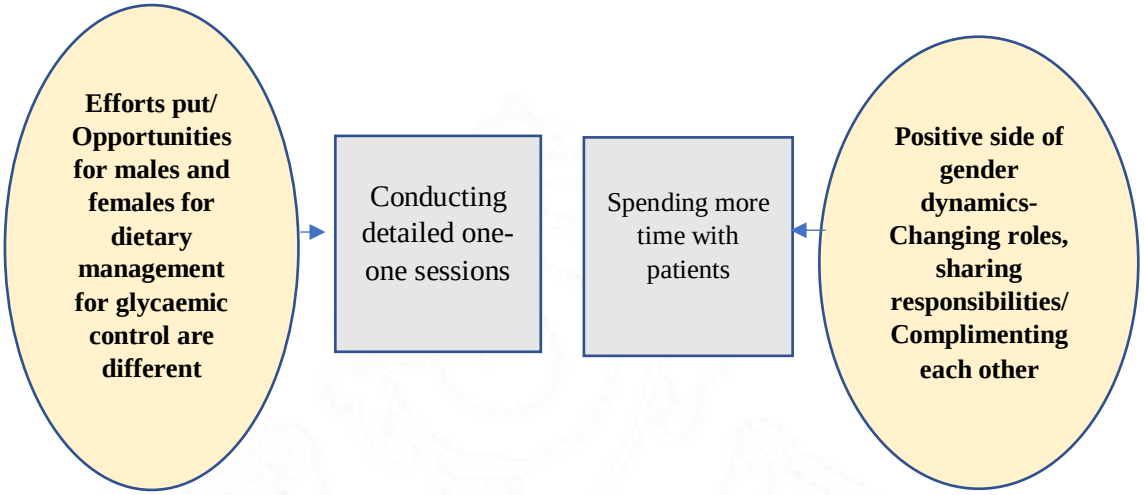

Figure 3.18: Perspectives and Practices- Gendered differences and changing gender dynamics

3.2.3 Synthesis of Study findings from the two study segments

This sequential explanatory study assessed the level of family support on dietary management among males and females above 30 years who were diagnosed with Type 2 Diabetes and also to understand how gendered roles affect dietary management. An attempt was also made to understand the perspectives and practices of Health care providers regarding the capacity of their patients with Type 2 Diabetes to adapt to dietary recommendations and to explore for gendered differences related to the same.

3.2.3.1 Summary of findings from the Cross-sectional survey

From the quantitative segment of the study, it was seen that women with diabetes had a comparable level of knowledge of treatment goals as men (71.8 percent in women as compared to 68.9 percent in men), and knowledge of blood glucose testing (37.3 percent in women as compared to 35.6 percent in men) and may even have better access or interaction with health care providers in terms of having a prescribed meal plan by a

provider (30 percent in women as compared to 23.3 percent in men) and follow up visits in the last 6 months (59.1 percent in women as compared to 45.6 percent in men) and this holds true for the 30 percent of widows in the study sample as well. However, this does not seem to be translating into similar or better levels of **optimal dietary behaviours for glycaemic control (12.7 percent in women as compared to 21.1 percent in men)** or **better glycaemic control among those who practised optimal dietary behaviours for glycaemic control (42.9 percent in women as compared to 57.9 percent in men).**

In general, participants with family support had contradictory findings with optimal core dietary modification (24.4 percent participants with family support practiced optimal core dietary modifications as compared to 34.4 percent participants without family support). Sex disaggregated data shows a similar pattern of observations with the distribution much profound in women than men (19 percent of women with family support practiced optimal core dietary modifications as compared to 30.6 percent of men with family support who practiced optimal core dietary modifications).

Family support when available for men was predominantly from the wife (33 of 36, 91.7 percent) and almost exclusively from a woman (35 of 36, 97.2 percent). For women, when family support was available, it was from another woman about a third of the time (12 of 42, 28.6 percent). Family support for men practically meant support from a wife but the reverse cannot be stated for female diabetics.

Socio economic class plays a crucial role as evidenced by the proportion of men and women who belonged to the higher socioeconomic strata who had better Dietary modification for glycaemic control as compared to those who belonged to a lower socioeconomic status (Women: 14.5 percent, 10.4 percent; Men: 24.1 percent, 15.6 percent).

3.2.3.2 Why women fall behind in required functioning and favourable outcomes related to diabetes

The power of agency and autonomy in dietary decision making

Food holds a deeper significance for each individual beyond mere sustenance; it encompasses cultural, social and personal meanings. In many households, men tend to their assert choices and preferences regarding food more prominently than women in a household. Verbalizing exact routines, food items and quantities was considered a reflection of the agency.

"Then, it will be around 10-10.30, to have breakfast or something like that. So that is why, it gets adjusted as an empty stomach issue doesn't come. Then in the afternoon, it will be 2-2:30 to have food, that will be rice only…little. Night most probably it will be chappati only. That 8:30, between 8:30-9:30…"- A 59-year-old male diabetic, Retired

"That, whatever I made (for family members), I will eat. I won't make and eat anything special for me. That will be anything…Some days it will be dosa, idli, pathiri, chappati…like that. I am a person who makes everything… anything, will keep on changing. Whatever is made, I will eat that. That…it will be 3 numbers…"- A 34-year-old female diabetic patient, Homemaker

This dynamic often arises from traditional gender roles, where men are typically seen as the primary breadwinners and providers for the household. Consequently, they wield greater power to influence food related decisions and implement their preferences, while women may have less opportunity to voice their thoughts and preferences in this context, reflecting differences in the level of autonomy they have for dietary modifications.

"Now suppose if we go for a marriage, it might be biriyani or ghee rice there. Since I am a person who doesn't eat all those, we try to come back from there fast. Then I come back home and eat. That has happened." - A 56-year-old male diabetic, Night shift security worker

Men and employed women with social class advantages often have greater agency and autonomy, which enables them to make choices regarding their food, especially intake of nutrient dense food. Ability of women to participate in decision-making related to nutrition dense foods is facilitated by their employment status, as it contributes to their overall agency and autonomy.

"I have knowingly or unknowingly, been keeping these likes. Bitter gourd, lady's finger, ivy gourd… in that way. That, for others…maybe they might be liking cabbage and cauliflower but me not taking it probably might be my selfishness."- A 51-year-old female diabetic patient, Advocate.

Personal preferences, familial roles and provider interactions shape subjectivities around achieving optimal dietary management and the challenges thereof

The multiple roles that women often juggle can make it challenging for them to establish a consistent routine around food intake compared to men.

"What I do now is that when kids go to madrasa, I will go with them. Will come back. Then, will drink tea. Sometimes I may eat a biscuit, or else I won't drink tea also, will enter straight to kitchen, since kids have to go to school. I eat breakfast after sending them."- A 34-year-old female diabetic patient, Homemaker

However, employed women have an advantage in this regard, as their employment can provide structure to their daily routines, including meals. While men may face their own

challenges or prioritize dietary modifications differently, women may encounter difficulties as they attempt to follow dietary recommendations, potentially exacerbating existing problems or developing new ones.

"Quantity means… rice I will…then…afternoon I will have a little only. I won't eat more. Because then it won't be possible for me to do work. If stomach gets full, to do any work its… I cannot bend"- A 62-year-old male diabetic, Farmer

This complexity suggests that the customization of diet plans by healthcare providers may be insufficient, as they may not anticipate the specific challenges, intolerances, or behaviours shaped by perceived problems or experienced difficulties. Participants did not report receiving tailored advice from healthcare providers, with the primary advice being limited to reducing sugar intake.

"Doctor hadn't told anything. He only told to reduce sugar… Other than that, haven't been told anything". - A 56-year-old male diabetic, Night shift security worker

The Dual Role of Women: Balancing Care for Others and Self-Care

Women, particularly when their husbands are diabetic, tend to take healthcare providers' advice more seriously.

"The one who cooks food. Wife only. From the interest which they show to listen itself we will understand. So, when we see so many faces, we will understand, wives will listen to it more carefully. If they are listening for their husbands, they will note in a clear and crisp way and go. They will be a little more anxious like, if something will happen if he eats this, will it affect leg, eyes. So, with that tension only, they will catch and will ask and understand everything"- HCP 7

Women often tend to use medical terminology more frequently, indicating a higher level of familiarity with treatment goals and follow-up duration, which they likely obtained from healthcare providers. This is supported by the observation of more frequent follow-up visits among women than men.

"So, every 6 months, I used to check my blood sugar levels. Once when I checked it, my fasting was 124. So, then I thought I would control it and I went to a general physician. He said just control your diet, I checked my HbA1c. It was like 7.5"- A 67-year-old female diabetic patient, Homemaker.

This knowledge among women could be the reason could why women try to persuade their spouses to get their follow ups done and this could also be the reason for lower follow up visits in men as they need constant reminders and pushing.

"So, they (men) go for their work, and when looking at timely periodic check-ups and all, it is usually men who does that because women make them do it when it's time, that's why. But when it comes to self, women may not do it, but when it's the matter of their husband or children, they will remember and will make them do things on time," - HCP 1

"It's woman who will take care more about this. Men, a little… women should remind them about their things. They don't have a tension or the thought that they should bring this under control, that thought is less among men when compared to women. Women have those things that this should come into control, it shouldn't cause any difficulties in the future, and thinking this, its them who are giving much more importance and care to this. Not only that, its them who are reminding their husbands and making them understand. Now it will be women who will be coming to our classes. So, if their diet or if their husband's diet is like this, they will go back and explain it and change it."- HCP 3

It could also be the reason for women demonstrating more efforts to ensure they do not miss their medications while traveling, perhaps due to their greater awareness of treatment goals and follow-up recommendations obtained from healthcare providers.

"I would have kept medicines with me. If I am going to daughter's house and all, I will keep this (medicines) in handy and then go…I have a big bag, I will take that."- A 72-year-old female diabetic patient, Retired teacher

While men, on the other hand, blame women for women's failures or lapses and considers advices for family level modifications as trivial. This dynamic reflects a broader pattern where a man's health is often seen as the woman's responsibility, while a woman's health is also primarily her own responsibility. This highlights the difference in the level of support received by men and women for their dietary management.

"No, like…he won't ignore me a lot. But, if I overdo it, he will tell. Or else at the time when sugar is high…when we test sugar and it shows high, he will tell, yeah, it's because you ate, it's because you did not control, like that he will tell. Other than that..."- A 34-year-old female diabetic patient, Homemaker

"The support which men gets…or the diet which they have had in the past will be different. They would have modified a few of the recipes and all. Now if they (the husband) had upma, vegetables would be added to it, wife would have given it to him. But in the same place, ladies would have reduced the quantity. Ladies would have brought diet control after reducing the quantity of upma." - HCP 2

It could also explain why men demands that wife should be there at home to monitor food intake and providers calls the wife at the time of diet counselling.

"But to implement that (dietary modifications) there should be someone at home, especially a wife. They should take care in a strict way, if I am deviating, they should tell me that no I should not do it."- A 59-year-old male diabetic, Retired

The relative freedom that men often experience in balancing other roles may enable them to structure actions for complementing behavioural modifications more effectively compared to women. This greater flexibility in managing responsibilities may contribute to a higher proportion of men achieving optimal complementing behavioural modifications compared to women.

"Then I have felt that males have a lot of opportunities. Concerning males, I have felt that they can do a little bit more. There is no limit to which they can go to the gym for exercise. They can go in the evening or in the morning they can also go for a walk. Regarding females, after avoiding the kitchen in the morning… If she doesn't have a servant at home, she cannot leave the kitchen and go for a walk at 5 am in the morning. Kids have to go to school, husband also has to go for a job, she herself has to go for job. So, concerning them, exercise is a dream which is not possible."- HCP 8

Considering family and cultural aspects in dietary management may reinforce gender roles

Eating pattern and timings, cultural practices are deeply ingrained in the fabric of the society, making diet a fundamental part of the culture. While these cultural influences are actively considered by health care providers when offering dietary advice, they can inadvertently reinforce gendered aspects, reflecting societal norms and expectations regarding food choices and meal preparation responsibilities.

"So, you had asked me before what factors will I consider, so it will depend on the region also. Region, their religious beliefs, their food culture, their customs… all this have real influence. So, if we go to a new place only if we have a good understanding of the general

diet pattern there, then only we can counsel. Only then our counselling becomes effective." – HCP 6

Therefore, it's not uncommon for healthcare providers to address women specifically during counselling sessions, recognizing their central role in dietary decision-making within the family unit.

"We will ask and understand what their living conditions were. Like basically whether caretakers are there at home, are you alone at home, who does the cooking. Or are you buying… now, if a maid is cooking, if any changes need to be made in the diet, we should explain it to the maid, so is there someone at home to make the maid understand the changes which are required. We will ask all this."- HCP 6

CHAPTER 4

DISCUSSION AND CONCLUSIONS

The purpose of this sequential explanatory study was to assess the level of family support on dietary management among males and females above 30 years who were diagnosed with Type 2 Diabetes and also to understand how gendered roles affect dietary management. An attempt was also made to understand the perspectives and practices of Health care providers regarding the capacity of their patients with Type 2 Diabetes to adapt to dietary recommendations and to explore for gendered differences related to the same. The cross-sectional survey was conducted among 200 participants diagnosed with diabetes from 25 clusters in total (8 patients from each cluster). For in depth interviews, participants were purposively chosen at the time of survey; health care providers were contacted and interviewed telephonically.

Dietary modification for glycaemic control was considered as the outcome variable for the study. People who had made the dietary modifications along with supportive behaviours had a higher proportion of participants achieving glycaemic control, a finding consistent with similar reports. (Thewjitcharoen et al., 2018) Similar to the statements made by Shrestha et al, there were gender differences in social structure (many more women were widows), and lifestyle modifications (less women having modifications), although access to follow up care was better in women. (Shrestha et al., 2013) Quantitative findings revealed that among those who had family support, optimal core dietary modification was practiced by 24.4 percent. Although a significant association could not be established, family support variables was found to be better among males compared to females.

Even though family support was deemed essential for dietary management among Type 2 Diabetes patients, the quantitative study did not establish a clear association between family support and dietary modification for males and gave a finding contradictory to expectations for females. The qualitative interviews with patients and providers, however, underscored its significance and highlighted the disadvantages of lacking family support. Despite participants acknowledging a shift in situation from earlier times, the persistence of gendered roles within households is still continuing, which in turn influenced the support received by males and females in dietary management and this was captured from the qualitative findings of the study.

4.1 The confluence of lifestyle and gender- a sociocultural perspective

Lifestyle is more than just individual choices regarding health behaviour and is a broader sociocultural phenomenon that arises from the interaction between patterns of behaviour and specific life situations. It is shaped by values, beliefs and behavioural practices that are learned within specific cultural contexts as well as opportunities and constraints defined by social and economic factors. (World Health Organisation, 1986) The importance of considering gender while discerning lifestyle changes is important and have been mentioned by Dean in the study about self-care components of lifestyle. (Dean, 1989) The influence of social networks, social support and socioeconomic factors on behaviour and health outcomes varies based on gender. (Dean, 1989) This variation arises from the societal expectations, roles and norms assigned to different genders, which shape the individual's interaction within social environments and determine their access to resources essential for maintaining health and wellbeing. A study conducted among 500 patients in a general medicine practice found that wives were more likely to take on caregiving responsibilities when their husbands were ill, while men were more inclined to suggest that

their wives consult a doctor when they experience symptoms. (Elliott-Binns, 1986) The qualitative findings from the current study support this observation where providers mentioned that women often exhibited a higher level of concern for their husband's health when they were diabetic and made instrumental changes to their activities. In contrast, when wives were diabetic, men took on assertive or persuasive roles and relied on their wives to listen and follow the advices given by the healthcare provider. Similar to the findings from the present study, factors related to social network had a smaller effect on healthcare received by women compared to men.

As pointed out by Bird and Fremont, if men and women were to occupy identical social roles, spending their time in the same manner and receiving equal pay for work, women would likely report better self-rated health than men. This suggests that disparities in morbidities experienced by women is largely attributed to social roles. (Bird and Fremont, 1991)

4.2 The Food Choice Process Model

Since food is an interplay of so many factors, it was felt that a 'Food Choice Process Model', which was originally conceptualised by Furst et al. in 1996 and later elaborated by Sobal and Bisogni in 2009 could be used to explain the results and structure the discussion. This model has three main components- Life course events and experiences, Influences and Personal food systems, the interplay of these components finally leads to behaviours associated with food.

The life course not only encompasses an individual's aspirations and future expectations but also includes the experiences and events shaping their current dietary preferences. Food choice trajectories evolve as people progress through life, influenced by pivotal transitions, timing, and contextual factors.

These influences, such as personal ideals, resources, and social surroundings, are positioned along the life course, impacting food choice decisions. Individuals attribute values to food and navigate their choices accordingly, ultimately forming scripts or routines around their dietary intake. (Sobal and Bisogni, 2009)

A diabetic patient's life experiences and learnings greatly influence their dietary decisions. The diagnosis of diabetes marks a significant transition, prompting changes such as adopting a meal plan or altering existing eating habits. The timing of diagnosis is crucial, as an unexpected diagnosis can be overwhelming and impact the management of the condition. Home serves as the primary context for food-related choices and actions, making it the starting point for dietary management aimed at glycaemic control.

Cultural ideals, such as abstaining from non-vegetarian foods due to religious reasons, personal preferences for specific foods like fruits and vegetables, and social roles such as those of a wife, mother, or daughter-in-law, all play significant roles in influencing food behaviours. These factors contribute to the development of personal identities and shape dietary choices within familial and societal contexts. Resources such as financial means for purchasing health-promoting foods and monitoring equipment, material resources like utilizing available space for implementing weight control measures and accessing blood glucose monitoring equipment, the knowledge of treatment goals and testing duration and social support in the form of family support are essential for effective dietary management aimed at glycaemic control in individuals with diabetes.

People attribute various values to food items and choices, as the significance of food differs for each individual as reflected in the study sample. This leads them to classify foods and determine what is beneficial or detrimental to their health, which is a dynamic and situational process. Value negotiations occur, where individuals prioritize their health and

seek to avoid unhealthy foods. Consequently, people adopt strategies such as restriction, replacement, and addition to their meals to manage their diabetes. These strategies become scripted and eventually integrate into their daily routines.

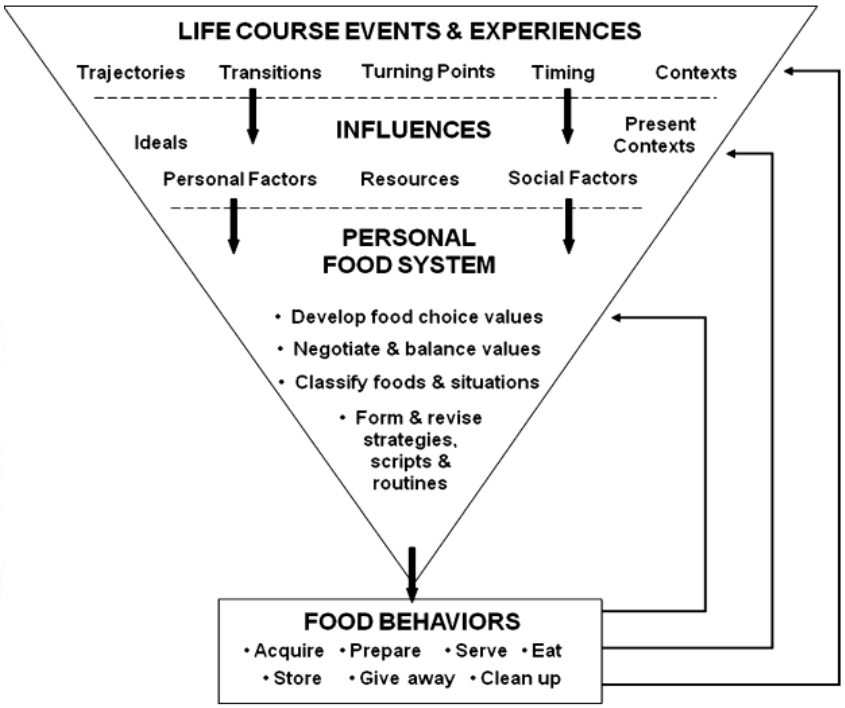

Figure 4.1: A Food choice process model (from Sobal and Bisogni, 2009)

Food, therefore, has an important role in shaping people's identities in addition to affecting their general health and nutritional status.

4.3 Practices surrounding Dietary management for glycaemic control at Home and the role of family support

Findings from this study are comparable to findings from another study which used a cross sectional design to estimate the existing self-care behaviours and factors influencing these behaviours among 200 Type 2 Diabetes patients in Vellore where calorie restriction measures were practised by 35 percent of participants. (Gopichandran et al., 2012) Calorie restriction measures were seen to be practised by females more than males.

Qualitative findings from the study demonstrated two main restriction measures adopted for dietary management, which is similar to the findings from another study where participants exhibited knowledge about the restriction measures that needs to be adopted. (Mphasha et al., 2021) The study findings point out that intake of nutrient dense food was practiced by males (28.9 percent) more than females (15.5 percent) which could be due to the priority given to the preferences, likes and dislikes of the males or children of the house by the female member, who will be the one primarily responsible for cooking food. The qualitative study added to the results that those who had greater autonomy and agency to voice their food related choices and preferences showed better intake of nutrient dense food. This could also be the reason why the proportion of males who practised optimal core dietary modification (34.4 percent) was more than females who practice optimal core dietary modification (27.3 percent). This is in line with the findings from a study done in Australia (Hepworth, 1999) and Canada (Mathew et al., 2012).

Optimal weight control was practised by 64.4 percent of males as compared to 46.4 percent of females. The qualitative findings help to explain the reasons for the low values for females. Females experienced other health issues like leg pain once they got diagnosed with diabetes and also showed a lack of interest or laziness to carry out weight control measures which is in concordance with the findings from another study conducted in a district of Kerala. (Jose et al., 2022) The common notion that there was no need to do exercise as they were already performing household works could be another reason for a lower percentage among females. Complementing behavioural modification for the purpose of glycaemic control was carried out by males more than females.

Even though the final outcome was found to be better among males than females, an attempt was made to encapsulate the distribution of the outcome variable as well as its

domains across socioeconomic status. This showed that differences still exist between social classes, which was a concept detailed by Morris in 2007. (Morris, 2007) Regular physical exercise was more common among individuals with higher income levels, regardless of gender. (Dean, 1989) This parallels the study findings where individuals with higher socioeconomic status were more likely to practise optimal complementing behavioural modifications.

Many studies consider family support as an enabler of dietary management (Mphasha et al., 2021; Tripathi et al., 2023) but there are only very few studies which has attempted to assess the level of family support for dietary management alone. This study was not able to establish an association between family support and dietary management for glycaemic control quantitatively, though the family support variables was observed to be better among males than females. A study conducted in the United States reported that diabetic women had higher rates of physical and cognitive limitations, more comorbidities, depression and decreased levels of mental and physical functioning as well as decreased ability to participate in self-care activities when compared to diabetic men. (McCollum et al., 2005) However, qualitative findings of this study corroborate with findings from other studies where family support played a very important role in management of diabetes for males, especially in the form of cooking food for them along with keeping the likes of all the family members. (Mathew et al., 2012; Wong et al., 2005)

4.4 While culturally sensitive, approach to dietary advice by healthcare providers is gender specific, perpetuating women's cooking roles

Only a quarter of the cross-sectional study participants had received a meal plan from a formal health care provider, but they were twice as likely to have modified their diet. As mentioned by Deed et al., evidenced based, culturally sensitive, yet individualised dietary

plans are effective for glycaemic control. (Deed et al., 2015) In the conversations with healthcare providers, providers acknowledged the importance of offering individualised diet plans tailored to each patient's dietary requirements, echoing this principle as well as findings from a study conducted in Ghana. (Hushie, 2019) Consideration was also given to the patient's work profile when providing advice. One of the salient findings from the current study was that providers noted the flexibility of meal plans, which could facilitate positive patient behaviours by allowing them to discuss any challenges and enabling providers to make necessary adjustments accordingly. This underscores the importance of follow up appointments, as reiterated by providers in this study as well as other studies where concerns were raised about patients not attending follow up visits. Patients' lack of knowledge and awareness was considered to be another reason why the strategies have been ineffective. This was similar to findings from a study conducted in Delhi. (Tripathi et al., 2023) The unheeding attitude displayed by individuals following a diabetes diagnosis, often only taking it seriously when major complications arise was another important barrier reported by providers. This behaviour may stem from lack of awareness regarding the seriousness and potential complications associated with uncontrolled diabetes. Participants also conveyed during the interview that they did not receive specific guidelines or instructions apart from reducing sugar intake. This might be attributed to physicians not being trained in nutrition interventions and only a few participants sought advice from a dietician regarding their dietary choices.

The dual roles of women managing both home and work responsibilities was highlighted by providers in this study and the challenges they experience in following their dietary advices while juggling these roles. This observation resonates with findings by Ballantyne, 1999 which demonstrated how women's dual roles impact their health as they navigate

various responsibilities. Women often find themselves enmeshed in a complex web of roles and duties.

Providers in the study also pointed that many women still experience financial dependence on their husbands. They recounted instances where husbands either ignored or mocked their wives when they were required to follow a diabetic diet. This clearly illustrates the paradoxical nature of marital relationship, as pointed by Ballantyne, where marriage can simultaneously enhance economic opportunities while potentially affecting women's health positively or negatively. The present study also shed light on the challenges some women encounter in their in-law's household to manage their dietary requirements where it is often the father-in-law who oversees household purchases. A similar observation was also reported by providers in the Delhi study. This reflects the continued existence of powerlessness and the lack of control over decision making among women in our society.

Providers acknowledged the importance of family support and conveyed that even though glycaemic control is seen among both males and females it is the variance in this support and the efforts made by each that influence their dietary management for glycaemic control. However, there was also the mention about changing gender dynamics which was a positive finding. Despite opportunities remaining more prevalent for men carrying out the advices, providers acknowledged cases where couples attended appointments together and provided mutual support.

4.5 Challenges in measuring Family and Social Support

The contradictory study findings of women with low family support probably doing better in terms of dietary modification highlights the challenges in measuring the level of support a person receives.

Social support is a manifestation of the mutuality and affection that characterize a connection between two people rather than a commodity that belongs to the provider and is transferred to the recipient. (Gottlieb and Bergen, 2010) Social support is described by Cohen et al. as "*the social resources that persons perceive to be available or that are actually provided to them by non-professionals in the context of both formal support groups and informal helping relationships*". (Cohen et al., 2001)

Gottlieb and Bergen also mention about measurement of the support's quantitative and qualitative adequacy from the recipient's point of view. The former assesses the quantity of support given, from too little to too much, while the latter asks about the quality of support, including the mode as well as the hidden message associated with its delivery. For instance, the provider might have offered support in a reluctant manner, imposing conditions that restrict the recipient's autonomy, or evoke the feelings of indebtedness or incompetence. So even if support is offered with good intentions, if it is clumsy, inappropriate or overly controlling, it can have a neutral or harmful effects on the recipient. (Gottlieb and Bergen, 2010)

Studies have been conducted on the cultural variations in the actions and behaviours that show support. It is critical to acknowledge that cross-cultural differences in the meaning of perceived and received support might make direct translation challenging. (Gottlieb and Bergen, 2010) This implies that using measures of perceived and received support in contexts with diverse cultures may present challenges due to the variations in how support is expressed, interpreted and valued across different cultural settings. Behaviours such as dominance and mocking may co-occur with acts of support (Gottlieb and Bergen, 2010), which could influence the individual's agency and autonomy, which may contribute to the findings observed from the current study.

So, along with establishing reliability and validity, it should be acceptable to the participants involved in the research and capable of measuring the construct of interest. It is crucial that the measurement tool is sensitive enough to detect variations in the phenomenon of interest, with the target population. Meaningful conclusions rely on valid, reliable and sensitive measurements of social support that accurately capture the complexities of the phenomenon within the population under study. (Undén and Orth-Gomér, 1989)

As concluded by House and Kahn in their chapter 'Measures and concepts of social support', while its crucial to customise the measures used in a given study to meet the objectives of that study, this does not imply the need to develop entirely new measures. Existing literature offers robust models for various types of measures, which can be adapted or refined to address specific research objectives, providing valuable foundation for the measurement of social support in diverse settings. (House J and Kahn L, 1985)

4.6 Approaching the problem using selected concepts from gender analysis frameworks

Women who have experienced gestational diabetes may encounter distinct biological variances as it progresses to Type 2 Diabetes. Discussions surrounding meals, meal preparation, and kitchen work typically occur among women. On the other hand, matters related to household finances are often discussed and handled by the men of the house. Expectations regarding appropriate behaviour differ between men and women. Men are typically expected to fulfill the role of the breadwinner, contributing to the productivity of society, maintaining dominance within the family, and serving as the ultimate decision-maker. Conversely, women are often expected to fulfill caregiving and reproductive roles, remaining obedient and accommodating by tending to the needs of their husband, children,

and in-laws. Men's responsibilities (what they can do) typically include providing for the family financially, ensuring the family's financial needs are met (including visits to health facilities and purchasing items according to the meal plan). Women's responsibilities often revolve around caring for the family, managing cooking and kitchen-related tasks, accommodating the food preferences of all family members, reminding husbands of follow-up visits, and taking detailed notes on their husband's diet as provided by a dietitian. Men typically take on roles (what they actually do) such as deciding how financial resources are allocated, determining which nutrient-dense food items need to be purchased. Women, on the other hand, often juggle multiple roles as a mother, employee, and community member. Their responsibilities commonly involve preparing food while considering the preferences and dislikes of others, as well as accompanying their husband for follow-up visits or visits to a dietitian. Practical gender needs for men involve tailored dietary plans that consider their specific work and activity profiles and for women, it includes gender-sensitive approaches to dietary advice and equitable sharing of household chores, recognizing their multiple roles and responsibilities. It's likely that the usual resources available for dietary management for glycaemic control are similar for both men and women, with the primary difference being socioeconomic status. The role of breadwinner and the dominant position within the family often provides men with the agency to implement food choices. Employment and higher social class similarly empower women to have control over their food choices and routines surrounding food.

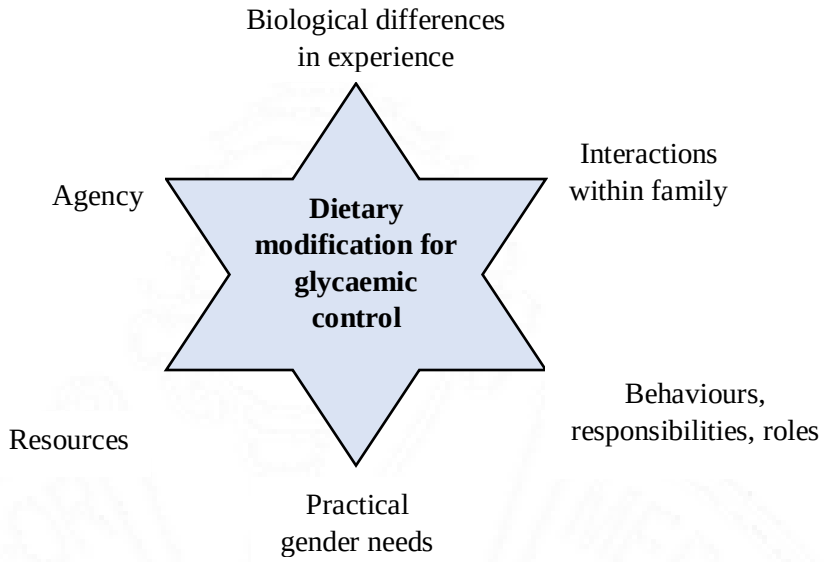

Figure 4.2: Applying a gender lens to the problem

To sum up, the findings fairly agree with the conclusions of Ravi et al., that state that women in a predominately patriarchal society may struggle to engage in healthy self-management behaviours due to the family relations while men may have some advantages due to the same. (Ravi et al., 2018)

4.7 Strength and trustworthiness of the study

This study assesses the level of family support available for patients with Type 2 Diabetes for dietary management. A sequential explanatory study was employed for this purpose. To the best of my knowledge such studies in the context of Kerala are very less. Additionally, an attempt was made to explore for the influence of gendered roles and also to understand the perspectives and practices of healthcare providers regarding the same. Since a direct tool to measure family support for dietary management alone was not found to be available, face validation of the interview tool which was adapted from two existing

tools was also performed. Triangulation of data was attempted and both methods complemented each other in addressing the study objectives.

In ensuring the trustworthiness of this study, multiple strategies were employed. Credibility was bolstered through prolonged engagement with participants during data collection, facilitating a deeper understanding of their experiences. Synthesizing findings from the two study segments further enriched the credibility of the study. Transferability was ensured through detailed descriptions of context-specific details to assess the applicability of the findings to similar contexts. Dependability was achieved by utilizing audio recordings of in-depth interviews, ensuring the accuracy and reliability of the data. Lastly, confirmability was supported through peer debriefing and reflexive journaling, allowing for critical reflection and validation of the study process and findings.

4.8 Positionality of the researcher

My research on this topic is influenced by my background as a public health student. Prior to initiating the study, I had engaged in discussions with individuals diagnosed with Type 2 Diabetes, who highlighted the critical role of family support in dietary management, alongside their multifaceted responsibilities such as caregiving, work and household tasks. I believe that these experiences have shaped my approach and provided valuable insights for a deeper understanding of this topic.

Diabetes has permeated virtually every household, with a diagnosis affecting at least one member of each family. For those diagnosed, dietary management becomes the initial and pivotal step in navigating the condition. However, what initially appeared straightforward revealed its intricacies upon closer examination. Reflective journaling emerged as a valuable tool for me, allowing for the documentation of important insights gleaned from

daily conversations. These reflections proved instrumental in shaping the formulation and analysis of the study, shedding light on the multifaceted nature of dietary management in diabetes. I have not personally assumed roles as a breadwinner or in cooking, nor have I directly engaged in dietary modifications for glycaemic control. Therefore, the insights presented are based on a second-hand perspective rather than first-hand experience.

4.9 Limitations of the study

The study had some limitations as well. Since the survey was conducted during the morning hours, males had gone for work and the sample was majorly elderly males. So, there is a possibility of selection bias. Dietary modification levels were lower than anticipated at the time of sample size estimation. (Watanabe et al., 2010) This may be because of the cultural and temporal difference between the referenced study and the present study setting.

Also, this study used a more stringent definition for the outcome variable based on the most updated guidelines. The study might be underpowered for detecting association between family support and dietary management. Participants could be having other illness or disease condition which could have influenced the dietary pattern. Only people with severe disabilities and bedridden patients were excluded from the study.

4.10 Conclusions and recommendations

Family support was deemed essential for dietary management among Type 2 Diabetes patients. While the quantitative study did not establish a clear association, the qualitative interviews with patients and providers underscored its significance and highlighted the disadvantages of lacking family support. Gendered roles and consequently differences in the mode of support were evident across all three sets of data. Quantitative data indicated better family support variables among males compared to females. Qualitative results

suggested the women offered instrumental support while men offered a prescriptive kind of support. The qualitative findings further highlighted the roles of females as wives and mothers, revealing their sacrificial nature, which in turn impacted their dietary management for glycaemic control. Both qualitative sets of interviews emphasized the importance of agency and autonomy. Participants with greater agency and autonomy exhibited a structured routine surrounding their food intake, while those lacking them did not. Quantitative results indicated better blood glucose control levels for males compared to females. This trend was further supported by qualitative findings, where females were observed to go the extra mile in ensuring their husbands' blood sugars remained under control. They did so by attending awareness classes conducted by dietitians or by encouraging their husbands to attend follow-ups. Additionally, females expressed a lack of interest or nonchalance in cooking separately for themselves. Reasons reported by participants for their inability to follow a meal plan aligned with qualitative findings of providers, including job-related difficulties and lack of time, financial constraints and personal reasons, challenges with food choices and unsatisfied hunger, and a lack of willingness to adhere to a meal plan. The broad discourse on dietary advices from a healthcare provider which was evident from the qualitative interviews of participants, was coherent with the results from qualitative analysis of the providers, from the lack of importance given to role of dieticians and diabetes educators in dietary management of diabetes. Professional dietary advice when available to diabetic patients was somewhat gender specific in nature, reflecting the gendered nature of food preparation. Men were requested to bring their spouse or women relatives while women were given dietary advice directly. The additional efforts at providing culturally sensitive dietary options would also possibly reinforce the gendered nature of food preparation.

Dietary advice from formal providers was low and needs to be enhanced. The Dietary modification for glycaemic control variable developed from the study could be easily implemented by a trained ASHA worker within the community if provided with additional training programs. The possibility of establishment of support groups where families of patients can share their experiences and learn from each other should be looked at. If advice for dietary modification for diabetic patients is to be truly person-centric, further research is needed on assessing gendered nuances of family support and developing training programs to dieticians or healthcare providers involved so that gender sensitive dietary advices could be delivered.

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ANNEXURE 1- Supplementary tables

Table S.1- Distribution of Diet barriers of participants across sex

Variables Eating problems because	Males (n=90)	Females (n=110)	Total (n=200)
Family tempts or are not supportive of the efforts to eat right, n (%)			
Living alone	0(0)	7 (6.4)	7 (3.5)
Never	89 (98.9)	100 (90.9)	189 (94.5)
About once/few times a month	1 (1.1)	3 (2.7)	4 (2.0)
Friends tempts or are not supportive of the efforts to eat right			
Never/ hardly ever eat with friends	83 (92.2)	107 (97.3)	190 (95.0)
Never faced problems	5 (5.6)	3 (2.7)	8 (4.0)
About once/few times a month	2 (2.2)	0 (0)	2 (1.0)
About once/few times a week	0 (0)	0 (0)	0(0)
Almost everyday	0 (0)	0 (0)	0(0)
Eating away from home			
Never/ hardly ever eat away from home	69 (76.7)	88 (80.0)	157 (78.5)
Never	17 (18.9)	19 (17.3)	36 (18.0)
About once/few times a month	3 (3.3)	3 (2.7)	6 (3.0)
About once/few times a week	1 (1.1)	0 (0)	1 (0.5)
Almost everyday	0 (0)	0 (0)	0(0)
Too busy with family, work or other responsibilities			
Usually never too busy	54 (60.0)	57 (51.8)	111 (55.5)
Never	35 (38.9)	35 (31.8)	70 (35.0)
About once/few times a month	10 (11.1)	18 (16.4)	28 (14.0)
About once/few times a week	8 (8.9)	9 (8.2)	17 (8.5)

Table continued…

Variables Eating problems because	Males (n=90)	Females (n=110)	Total (n=200)
Almost everyday	2 (2.2)	3 (2.7)	5 (2.5)
Prescribed food is too expensive			
Not received any prescription	52 (57.8)	54 (49.1)	106 (53.0)
Never	37 (41.1)	55 (50.0)	92 (46.0)
About once/few times a month	0 (0)	1 (0.9)	1 (0.5)
About once/few times a week	1 (1.1)	0 (0)	1 (0.5)
Almost everyday	0 (0)	0 (0)	0(0)

Table S.2- Distribution of Medication barriers of participants across sex

Variable Medication barrier	Males (n=90)	Females (n=110)	Total (n=200)
When away from home, n (%)			
Never/Hardly ever away from home	28 (31.1)	23 (20.9)	51 (25.5)
Never	45 (50.0)	72 (65.5)	117 (58.5)
1 time a month or less	9 (10.0)	4 (3.6)	13 (6.5)
2-3 times per month	1 (1.1)	1 (0.9)	2 (1.0)
1-3 times a week	0 (0)	0 (0)	0 (0)
4-6 times a week	1 (1.1)	0 (0)	1 (0.5)
1 or more times per day	1 (1.1)	0 (0)	1 (0.5)

Table S.3- Distribution of Family support variables for Optimal Core Dietary modification across sex

Core Dietary modification		Does the person who supports your diet therapy n (%)	Total (n)	p value
		Encourage you to eat the right foods		
Males	**Suboptimal**	21 (35.6)	59	0.752
	Optimal	10 (32.3)	31	
Females	**Suboptimal**	29 (36.2)	80	0.019
	Optimal	4 (13.3)	30	
		Let you know they understand how important it is for you to eat right		
Males	**Suboptimal**	16 (27.1)	59	0.847
	Optimal	9 (29.0)	31	
Females	**Suboptimal**	25 (31.2)	80	0.058
	Optimal	4 (13.3)	30	
		Remind you about sticking to your meal plan		
Males	**Suboptimal**	24 (40.7)	59	0.434
	Optimal	10 (32.3)	31	
Females	**Suboptimal**	28 (35.0)	80	0.062
	Optimal	5 (16.7)	30	
		Suggest foods you can eat on your meal plan		
Males	**Suboptimal**	6 (10.2)	59	0.941
	Optimal	3 (9.7)	31	
Females	**Suboptimal**	12 (15.0)	80	0.109
	Optimal	1 (3.3)	30	
		Join you in eating the same foods as you		

Table continued…

Males	**Suboptimal**	24 (40.7)	59	0.434
	Optimal	10 (32.3)	31	
Core Dietary modification		**Does the person who supports your diet therapy n (%)**	**Total (n)**	**p value**
Females	**Suboptimal**	32 (40.0)	80	0.049
	Optimal	6 (20.0)	30	
		Avoid tempting you with food or drinks that you should not have		
Males	**Suboptimal**	25 (42.4)	59	0.215
	Optimal	9 (29.0)	31	
Females	**Suboptimal**	30 (37.5)	80	0.081
	Optimal	6 (20.0)	30	
		Watch what you eat when you eat out		
Males	**Suboptimal**	7 (11.9)	59	0.572
	Optimal	5 (16.1)	31	
Females	**Suboptimal**	7 (8.8)	80	0.186
	Optimal	0 (0)	30	
		Cook meals for you that fit your meal plan		
Males	**Suboptimal**	25 (42.4)	59	0.350
	Optimal	10 (32.3)	31	
Females	**Suboptimal**	13 (16.2)	80	0.192
	Optimal	2 (6.7)	30	
		Eat at the same time you do		
Males	**Suboptimal**	25 (42.4)	59	0.526
	Optimal	11 (35.5)	31	
Females	**Suboptimal**	31 (38.8)	80	0.028
	Optimal	5 (16.7)	30	

		Praise you or show their appreciation for following your diet		
Males	**Suboptimal**	21 (35.6)	59	0.530
	Optimal	9 (29.0)	31	
Females	**Suboptimal**	24 (30.0)	80	0.030
	Optimal	3 (10.0)	30	
		Support the purchase of special foods as per your diet plan		
Males	**Suboptimal**	8 (13.6)	59	0.471
	Optimal	6 (19.4)	31	
Females	**Suboptimal**	15 (18.8)	80	0.065
	Optimal	1 (3.3)	30	
		Tell you not to eat something you should not		
Males	**Suboptimal**	24 (40.7)	59	0.434
	Optimal	10 (32.3)	31	
Females	**Suboptimal**	32 (40.0)	80	0.021
	Optimal	5 (16.7)	30	

S.2 Factors related to Optimal Dietary modification for glycaemic control – detailed results

S.2.1 Association of Optimal Dietary modification for glycaemic control with Sociodemographic characteristics

Table S.4 shows distribution of participants by optimal dietary modification for glycaemic control by socio demographic characteristics of participants. A higher proportion of married people practice optimal dietary modification for glycaemic control when compared to single/divorced/widowed people. Participants with higher educational level have almost three times odds of practicing optimal dietary modification for glycaemic control when compared to participants with lower educational level. Age group, type of family, sex, colour of ration card, ownership of house, work status and household expenditure had no significant association with optimal dietary modification for glycaemic control.

Table S.4- Association of Dietary modification for glycaemic control with Sociodemographic characteristics

Variable	N	Optimal Dietary modification for glycaemic control n (%)	p value	Crude OR (95% CI)
Marital status				
Single/Divorced/Widowed	45	3 (6.7)	**0.055**	**Ref**
Married	155	30 (19.4)		3.4(1.0-11.6)
Education				
No formal education/Upto primary	69	6 (8.7)	**0.036**	**Ref**
Upto secondary/ Higher secondary/ Degree and above	131	27 (20.6)		2.7 (1.1-7.0)

*OR-Odds Ratio, CI-Confidence Interval

S.2.2 Association of Optimal Dietary modification for glycaemic control with general health and disease condition related characteristics

Those who had mobility issues had a lower odds of practicing optimal dietary modification for glycaemic control when compared to those who do not have mobility issues. Other health and disease condition related characteristics had no significant association with optimal dietary modification for glycaemic control.

Table S.5- Association of Dietary modification for glycaemic control with general health and disease condition related characteristics

Variable	N	Optimal Dietary modification for glycaemic control n (%)	p value	Crude OR (95% CI)
Mobility				
No problems in walking about	95	23 (24.2)	**0.007**	**Ref**
Slight/moderate/severe/ unable	105	10 (9.5)		0.3(0.2-0.7)

Table continued…

Variable	N	Optimal Dietary modification for glycaemic control n (%)	p value	Crude OR (95% CI)
Anxiety				
Not anxious/depressed	140	28 (20.0)	**0.048**	**Ref**
Slightly/moderately/severely/ extremely	60	5 (8.3)		0.4 (0.1-1.0)
Who prescribed meal plan				
Family/Friends/social media/Others	146	20 (13.7)	**0.083**	**Ref**
Health care provider	54	13 (24.1)		2.0 (0.9- 4.4)

*OR-Odds Ratio, CI-Confidence Interval

S.2.3 Multiple Logistic Regression model

All predictor variables which exhibited alpha value less than 0.1 on bivariate analysis was taken for building a model. Optimal Dietary modification for glycaemic control was taken as the dependent variable. Enter method was used. In addition to variables which was obtained significant in bivariate analysis age group and sex was retained during the analysis. Variables which had p values less than 0.1 were regarded as significant predictors for the outcome variable. Prescription of a meal plan and Mobility were found as significant predictors for Optimal Dietary modification for glycaemic control. People who were prescribed a meal plan by a Health care provider were 2.14 times likely to practice optimal dietary modification for glycaemic control when compared to those who were prescribed a meal plan by family/friends/social media/others. People who had slight/moderate/severe mobility issues or those who were unable to walk were less likely to practice optimal dietary modification for glycaemic control than others who did not have problems in walking about.

Variable	Adjusted OR (95%CI)	p value
Who prescribed meal plan		
Family/Friends/social media/Others	Ref	
Health care provider	2.14 (0.92-4.95)	0.075

Table continued…

Mobility		
No problems in walking about	Ref	
Slight/moderate/severe/ unable	0.459 (0.18-1.14)	0.094

S.3 List of themes and subthemes that emerged from the inductive thematic analysis

Theme	Axial Codes	Open codes
1. Food is shaped by family's preferences and personal choices	The need to deal with food related expectations and preferences of family members	• Variety in the diet- to avoid monotony and to fulfil food preference for the family members • Food and relationships
	Adapting food preferences to individualised perspectives while recognising its impact on the body	• What does food mean to them? • Taking responsibility for one's health • Realisation of good and bad foods for the body • Prevent disordered eating practices like overeating • Reasons for not over eating-work related • Reasons for not over eating-precautionary measure • Realisation of one's weakness regarding food • Source of health-related information (TV, radio, AW, doctors) • Tailoring the dietary pattern as per one 's comfort and health

Table continued…

Theme	Axial Codes	Open codes
2. Determining factors that influence the selection of dietary management strategies for diabetes	General biomedical and symptomatic knowledge influencing responses to diabetes diagnosis and the physiological impact of diagnosis on the body	• General biomedical and symptomatic knowledge about the condition • Acceptance of the diagnosis • Unanticipated sugar diagnosis • Disappointment associated with diagnosis • Stigma associated with the diagnosis • Effect of diagnosis on the body
	General knowledge on food-related management of the condition and additional sources of information for dietary management contributing to consistent dietary practices.	• General knowledge about management of the condition (food related) • Probable h/o hypoglycaemic episodes • Keeping chocolates/ sweets in handy to manage hypo episodes • Source of health-related information (TV, radio, AW, doctors) • Advice by HCP for dietary modifications- number/quantity/ food items specified
	Enforcing restrictions in food to manage sugar levels	• Calorie restriction to manage diabetes/ Reduction in portion sizes • Sugar restriction to manage diabetes
	Enforcing substitution/replacement in food to manage sugar levels	• Use of sugar substitutes • Rice to wheat replacement
	Incorporating Nutrient-Rich additions to food to manage sugar levels	• Intake of nutrient dense food to manage diabetes • Intake of ragi, millets

Table continued…

Theme	Axial Codes	Open codes
	Verbalising quantities of food consumed	• Fixed number/quantity of food
	Attempts in following a routine surrounding food intake	• Fixed timings to have food
3. Drivers of Dietary Management in Diabetes	Agency and autonomy enabling good and consistent dietary management for diabetes as well as promoting healthy dietary behaviour among other family members	• Consistency in following the advices given by the healthcare provider/self • Decision making power within the house (food and overall) • Voice- implementation of their food related wishes/ Implementation of food choices/preferences • Promotion of healthy dietary behaviours among other family members
	Driving factors in supporting the diabetic person which enables good and consistent dietary management	• Diabetic spouse in the house • Support to the diabetic spouse in terms of taking care of his dietary requirements • Spousal support in following dietary advices at home- yes • Support from other family members in following dietary advices at home • Support in other forms from others • Presence of other illness which demands food restriction- sugar • Presence of other illness which demands food restriction- non veg

Table continued…

Theme	Axial Codes	Open codes
4. Challenges in Dietary Management	Agency Constraints, Health Limitations, and Motivational Deficits	• Biggest problem in managing diabetes- food control • Barriers in following the intended dietary pattern • Adoption of dietary modification- inability to carry it out due to laziness/lack of interest • No voice • Eating problems- travelling • Adoption of dietary modification- inability to carry it out due to health issues • Intake of nutrient dense food to manage diabetes- inability to follow dietary advices by HCP (health issues)
	Cultural practices surrounding food intake	• Cultural/religious practices
	Generalized Healthcare guidance affecting Dietary management strategies	• Discourse on dietary advice received from HCP- very broad and general • Number/quantity of food not fixed • No fixed timings/routine to have food

Table continued…

Theme	Axial Codes	Open codes
	Craving and disappointment which calls for emotional support and someone at home to stop unhealthy eating habits even after diagnosis	• Inability to restrict sugar intake • Tendency to deviate from the intended dietary pattern (craving) • Biggest problem in managing diabetes- disappointment associated with it • Comparison of sugar levels with that of another diabetic person in the house • Continuing unhealthy eating habits after the diagnosis • Emotional barriers in controlling blood glucose levels
	Lack of Spousal Support	• Spousal support in following dietary advices at home- no • Need for emotional and mental support for managing diabetes • Need to have someone at home to help in management
5. Exercise as a form of behavioural modification	Carrying out the behavioural modification	• Carrying out behavioural modification (exercises) • Discourse by HCP on behavioural modifications- exercise is very broad
	Health issues hindered the implementation or attempt to engage in exercise, serving as barriers	• Adoption of weight control measures- inability to carry it out due to health issues
	Motivational deficits in carrying out the behavioural modification	• Demotivated to carry out exercises

Table continued…

Theme	Axial Codes	Open codes
6. Medications for management	Knowledge and autonomy regarding medication for management	• General biomedical knowledge (about medications) • Means of visiting health facility for check ups • Freedom to take decisions about one's health • Advice by HCP for behavioural modifications- medication • Financial freedom/independence • Intake of insulin for management • Fear associated with taking insulin
	Knowledge about treatment goals	• Knowledge about treatment goals
	Efforts taken not to miss medications while travelling	• Efforts taken to not to miss medication while travelling
	Comparison of sugar levels with that of another diabetic person in the house	• Comparison of sugar levels with that of another diabetic person in the house • Inconsistency in intake of medications
7. Gendered roles and differences	Subtle patronizing/Obligations	• Who does the cooking? • Who does the serving?
	Gendered roles	• Feminine role of doing housework and cooking for the family as well as others • Masculine role of earning for the family/breadwinning
	Financial freedom/independence	• Financial freedom/independence

Table continued…

Theme	Axial Codes	Open codes
	Difference in the level of support received by a man and a woman for managing their diabetes	• Difference in support received by a man and a woman for managing their diabetes
	Changing Gender dynamics	• Changing gender dynamics

ANNEXURE 2a- CLUSTER SHEET AND INTERVIEW SCHEDULE FOR CROSS-SECTIONAL SURVEY

GENDERED DIFFERENCES IN THE DIETARY MANAGEMENT AMONG TYPE 2 DIABETES PATIENTS IN PALAKKAD DISTRICT, KERALA

CLUSTER SHEET (For each ward)

Rural/ Urban: _____

Cluster/Ward no: _____

Household number	Household sheet filled 0-No 1-Yes	Reason if not filled 0-No diabetic person 1-Other (specify)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Household participants- Males (age in descending order)

Sl No	Men	Diabetic status	Selected (✔)	Remarks (if any)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

Household participants- Females (age in descending order)

Sl No	Women	Diabetic status	Selected (✔)	Remarks (if any)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

Achutha Menon Centre for Health Science Studies (AMCHSS)

Sree Chitra Tirunal Institute for Medical Sciences & Technology (SCTIMST)

Trivandrum -11

GENDERED DIFFERENCES IN THE DIETARY MANAGEMENT AMONG TYPE 2 DIABETES PATIENTS IN PALAKKAD DISTRICT, KERALA

Interview Schedule- T2DM Patients

Identification No.: ……

Date of interview: ……

Panchayath/Municipality: ……

Ward name: ……

Participant and Sociodemographic details

Sl No	Question	Responses	Remarks
1	Name		
2	Age in completed years		
3	Sex	1❑F 2❑M	
4	Marital status	1 ❑ Single 2 ❑ Married 3 ❑ Divorced / ❑ Separated 4 ❑ Widowed 5❑Other(specify) ……	**Skip to 6 if not answered 2**
5	Is your spouse diabetic?	1❑ Yes 2❑ No	

6	Religion	1 ❑Hindu 2 ❑Muslim 3 ❑Christian 4 ❑Others (Specify) ……	
7	Type of family	1 ❑ Nuclear 2 ❑ Joint 3 ❑ Extended	
8	Highest Education level completed	1❑ No formal education 2 ❑Upto Primary school 3 ❑Upto Secondary school 4 ❑Higher secondary/Certificate/Diploma 5❑ Degree and above	
9	What kind of work do you mainly do?	……	
10	Colour of Ration card	1 ❑Yellow 2 ❑Pink 3 ❑Blue 4 ❑White 5 ❑No ration card	
11	Current housing situation	1❑Own house 2❑Rented house 3❑Others (specify) ……	**Skip to 13 if answered 2 or 3**
12	Who owns the house?	1❑Male member 2❑Female member	

		3❑Both 4❑Don't know	
13	Approximate Household expenditure in the last month (in Rs)	……	
14	How long have you been diagnosed as diabetic? (Duration in completed years)	……	
15	Source of the above information	1❑Self-reported 2❑ Based on records	
16	Any other illness?	1❑Hypertension 2❑Dyslipidemia 3❑Others (specify) ……	**Selection of Multiple options possible**
17	What is your smoking status?	1❑ Never smoked 2❑Smoked in the past, but currently not smoking 3❑Current smoker	
18	Do you use any form of smokeless tobacco products?	1❑ Never used 2❑ Used in the past, but currently not using 3❑Current user	
19	Have you ever consumed any alcoholic products?	1❑ Yes 2❑ No	**Skip to 20 if answered 2**
19.1	If yes, on how many days did you have at least 1 drink of alcohol in the last month?		
20	Do you currently use any digital device/application to help you manage your diabetes?	1❑ Yes 2❑ No	**Skip to 21 if answered 2**

20.1	If yes, how do you use the digital device/application for helping you control your diabetes	❑Tracking blood sugar levels ❑Managing my diet ❑Managing my physical activity level ❑Reminders for taking medication/health check-ups	**Selection of Multiple options possible**
20.2	Could you please show me the digital device/application that you are using?	……	

Health related Quality of life using EQ-5D-5L

21	Under each heading, please tick the ONE box that best describes your health TODAY	
21.1	**MOBILITY**	
21.1.1	I have no problems in walking about	❑
21.1.2	I have slight problems in walking about	❑
21.1.3	I have moderate problems in walking about	❑
21.1.4	I have severe problems in walking about	❑
21.1.5	I am unable to walk about	❑
21.2	**SELF-CARE**	
21.2.1	I have no problems washing or dressing myself	❑
21.2.2	I have slight problems washing or dressing myself	❑
21.2.3	I have moderate problems washing or dressing myself	❑
21.2.4	I have severe problems washing or dressing myself	❑
21.2.5	I am unable to wash or dress myself	
21.3	**USUAL ACTIVITIES (e.g., work, study, housework, family or leisure activities)**	
21.3.1	I have no problems doing my usual activities	❑
21.3.2	I have slight problems doing my usual activities	❑
21.3.3	I have moderate problems doing my usual activities	❑
21.3.4	I have severe problems doing my usual activities	❑
21.3.5	I am unable to do my usual activities	❑
21.4	**PAIN / DISCOMFORT**	
21.4.1	I have no pain or discomfort	❑
21.4.2	I have slight pain or discomfort	❑
21.4.3	I have moderate pain or discomfort	❑
21.4.4	I have severe pain or discomfort	❑
21.4.5	I have extreme pain or discomfort	❑

21.5	ANXIETY / DEPRESSION	
21.5.1	I am not anxious or depressed	❑
21.5.2	I am slightly anxious or depressed	❑
21.5.3	I am moderately anxious or depressed	❑
21.5.4	I am severely anxious or depressed	❑
21.5.5	I am extremely anxious or depressed	❑

EQ-5D Visual Analog Scale

• We would like to know how good or bad your health is TODAY.

• This scale is numbered from 0 to 100.

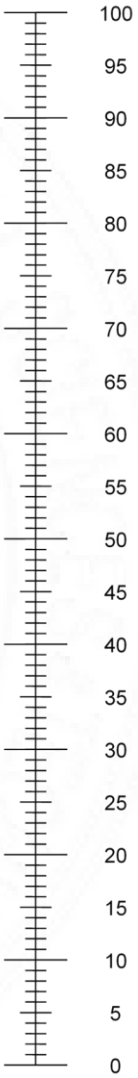
• 100 means the best health you can imagine. 0 means the worst health you can imagine

• Mark an X on the scale to indicate how your health is TODAY.

• Now, please write the number you marked on the scale in the box below.

22. YOUR HEALTH TODAY = ☐

The best health you can imagine



The worst health you can imagine

Perceived Blood glucose control

23	How satisfied are you with your overall blood glucose control	1❑ I have excellent control 2❑ I have good control 3❑ I have some problems 4❑ I have very poor control	
24	Can you tell me what you mean when you say blood glucose control? By blood glucose control, I mean keeping Blood sugar level below a certain level as prescribed by a healthcare provider	……	
25	How have you usually tested your blood sugar in the last 1 year?	1❑Hospital/Lab only 2❑ Hospital/Lab + Home based test by health provider 3❑ Hospital/Lab + Home based glucometer test by self/caregiver 4❑ Not tested	**Skip 26-28 if answered 4**
26	How often did you test your blood sugar in the last 1 year?	1❑ Occasionally as needed 2❑ About once a month 3❑ About 2-3 times a month 4❑ About once a week 5❑ Several times a week 6❑ Once a day 7❑ Several times a day	
27	When was the last time you checked your blood sugar level?	……	

28	Do you have your reports with you?	1❑Yes 2❑No	**Skip 28.1 if answered 2**
28.1	If Yes, can I see them?	Recent blood sugar level is …… on …… Type of reading- 1❑Fasting 2❑Post prandial 3❑Random	
29	When was the last time you checked your HbA1c level? HbA1c test is a simple blood test that measures your average blood sugar levels over the past 3 months	……	
29.1	Do you have your reports with you?	1❑Yes 2❑No	**Skip 29.2 if answered 2**
29.2	If Yes, can I see them?	Recent HbA1c level is …… on ……	

Diet

30	In a typical week, on how many days do you eat fruit?	Number of days…… ❑Don't Know	
31	In a typical week, on how many days do you eat vegetables?	Number of days…… ❑Don't Know	
32	**Does your daily diet include:**		
32.1	Green leafy vegetables (Amaranthus/ palak/spinach/drumstick leaves)	1❑Yes 2❑No	**Skip to 32.2 if answered 2**

32.1.1	If yes, how much?	1❑2 handful at least 2❑ Less than 2 handful	
32.2	Other vegetables, cooked/chopped/raw (Excluding potato and tubers)	1❑Yes 2❑No	**Skip to 32.3 if answered 2**
32.2.1	If yes, how much?	1❑ 1 handful at least 2❑ Less than 1 handful	
32.3	Vegetable Juice (Bittergourd/ Cucumber/ Carrot/ Ashgourd)	1❑Yes 2❑No	**Skip to 32.4 if answered 2**
32.3.1	If yes, how much?	1❑ 1 handful 2❑ Less than 1 handful	
32.4	Fresh fruit (Mango/ Banana/ Papaya/ Orange/ Grapes/ Apple/ Jackfruit)	1❑Yes 2❑No	**Skip to 32.5 if answered 2**
32.4.1	If yes, how much?	1❑ One medium sized piece (apple/banana) 2❑ Less than that	
32.5	Chopped/ cooked/ canned fruit (Mango/ Pineapple/ Jackfruit)	1❑Yes 2❑No	**Skip to 32.6 if answered 2**
32.5.1	If yes, how much?	1❑1 handful at least 2❑ Less than 1 handful	
32.6	Fruit juice (Orange/ Mango/ Grapes)	1❑Yes 2❑No	**Skip to 33 if answered 2**
32.6.1	If yes, how much?	1❑ 1 handful at least 2❑ Less than 1 handful	

Weight change and Diet change readiness

33	Are you currently trying to lose weight?	1❑Yes, I am trying to lose weight 2❑ No, but I am trying to keep from gaining weight 3❑No, I am not making any attempts to control my weight now.	
34	Have you experienced weight loss without trying?	❑Yes ❑No/Don't know	
35	Are you currently trying to follow a meal plan in order to better control your blood glucose? By meal plan I mean a prescribed plan for Timing, quantity, type of food.	1❑Yes, I have a plan I am trying to follow 2❑No, I am not following a plan but I am conscious of how food affects my blood sugar and try to make some changes 3❑ No, I continue to eat how I usually have been eating all along	**Skip to 35.2 if answered 1**
35.1	If No, can you tell me why?	1❑I have not been prescribed a meal plan 2❑Others (specify) ……	**Skip to 36 if answered 1**
35.2	Who has prescribed the meal plan?	1❑Health care provider 2❑Family member 3❑Friends 4❑Social media 5❑Others	**Selection of multiple options possible**

Diet knowledge and skills

36	**During the past 3 months,**		
36.1	How often did you deliberately skip a meal to cut calories or fat? By meal I mean regular relatively large servings of food consumed as breakfast, lunch or dinner	1❑Never 2❑ About once/few times a month 3❑ About once/few times a week 4❑ Almost everyday	
36.2	How often did you deliberately skip a snack to cut calories or fat? By snacks, I mean smaller servings like (names of locally popular snacks)	1❑Never 2❑ About once/few times a month 3❑ About once/few times a week 4❑ Almost everyday	
36.3	How often did you deliberately take small portion sizes to cut calories, sugar or fat?	1❑Never 2❑ About once/few times a month 3❑ About once/few times a week 4❑ Almost everyday	
36.4	How often did you resist the temptation to eat a food you want because it is too high in fat, sugar, or calories?	1❑Never 2❑ About once/few times a month 3❑ About once/few times a week 4❑ Almost everyday	

Eating Problems

37	**During the past 3 months,**		
37.1	How often did you overeat? By overeating, we mean eating until you feel stuffed or too full.	1❑Never 2❑ About once/few times a month 3❑ About once/few times a week 4❑ Almost everyday	
37.2	How often did you eat unplanned snacks/ Make unhealthy food choices? That is, how often do you find yourself snacking/eating a particular food and then thinking "I wish I had not eaten that?"	1❑Never 2❑ About once/few times a month 3❑ About once/few times a week 4❑ Almost everyday	

Diet Barriers

38	**During the past 3 months, how often have you had a problem with each of the following?** **By an eating problem we mean difficulty in following a prescribed diet or restricting foods that you were told to restrict**		
38.1	Eating problems because family tempt you or are not very supportive of your efforts to eat right	0❑Living alone 1❑Never 2❑ About once/few times a month 3❑ About once/few times a week 4❑ Almost everyday	

38.2	Eating problems because friends tempt you or are not very supportive of your efforts to eat right	0❑I never/hardly ever eat with friends 1❑Never faced problems 2❑ About once/few times a month 3❑ About once/few times a week 4❑ Almost everyday	
38.3	Eating problems when eating away from home (e.g., restaurants, relatives).	0❑I never/rarely ever eat away from home 1❑Never 2❑ About once/few times a month 3❑ About once/few times a week 4❑ Almost everyday	
38.4	Eating problems because you are too busy with family, work, or other responsibilities.	0❑ I am usually never too busy with responsibilities 1❑ Never 2❑ About once/few times a month 3❑ About once/few times a week 4❑ Almost everyday	

38.5	Eating problems because the prescribed food is too expensive. By prescribed food we mean food prescribed by a healthcare provider	0❑I have not received any prescription for specific foods 1❑ Never 2❑ About once/few times a month 3❑ About once/few times a week 4❑ Almost everyday	
38.6	Do you tend to reduce your control over what you eat during special occasions like festivals? (Onam, Vishu, Ramzan, Easter)?	1❑Never 2❑Rarely 3❑Occasionally 4❑Often 5❑Always	
38.7	Do you find it difficult to follow your dietary advice during these festivals or religious events (Onam, Vishu, Ramzan, Easter)?	1❑Never 2❑Rarely 3❑Occasionally 4❑Often 5❑Always	

Medication use

39	What type of treatment are you currently following for your diabetes management?	1❑Allopathy 2❑ Indian system of medicine (Ayurveda, Unani or Siddha) 3❑ Homoeopathy, Yoga & Naturopathy 4❑Others (specify) …… 5❑No treatment	**Selection of Multiple options possible**
40	What is the type of medical institution that you regularly go for your diabetes treatment?	1❑ Govt./public hospital (incl. HSC/PHC/CHC etc.) 2❑Charitable/Trust/NGO run hospital 3❑ Private hospital 4❑Others (specify) ……	
41	Has your doctor prescribed any medications for your diabetes?	1❑Yes 2❑No	**Skip 41.1-41.3, if answered 2**
41.1	If Yes, can I see the prescription/ medicines which you are taking?	1❑Verified- Oral hypoglycaemic agents 2❑ Verified- Complementary and alternative medicine 3❑Not verified	
41.2	How often are you supposed to take these medications?	1❑I do not take medication for my diabetes 2❑Occasionally as needed	

		3❑Once per day 4❑Twice per day 5❑Three or more times per day	
41.3	How often do you end up taking these medications?	1❑ I do not take medications for my diabetes 2❑ I never miss a dosage. 3❑ I miss a dose a couple times a month or less 4❑ I miss a dose once or a few times a week 5❑ I miss a dose almost every day 6❑ I never take my prescribed medications	
42	Has your doctor prescribed insulin shots for your diabetes?	1❑Yes 2❑No	**Skip 42.1-42.2, if answered 2**
42.1	How often are you supposed to take insulin?	1❑I don't take insulin 2❑Occasionally as needed 3❑Once a day 4❑Twice a day 5❑Three or more times a day	
42.2	How often do you end up taking your insulin?	1❑ I have not been prescribed insulin for my diabetes 2❑ I never miss a shot	

		3❑ I miss a couple times a month 4❑ I miss once or few times a week 5❑ I miss almost every day 6❑ I never take my prescribed insulin	

Medication Barriers

43.	**During the past 3 months, how often has each of the following caused a problem in taking your prescribed medicine (including insulin shots)?**		**Skip if answered 2 for 41**
43.1	The medicine has unpleasant side effects.	1❑Never 2❑1 time a month or less 3❑2-3 times per month 4❑1-3 times a week 5❑4-6 times a week 6❑1 or more times per day	
43.2	Family members are not very supportive.	1❑Never 2❑1 time a month or less 3❑2-3 times per month 4❑1-3 times a week 5❑ 4-6 times a week 6❑1 or more times per day	

43.3	When away from home (e.g., on vacation, business trips, at restaurants).	0❑Iam never/hardly ever away from home 1❑Never 2❑1 time a month or less 3❑2-3 times per month 4❑1-3 times a week 5❑ 4-6 times a week 6❑1 or more times per day	
43.4	My daily schedule (waking, going to bed, eat, work, etc.) is different from one day to the next.	1❑Never 2❑1 time a month or less 3❑2-3 times per month 4❑1-3 times a week 5❑ 4-6 times a week 6❑1 or more times per day	
43.5	Being too busy with family, work, or other responsibilities.	1❑Never 2❑1 time a month or less 3❑2-3 times per month 4❑1-3 times a week 5❑ 4-6 times a week 6❑1 or more times per day	

43.6	Are there any other reasons for missing medications?	1❑Fear of injections 2❑Financial barriers 3❑Others(specify) ……	

Family Nutrition Support

44	Is there any person who supports or advises your diabetic diet therapy?	1❑Yes 2❑No	**Conclude the interview, if answered 2**
45	Who supports your diet therapy?	1❑Spouse 2❑Family member- Male 3❑ Family member- Female 4❑ Others (specify) ……	
46	**Does the person who supports your diet therapy:**		
46.1	Encourage you to eat the right foods.	1❑Never 2❑Less than 2 times a month 3❑Twice a month 4❑Once a week 5❑Several times a week 6❑At least once a day	

46.2	Let you know they understand how important it is for you to eat right	1❑Never 2❑Less than 2 times a month 3❑Twice a month 4❑Once a week 5❑Several times a week 6❑At least once a day	
46.3	Remind you about sticking to your meal plan	1❑Never 2❑Less than 2 times a month 3❑Twice a month 4❑Once a week 5❑Several times a week 6❑At least once a day	
46.4	Suggest foods you can eat on your meal plan	1❑Never 2❑Less than 2 times a month 3❑Twice a month 4❑Once a week 5❑Several times a week 6❑At least once a day	
46.5	Join you in eating the same foods as you	1❑Never 2❑Less than 2 times a month 3❑Twice a month	

		4❑Once a week 5❑Several times a week 6❑At least once a day	
46.6	Avoid tempting you with food or drinks that you shouldn't have	1❑Never 2❑Less than 2 times a month 3❑Twice a month 4❑Once a week 5❑Several times a week 6❑At least once a day	
46.7	Watch what you eat when you eat out	0❑ I never/ hardly ever eat out 1❑Never 2❑Less than 2 times a month 3❑Twice a month 4❑Once a week 5❑Several times a week 6❑At least once a day	
46.8	Cook meals for you that fit your meal plan	0❑ They do not generally cook 1❑Never 2❑Less than 2 times a month 3❑Twice a month 4❑Once a week 5❑Several times a week	

		6❑At least once a day	
46.9	Eat at the same time you do	1❑Never 2❑Less than 2 times a month 3❑Twice a month 4❑Once a week 5❑Several times a week 6❑At least once a day	
46.10	Praise you or show their appreciation for following your diet	1❑Never 2❑Less than 2 times a month 3❑Twice a month 4❑Once a week 5❑Several times a week 6❑At least once a day	
46.11	Support the purchase of special foods as per your diet plan	1❑Never 2❑Less than 2 times a month 3❑Twice a month 4❑Once a week 5❑Several times a week 6❑At least once a day	

46.12	Tell you not to eat something you shouldn't	1❑Never 2❑Less than 2 times a month 3❑Twice a month 4❑Once a week 5❑Several times a week 6❑At least once a day	
47.	How do you feel about their support?	1❑I appreciate their support and follow their advice 2❑I just appreciate their support but don't always follow their advice 3❑I appreciate their support but sometimes feel emotional barriers 4❑Others (specify) ……	

ANNEXURE 2b- INTERVIEW GUIDELINE FOR IN-DEPTH INTERVIEW (PATIENT)

Achutha Menon Centre for Health Science Studies (AMCHSS)

Sree Chitra Tirunal Institute for Medical Sciences & Technology (SCTIMST)

Trivandrum -11

GENDERED DIFFERENCES IN THE DIETARY MANAGEMENT AMONG TYPE 2 DIABETES PATIENTS IN PALAKKAD DISTRICT, KERALA

In depth interview- T2DM Patient

Date of interview: ……

Information sheet given: Yes/No

Written/Electronic informed consent received: Yes/No

Thank you for agreeing to participate in this study. I am doing this study to assess the level of family support and gender roles on dietary management among patients with Type 2 Diabetes and the things that may help or hinder their ability to follow dietary advices. Please remember there are no right and wrong answers here and your opinions are the most valuable. Your frank and open thoughts are important to understand the issue.

All information obtained from this interview will remain confidential and will be used for research purposes only. Individual information will not be disclosed to anyone under any circumstances.

1. Can you tell me how did you find out that you had diabetes?

- Probes
  - At the moment, how do you feel about being a person with diabetes? Can you tell me what makes you feel so? - things related to symptoms, diagnosis, life style, treatment modifications and such.
  - Who of those close to you- for example, your partner, family or friends- know that you have diabetes?

2. Normally, it is recommended for people living with diabetes to take medicine, change their diet, and be physically active (or exercise). Has your doctor recommended any of these things?

- Probes
    - Form of advice received (Oral, written form, sample diet plan, brochure, any other sources)
    - Who has given the advice?
    - How do you incorporate the different forms of advice into your diabetes management?

3. Has your food intake changed since your diabetes diagnosis? What have been the most important changes? Can you tell me about the current dietary practice that you follow?

- Probes
    - How easy or difficult has this been? Why has this been so?
    - Is the food prepared specially for you?
    - Is it different on weekdays and weekends?
    - Is it the same when you travel? (Work, social gatherings, festivals, occasions)

4. Have your family members' dietary habits changed since you were diagnosed with T2DM?

5. Has your diabetes affected the rest of the family? If so, how has it affected?

- Probes
    - Any issues in the family due to your dietary requirements
    - Issues specific to financial aspects, peoples' routines (so as to accompany you to doctor's appointment, maintain eating habits, exercise habits etc)

6. Who does the cooking in your house?

7. Can you tell me about the obstacles that you face in following your intended dietary pattern?

8. Can you tell me what is your usual time of having food?

- Probe
    - Do you usually eat last in your family? Do you practice clean plate attitude? (Not leaving leftover food on your plate)

9. How does your family support your need to eat healthily? Is there someone at home that provides support so that you can make the necessary changes in your dietary pattern? How do they help you? If no one helps you, why do you think that is?

- Probes
  - Who all help you monitor your food consumption practices at home?
  - Can you help me understand how they help you/why they are not able to help you in monitoring your food consumption practices? (Frequency, quantity, restricting eating away from home, acknowledging efforts made etc.)

10. Can you tell me about your role in decision-making in the house?

- Probes
  - Decision making on day-to-day things
  - Deciding what groceries to buy
  - Deciding what meals to cook and when to cook
  - Deciding when to eat

11. Can you tell me how do you get health related information?

- Probe
  - Which channel- community groups, healthcare workers, mobile, media

12. Can you tell me about your freedom to take decisions regarding your health on the basis of this information?

- Probe
  - Decide where and when to go to a healthcare facility

13. Can you tell me about your freedom to take decisions regarding the financial matters of the house?

- Probes
  - Financial resources, independence and responsibilities
  - Money you have at your disposal to spend for yourself

14. Can you tell me about any occasions when you were unable to follow the diabetic diet instructions? What would you say, is the biggest problem in managing your diabetes?

15. Men and women in our society have different roles and responsibilities. Can you describe some of the differences in the roles of men and women in your family/neighbourhood? Are there different expectations from men and women?

16. Do you feel that these differences affect the dietary management and the family support they receive for this?

17. What according to you, would help you follow your dietary advice better to manage your diabetes?

- Probes
  - Support from family
  - Support from friends, doctors
  - Others

18. Is there anything else that you would like to tell me regarding your diabetes and its treatment and the support that you receive from your family to manage your diabetes? Do your work, responsibilities, or (other activities based on the interview) interfere with your ability to manage your diet in ways that we have not discussed yet?

19. What change would you like to see happening in relation to the diet related aspects that we have discussed today?

Thank you for your time

ANNEXURE 2c- INTERVIEW GUIDELINE FOR IN-DEPTH INTERVIEW (HEALTH CARE PROVIDER)

Achutha Menon Centre for Health Science Studies (AMCHSS)

Sree Chitra Tirunal Institute for Medical Sciences & Technology (SCTIMST)

Trivandrum -11

GENDERED DIFFERENCES IN THE DIETARY MANAGEMENT AMONG TYPE 2 DIABETES PATIENTS IN PALAKKAD DISTRICT, KERALA

In depth interview- Health care Provider

Date of interview:

Information sheet given: Yes/No

Written informed consent received: Yes/No

Thank you for agreeing to participate in this study. I am doing this study to assess the level of family support and gender roles on dietary management among patients with Type 2 Diabetes and the things that may help or hinder their ability to follow dietary advices. Please remember there are no right and wrong answers here and your opinions are the most valuable. Your frank and open thoughts are important to understand the issue.

All information obtained from this interview will remain confidential and will be used for research purposes only. Individual information will not be disclosed to anyone under any circumstances.

1. **Regarding T2DM, patients need to manage blood glucose levels in order to delay or prevent complications. How would you summarise current key guidelines in Kerala for managing hyperglycemia?**

2. **I would be interested in discussing dietary patterns with you. What's your understanding of the term "dietary patterns", "dietary guidelines", "dietary habits"?**

3. **Do you currently give any advice on dietary patterns to patients with T2DM?**

4. **Can you give me an example of what advice you give on dietary patterns, and how you provide that information to your patients?**

    - Probes
        - How much detail do you go into (is there a specific structure)?
        - Do you provide information on foods, portion sizes, other?
        - Do you provide illustrations or leaflets?

5. **Can you tell me about your experiences with the dietary prescriptions for patients with T2DM?**

    - Probes
        - Type of advice
        - How patients perceive the advice
        - What works/ what is challenging?

6. **Are there different dietary patterns that you prescribe to T2DM patients? What would influence your choice of dietary pattern for advising patients with T2DM?**

7. **Can you recollect some recent patient encounters where the person was able to modify their diet in a very good way. Can you share another experience where the person was not able to make the recommended dietary changes? In your opinion, why are some people able to make the recommended changes while some others are not?**

8. **How important do you think family support is for a T2DM patient to follow dietary advice which you give?**

9. **In your experience, have you encountered situations where patients with T2DM have expressed challenges or difficulties in adhering to the dietary recommendations you've provided for their diabetes management? If so, could you please share some of the common reasons or barriers that patients have mentioned during these discussions?**

10. **Men and women in our society have different roles and responsibilities. Can you describe some of the differences in the roles of men and women among the patients and their families that you serve? Can you tell me about the differences in expectations from men and women?**

11. Do you feel that these differences affect the dietary management and the family support for the same that your patients receive?

12. What changes would you like to see so that patients with diabetes are able to modify their diet as required?

- Probe
  - Guidelines, skilled providers

Thank you for your time

ANNEXURE 3- INFORMATION SHEET AND CONSENT FORM OF PATIENTS AND HEALTH CARE PROVIDERS

Achutha Menon Centre for Health Science Studies (AMCHSS)

Sree Chitra Tirunal Institute for Medical Sciences & Technology (SCTIMST)

Trivandrum -11

GENDERED DIFFERENCES IN THE DIETARY MANAGEMENT AMONG TYPE 2 DIABETES PATIENTS IN PALAKKAD DISTRICT, KERALA

Information sheet

Type 2 Diabetes patient

I am Dr. Amritha Suresh. I am a Dental graduate and Post graduate student in Public Health, studying at Achutha Menon Centre for Health Science Studies under Sree Chitra Tirunal Institute for Medical Sciences and Technology in Trivandrum, Kerala. As part of my course, I am doing research on the topic "Gendered differences in the Dietary management among Type 2 Diabetes patients in Palakkad district, Kerala". I would like to interview you about the dietary practices which you follow to control your diabetes and the factors associated with whether or not you are able to follow the suggestions given by your treating team/health care professionals. This information form may contain words that you do not understand. You can stop me at any point of time and I will be clarifying any questions or doubts during the course of interview. By giving informed consent, you indicate that you understood all the information provided in the information sheet and furnished your voluntary consent to participate in the research.

Purpose of the study

The purpose of this study is to assess the level of family support and gender roles on dietary management among Type 2 Diabetes patients above 30 years of age in Palakkad district, Kerala and also the differences in the way these effect men and women with diabetes. Another objective is to describe the perspectives and practices of health care providers such as dieticians, medical officers, staff nurses etc regarding the capacity of their patients with Type 2 Diabetes to adapt to dietary recommendations

About the study

We aim at collecting information using surveys and detailed interviews with some participants who are Type 2 Diabetes patients above 30 years of age, diagnosed with diabetes for at least 1 year as well as from Dieticians, Medical Officers, Staff nurses. This study is conducted by me as Principal Investigator (PI) under the supervision of my guide, Dr. Ravi Prasad Varma, Professor at Achutha Menon Centre for Health Science Studies, Sree Chitra Tirunal Institute for Medical Sciences and

Technology, Trivandrum. The ethics approval for the study will be obtained from Institutional Ethics Committee of Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum.

Participant Selection

I would like to know about the dietary practices that you follow to control your diabetes and the things that may help or hinder your ability to follow dietary advices. The interview may last for 20-30 minutes and will be audio recorded for documenting after seeking your consent. If you feel that the interview is long, I can conduct it over two sittings of about 15 minutes each according to your convenience. I will also request you to allow me to review the health records related to your diabetes. You may be contacted again if required, for detailed interviews, which may last for 40-45 minutes.

Voluntary Participation

Your participation in this research is entirely voluntary. It is your choice whether to participate or not. You may change your mind later and stop participating even if you agreed earlier.

What participation will be required from your side?

You may participate by responding to questions about your Diabetes and the dietary practices you follow to control it and the things that may help or hinder your ability to follow dietary advices. Your interview will be recorded after obtaining your consent. If you accept to take part, the interview will last for 20 to 30 minutes and the detailed interview will last for 40-45 minutes. Only and my guide Dr. Ravi Prasad Varma and I, will have access to the information. It is completely confidential. After the interview, you might be contacted again, if required, for a detailed interview.

Risks

There is a chance that you might accidentally disclose some private or confidential information, or that you might find some of the issues uncomfortable to discuss. If that happens, you can stop the interview at any stage and you are not required to respond to any questions or participate in the interview if you choose not to, and that is also acceptable. No explanation is necessary if you choose not to answer a question.

Benefits

There will be no direct benefit for you. There will be no kind of reward for taking part in the study. But, because of your involvement, the study's findings will be valuable in formulating policy that might be beneficial to service provision, policy making and further research in this topic.

Confidentiality

My guide and I will be the only people with access to the information you share, which will be held in strict confidence. No one other than my guide will ever be given access to the information that may reveal your identity. All data being gathered will only be utilised for research purposes. The data will be used for analysis of the study. The study's findings will be published and presented in scientific forums but will not identify you by name.

Right to Refuse or Withdraw

Your participation in the study will be completely voluntary. You have every right to withdraw during the course of interview at any point of time. There will be no consequences for withdrawing or choosing not to take part in the study.

For further clarifications and information

If you have any research related questions or doubts you can ask them now or later.

You may contact me through mail or phone.

Dr. Amritha Suresh,

MPH 2022, AMCHSS,

SCTIMST, Trivandrum, Kerala-695011

E-mail: amritha14jan@gmail.com

Contact no: 9400846001

If you have any concerns or queries on the authentication of this study, you may contact the member secretary of Institutional Ethics Committee of Sree Chitra Tirunal Institute for Medical Sciences & Technology. The contact details are given below.

Dr. Srinivas G,

Member Secretary, Institutional Ethics Committee

SCTIMST, Thiruvananthapuram – 695011.

Email: iec.mem.sec@sctimst.ac.in ,

Phone: 0471-2524689

Achutha Menon Centre for Health Science Studies (AMCHSS)

Sree Chitra Tirunal Institute for Medical Sciences & Technology (SCTIMST)

Trivandrum -11

GENDERED DIFFERENCES IN THE DIETARY MANAGEMENT AMONG TYPE 2 DIABETES PATIENTS IN PALAKKAD DISTRICT, KERALA

Information sheet

Health care provider

I am Dr. Amritha Suresh. I am a Dental graduate and Post graduate student in Public Health, studying at Achutha Menon Centre for Health Science Studies under Sree Chitra Tirunal Institute for Medical Sciences and Technology in Trivandrum, Kerala. As part of my course, I am doing research on the topic "Gendered differences in the Dietary management among Type 2 Diabetes patients in Palakkad district, Kerala". I would like to interview you about your perspectives and practices of dietary management of your patients with Type 2 Diabetes. This information sheet may contain words that you do not understand. You can stop me at any point of time and I will be clarifying any questions or doubts during the course of interview. By giving informed consent you indicate that you understood all the information provided in the information sheet and furnished your voluntary consent to participate in the research.

Purpose of the study

The purpose of this study is to assess the level of family support and gender roles on dietary management among Type 2 Diabetes patients above 30 years of age in Palakkad district, Kerala. Also, to describe the perspectives and practices of health care providers such as dieticians, medical officers, staff nurses etc regarding the capacity of their patients with Type 2 Diabetes to adapt to dietary recommendations

About the study

We aim at collecting information using surveys and in-depth interviews from Type 2 Diabetes patients above 30 years of age, diagnosed with diabetes for at least 1 year as well as from Dieticians, Medical Officers, Staff nurses. This study is conducted by me as Principal Investigator (PI) under supervision of my guide Dr. Ravi Prasad Varma, Professor at Achutha Menon Centre for Health Science Studies, Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum. The ethics approval for the study will be obtained from Institutional Ethics Committee of Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum.

Participant Selection

I would like to know about your perspectives and practices of dietary management of your patients with Type 2 Diabetes. The interview may last for 40-45 minutes and will be audio recorded for documenting after seeking your consent. You may be contacted again if required, only if the information documented is either incomplete or if any further clarification is needed.

Voluntary Participation

Your participation in this research is entirely voluntary. It is your choice whether to participate or not. You may change your mind later and stop participating even if you agreed earlier.

What participation will be required from your side?

You may participate by responding to questions about your perspectives and practices of dietary management of your patients with Type 2 Diabetes. Your interview will be recorded after obtaining your consent. If you accept to take part, the interview will last 40 to 45 minutes. Only my guide Dr. Ravi Prasad Varma and I, will have access to the information. It is completely confidential. After the interview, you might be contacted again, if required, only if the information documented is either incomplete or if any further clarification is needed.

Risks

There is a chance that you might accidentally disclose some private or confidential information, or that you might find some of the issues uncomfortable to discuss. However, you are not required to respond to any questions or participate in the interview if you choose not to, and that is also acceptable. No explanation is necessary if you choose not to answer a question.

Benefits

There will be no direct benefit for you. There will be no kind of reward for taking part in the study. But, because of your involvement, the study's findings will be valuable in formulating policy that might be beneficial to service provision, policy making and further research in this topic.

Confidentiality

I and my guide will be the only people with access to the information you share, which will be held in strict confidence. No one other than my guide will ever be given access to the specifics of the interview. All data being gathered will only be utilised for research purposes. The data will be used for analysis of the study. The study's findings will be published and presented in scientific forums but will not identify you by name.

Right to Refuse or Withdraw

Your participation in the study will be completely voluntary. You have every right to withdraw during the course of interview at any point of time. There will be no consequences for withdrawing or choosing not to take part in the study.

For further clarifications and information

If you have any research related questions or doubts you can ask them now or later.

You may contact me through mail or phone.

Dr. Amritha Suresh,

MPH 2022, AMCHSS,

SCTIMST, Trivandrum, Kerala-695011

E-mail: amritha14jan@gmail.com

Contact no: 9400846001

If you have any concerns or queries on the authentication of this study, you may contact the member secretary of Institutional Ethics Committee of Sree Chitra Tirunal Institute for Medical Sciences & Technology. The contact details are given below.

Dr. Srinivas G,

Member Secretary, Institutional Ethics Committee

SCTIMST, Thiruvananthapuram – 695011.

Email: iec.mem.sec@sctimst.ac.in ,

Phone: 0471-2524689

Achutha Menon Centre for Health Science Studies (AMCHSS)

Sree Chitra Tirunal Institute for Medical Sciences & Technology (SCTIMST)

Trivandrum -11

GENDERED DIFFERENCES IN THE DIETARY MANAGEMENT AMONG TYPE 2 DIABETES PATIENTS IN PALAKKAD DISTRICT, KERALA

Informed Consent

Type 2 Diabetes Patients-Analytical Cross-sectional survey

I _____ have read/ heard and understood all the information provided in the research information sheet. I understand that my participation in this study is entirely voluntary. By signing/ putting thumb impression I confirm my voluntary participation in this study. I give the researcher permission to audio record my interview for research reasons and to only share the recording with her guide. I also give her permission to review my health records related to my diabetes, when asked. I understand that I can withdraw my participation at any time during the interview without any explanation and I also understand that my identity and personal information will be kept confidential. I have been informed who should be contacted for further clarifications. I agree to take part in this study.

Permission given for recording: Yes/No

Name of the Participant: _____

Signature of the Participant: _____

Witnessed Thumb Impression (if unable to sign): Signature of witness:

Date: _____

Achutha Menon Centre for Health Science Studies (AMCHSS)

Sree Chitra Tirunal Institute for Medical Sciences & Technology (SCTIMST)

Trivandrum -11

GENDERED DIFFERENCES IN THE DIETARY MANAGEMENT AMONG TYPE 2 DIABETES PATIENTS IN PALAKKAD DISTRICT, KERALA

Informed Consent

Type 2 Diabetes Patients-In depth Interview

I _____ have read/ heard and understood all the information provided in the research information sheet. I understand that my participation in this study is entirely voluntary. By signing/ putting thumb impression I confirm my voluntary participation in this study. I give the researcher permission to audio record my interview for research reasons and to only share the recording with her guide. I understand that I can withdraw my participation at any time during the interview without any explanation and I also understand that my identity and personal information will be kept confidential. I have been informed who should be contacted for further clarifications. I agree to take part in this study.

Permission given for recording: Yes/No

Name of the Participant: _____

Signature of the Participant: _____

Witnessed Thumb Impression (if unable to sign) Signature of witness:

Date: _____

Achutha Menon Centre for Health Science Studies (AMCHSS)

Sree Chitra Tirunal Institute for Medical Sciences & Technology (SCTIMST)

Trivandrum -11

GENDERED DIFFERENCES IN THE DIETARY MANAGEMENT AMONG TYPE 2 DIABETES PATIENTS IN PALAKKAD DISTRICT, KERALA

Informed Consent

Healthcare Provider-In depth interview

I _____ have read/ heard and understood all the information provided in the research information sheet. I understand that my participation in this study is entirely voluntary. By signing/ putting thumb impression I confirm my voluntary participation in this study. I give the researcher permission to audio record my interview for research reasons and to only share the recording with her guide. I understand that I can withdraw my participation at any time during the interview without any explanation and I also understand that my identity and personal information will be kept confidential. I have been informed who should be contacted for further clarifications. I agree to take part in this study.

For electronic consent: Pdf of information sheet shared: Yes/No

Audio recording of consent (Introduction, explanation, voluntary participation, confidentiality, clarifications): Yes/No

Affirmation of consent through SMS/voice note: Yes/No

Permission given for recording: Yes/No

Name of the Participant: _____

Signature of the Participant: _____

Witnessed Thumb Impression (if unable to sign): Signature of witness:

Date: _____

ANNEXURE 4- PERMISSION LETTERS FROM MUNICIPALITY AND PANCHAYATS

OTTAPALAM MUNICIPALITY

MUNICIPAL OFFICE
OTTAPALAM OFFICE 04662244349
PIN 679 102
e-mail ID: secotplm3@gmail.com
DATE. 18/10/2023

To,

Dr.Amritha Suresh
MPH 2022, AMCHSS
SCTIMST, Trivandrum
Kerala – 695011

Sir,

Sub: Permission granting for the survey on " Gendered differences in the Dietary management among Type 2 Diabetes patients in Palakkad district, Kerala"

Citation (1). Letter from Sree Chitra Tirunal Institute for Medical Sciences And Techonlogy, Trivandrum dated 04/10/2023

(2). Your application dated 18/10/2023.

As per the requests cited above, I grant permission to Dr.Amritha Suresh scholar in MPH at Achutha Menon Centre For Health Science Studies, Sree Chitra Tirunal Institute for Medical Sciences And Techonlogy, Trivandrum to do her survey in Gendered differences in the Dietary management among Type 2 Diabetes patients in Ottapalam Municipal premises for academic purpose.

Janakidevi

Chairperson
Ottapalam Municipality

JANAKI DEVI K
CHAIRPERSON
Ottapalam Municipality

എ.പി. ലതിക
പ്രസിഡണ്ട്
തൃക്കടീരി ഗ്രാമപഞ്ചായത്ത്
പി.ഒ. തൃക്കടീരി-679502, പാലക്കാട് ജില്ല
ഫോൺ : 0466-2380042

കാരാട്ടുപറമ്പിൽ ഹൗസ്
വീരമംഗലം പി.ഒ-679503
മൊബൈൽ : 9496047156
9961176194

തിയ്യതി : 18/10/2023

സ്വീകർത്താവ്,

ഡോ.അമൃത സുരേഷ്,
MPH 2022, AMCHSS,
SCTIMST, തിരുവനന്തപുരം.

വിഷയം : തൃക്കടീരി ഗ്രാമപഞ്ചായത്തിലെ ടൈപ്പ് 2 പ്രമേഹരോഗികൾക്കിടയിലുള്ള ഭക്ഷണപരിപാലനത്തിനുള്ള ലിംഗപരമായ വ്യത്യാസങ്ങളെക്കുറിച്ചുള്ള പഠനത്തിന് അനുമതി നൽകുന്നത് .

തിരുവനന്തപുരം ശ്രീചിത്ര തിരുനാൾ ഇൻസ്റ്റിറ്റ്യൂട്ട് ഫോർമെഡിക്കൽസയൻസസ് ആൻറ് ടെക്നോളജിക്ക് കീഴിലുള്ള അച്ചുത മേനോൻസെൻറർഫോർഹെൽത്ത് സയൻസ് സ്റ്റഡീസിൽപഠിക്കുന്ന ഡോ.അമൃത സുരേഷ്, എംപിഎച്ച് 2022 എന്നവർക്ക് ടൈപ്പ് 2 പ്രമേഹരോഗികൾക്കിടയിലുള്ള ഭക്ഷണപരിപാലനത്തിനുള്ള ലിംഗപരമായ വ്യത്യാസങ്ങളെക്കുറിച്ചുള്ള പഠനത്തിനായി 6 വാർഡിൽനിന്നും 8 പേരുടെ വീതം വിവരങ്ങൾശേഖരിക്കുന്നതിനായി ഇതിനാല് അനുമതി നൽകുന്നു.

A.P. LATHIKA
President
Thrikkadeeri Grama Panchayat
Thrikkadeeri (Po), Palakkad (Dist.)

വല്ലപ്പുഴ ഗ്രാമപഞ്ചായത്ത്
വല്ലപ്പുഴ പി.ഒ, പാലക്കാട് ജില്ല – 679336
ഫോൺ : 0466–2235222
ddpvallapuzhapkd@gmail.com

No.VPZ-VGP/P57/2023 **Date: 19/10/2023**

പ്രേഷകൻ:

പ്രസിഡന്റ്,
വല്ലപ്പുഴ ഗ്രാമപഞ്ചായത്ത്

സ്വീകർത്താവ്:

ഡോ.അമൃത സുരേഷ്
MPH 2022, AMCHSS
SCTIMST, തിരുവനന്തപുരം.

സർ,

വിഷയം: വല്ലപ്പുഴ ഗ്രാമപഞ്ചായത്ത് – ടൈപ്പ് 2 പ്രമേഹ രോഗികൾക്കുള്ള ഭക്ഷണ പരിപാലനത്തിനുള്ള ലിംഗപരമായ വ്യത്യാസങ്ങളെ കുറിച്ചുള്ള പഠനത്തിന് അനുമതി – സംബന്ധിച്ച്.

തിരുവനന്തപുരം ശ്രീചിത്ര തിരുനാൾ ഇൻസ്റ്റിറ്റ്യൂട്ട് ഫോർ മെഡിക്കൽ സയൻസ് ആന്റ് ടെക്നോളജിക് കീഴിലുള്ള അച്യുത മേനോൻ സെന്റർ ഫോർ ഹെൽത്ത് സയൻസ് സ്റ്റഡീസ്–ൽ പഠിക്കുന്ന ഡോ.അമൃത സുരേഷ്, എം.പി.എച്ച് 2022 എന്നവർക്ക് ടൈപ്പ് 2 പ്രമേഹ രോഗികൾക്കിടയിലുള്ള ഭക്ഷണ പരിപാലനത്തിനുള്ള ലിംഗപരമായ വ്യത്യാസങ്ങളെ കുറിച്ചുള്ള പഠനത്തിനായി 6 വാർഡുകളിൽ നിന്നും 8 പേരുടെ വീതം വിവരങ്ങൾ ശേഖരിക്കുന്നതിനായി ഇതിനാൽ അനുമതി നൽകുന്നു.

പ്രസിഡന്റ്,

GRAMA PANCHAYATH OFFICE VALLAPUZHA PALAKKAD DT. PIN: 679 336 VALLAPUZHA P.O.

N.K. ABDUL LATHIF
President
Vallapuzha Grama Panchayath
Vallapuzha P.O.Palakkad Dt-679336
Mob: 9496047132

LAKKIDI-PERUR GRAMA PANCHAYAT

Mangalam (P.O), Palakkad Dt., Pin code: 679301
Phone: 0466-2230047 **E-mail: ddplekkidiperroorpkd@gmail.com**

No – A38189/23 Date – 20/10/2023

TO
Dr. Amritha Suresh
MPH 2022, AMCHSS
SCTIMST, Trivandrum
Kerala – 695011

Sir

Sub:- Permision granting for the survey on Gender differences in the Dietary Management Amoung type 2 Diabetes Patients in Palakkad district, Kerala

Citation - 1. Letter from Sree Chithra Tirunal Institute for Medical Science And Technology, Trivandrum
2. Your Application Dated 18/10/2023

As per the requests cited above, I grand permision to Dr.Amritha Suresh scholar in MPH at Achutha Menon Centre For Health Science Studies , Sree chithra Tirunal Institute for Medical Science And Technology, Trivandrum to do her survey in Gendered differences in the Dietary management amoung type 2 Diabetes patients in Lekkidi- Perur grama panchayat premises for academic purpose

Office of the Lakkidi Perur Grama Panchayat * Pin - 67 *

Secretary
Lakkidi Perur Grama Panchayat

ANNEXURE 5- COPY OF EMAIL FROM EUROQOL APPROVING THE USE OF EQ-5D-5L

Gmail — Amritha Suresh <amritha14jan@gmail.com>

Terms of Use Non-Commercial for the registration ID: 59356

EuroQol - Registration <registration@euroqol.org> — 5 October 2023 at 15:1
To: "amritha14jan@gmail.com" <amritha14jan@gmail.com>
Cc: "registration@euroqol.org" <registration@euroqol.org>

EQ-5D

Dear Ms. A Suresh ,

Thank you for your registration.

The study / project titled "Gendered differences in the Dietary management among Type 2 Diabetes patients in Palakkad district, Kerala" you registered fulfills the conditions for you to use the requested version(s) free of charge.

Below you find our **Terms of Use Non-Commercial**. We will provide you with the requested versions free of charge once we have received your agreement with our Terms of Use. You can indicate your agreement by pressing the green "Agree" button below. If you do not agree, please press "Disagree".

If you have any questions please contact us via Support Form on the website https://customer.euroqol.org/support.

Thank you in advance.

These Terms of Use of the ***STICHTING EUROQOL RESEARCH FOUNDATION***, *also trading as* ***EUROQOL RESEARCH FOUNDATION***, *a registered charity incorporated under the laws of The Netherlands, having its registered office in Rotterdam, and its principal place of business in (3068 AV) Rotterdam at the Marten Meesweg 107, The Netherlands* (hereinafter "**EuroQol**") should be accepted for the use of the EQ-5D in a Non-Commercial study or ROM/PROMS project, including registries (hereinafter "**Study**" or "**ROM/PROMs Project**").

By registering the Study or ROM/PROMs Project at the EuroQol website (https://euroqol.org/) and explicitly confirming acceptance of these Terms of Use by clicking the box "*Accept*" or by accepting the Terms by e-mail, the registered natural person or legal registered person becomes a User ("**User**").

Article 1 -Approved use

1. User is allowed to use the requested EQ-5D version on paper to be filled out by pen(cil) (hereinafter "**EQ-5D Paper**") and/or as ready-to-use surveys to collect EQ-5D data electronically on supported Electronic Data Capture (EDC) platforms (hereinafter "**EQ-5D module**") for the Study or ROM/PROMs Project registered on EuroQol's website.
2. Considering that the Study or ROM/PROMs Project is non-commercial, EuroQol grants permission to use the full version (*descriptive system, Visual Analogue Scale and copyright statement*) of the EQ-5D Paper and/or the EQ-5D module **free of charge** for the duration of the Study or ROM/PROMs Project: 'Gendered differences in the Dietary management among Type 2 Diabetes patients in Palakkad district, Kerala' with tracking ID number 59356.
3. In order to request use of the EQ-5D Paper and/or the EQ-5D module in a new study/project a new registration should be made on the website of EuroQol.
4. Separate permission is required if the Study or ROM/PROMs Project is funded by a pharmaceutical company, medical device manufacturer or other profit-making stakeholder.
5. Separate permission is required when the intention is to charge a fee for third party access to collected EQ-5D data in the Study or ROM/PROMs Project.
6. The permission to use the EQ-5D Paper and/or the EQ-5D module is restricted to:
   - A maximum of 10,000 unique respondents when used in a Study or Registry;
   - A maximum of 100,000 unique respondents when used in a ROM/PROMs Project;
   - 10 years from the date of acceptance of the Terms of Use when used in a ROM/PROMs project or Registry.
7. Upon acceptance of these Terms of Use, EuroQol will make the requested available EQ-5D Paper and/or EQ-5D module(s) accessible to User by means of the online customer portal.
8. The provided EQ-5D Paper and/or EQ-5D module may not be distributed to third parties other than clinical sites and participating partners without prior approval of EuroQol. Distribution includes, but is not limited to, making available on the internet and/or providing the versions to third parties other than participating partners, respondents or clinical sites.
9. The provided EQ-5D Paper may only be provided to respondents **on paper** to be **filled out with a pen(cil).**
10. The provided EQ-5D Paper and/or EQ-5D module may **only be used in accordance with the written instructions** of EuroQol as set out in the corresponding user guide (https://euroqol.org/publications/user-guides/). For the proper use of the EQ-5D module a separate guide will be issued, together with the EQ-5D module
11. Implementation of the provided EQ-5D Paper into an online survey, app or an electronic device is not allowed.
12. Implementation of the provided EQ-5D module onto other (EDC) platform(s) than for which it is developed, is not allowed.

Article 2 - Intellectual Property Rights

1. "**Intellectual Property Rights**" means copyrights, neighbouring rights, patents, design rights, trademarks, service marks, database rights, know-how, trade or business names, rights in confidential information and all other intellectual property rights and rights of a similar nature, whether registered or unregistered and wherever in the world such rights arise.
2. "**Moral Rights**" are all existing and future worldwide rights of the creator, including but not limited to the use and changing the name / title of EQ-5D, changes to or mutilation of EQ-5D.
3. EuroQol's Intellectual Property Rights includes rights in or in connection with EQ-5D (any version) and the name EQ-5D (any version).
4. All Intellectual Property Rights in, or in connection with the EQ-5D Paper and EQ-5D module are vested in EuroQol.
5. User is not allowed to modify, alter, amend the provided EQ-5D Paper and/or EQ-5D modular version or develop any (new) Language of the provided version(s), without permission of EuroQol.
6. Upon acceptance of these Terms of Use, User automatically transfers and assigns in advance irrevocably all Intellectual Property Rights in, or in connection with any modification, alteration, amendment, translation, flowchart, legend, dictionary or manual, which transfer EuroQol (on behalf of the EuroQol Group1) hereby accepts. User warrants that the Intellectual Property Rights shall be assigned and transferred to the EuroQol Group without any encumbrance pursuant to this Article 2.7. In addition, User renounces, as far as necessary, its Moral Rights in connection with or arising from any modification, alteration, amendment, translation, flowchart, legend, dictionary or manual. User shall not invoke its Moral Rights in connection with or arising from any modification, alteration, amendment, translation or development of any translation, flowchart, legend, dictionary or manual.
7. The User of the EQ-5D Paper and/or EQ-5D module shall include the copyright statement located in the footer of each EQ-5D Paper and/or EQ-5D module.
8. The User of the EQ-5D module is responsible for the correct representation of EQ-5D in the Study or ROM/PROMs Project. The EQ-5D should be represented as shown in the demo pages that can be found on the EuroQol website: https://euroqol.org/eq-5d-instruments/sample-demo/).
9. The User of the EQ-5D module is responsible for any license required for the use of the EDC platform if applicable.
10. Upon agreeing to the Terms of Use, User automatically transfers and assigns in advance irrevocably all Intellectual Property Rights in, or in connection with any modification, alteration, amendment or any (new) translation of the version, flowchart, legend, dictionary or manual, which transfer EuroQol hereby accepts. User warrants that the intellectual property rights shall be assigned and transferred to EuroQol Group without any encumbrance pursuant to this Article. In addition, any moral rights shall to the best of User's knowledge be waived.
11. The provided EQ-5D Paper and/or EQ-5D module **may not be reproduced** in a **publication or on the internet without written permission.**

Article 3 - Study or ROM/PROMs Project data

1. User is proprietor with regard to all personal and other data which is collected in connection with the use of the requested version.
2. The EuroQol Office shall not request nor receive any collected data from User. Therefore, User will be solely responsible with regard to the compliance with all applicable laws and regulations in respect of the protection of the collected (personal) data.

Article 4 - Liability

1. User is solely responsible for the use of the EQ-5D Paper and/or EQ-5D module and the data resulting from such use.
2. For the avoidance of any doubt, EuroQol is not liable towards User for any damage resulting from the use of the EQ-5D Paper and/or EQ-5D module in the Study or ROM/PROMs Project, except in case of gross negligence or willful misconduct by EuroQol.
3. User shall indemnify EuroQol and hold EuroQol harmless against any and all damages, claims, liabilities, costs and expenses, which may arise out of or are related to the (mis)use and/or reproduction of the content of the EQ-5D Paper and/or EQ-5D module provided by EuroQol to User, except in case of gross negligence or willful misconduct by EuroQol.

Article 5 - Miscellaneous

1. In case of questions regarding data analysis, User is requested to complete the Support Form on the website (https://customer.euroqol.org/support). Please refer to the Tracking ID number.
2. Frequently asked questions relating to the EQ-5D are answered on EuroQol's website (https://euroqol.org/support/faqs/).

Article 6 - Governing law

These Terms of Use shall be governed by, and construed in accordance with, the laws of the Netherlands.

Article 7 - Dispute Resolution and Governing Law

a) Vested outside the EU

1. If User is vested outside the EU, any dispute arising out of or in connection with these Terms of Use, including any question regarding its existence, validity or termination, shall be referred to and finally resolved by arbitration conducted in accordance with the International Chamber of Commerce Rules for Arbitration ("ICC Rules") for the time being in force, which rules are deemed to be incorporated by reference.
2. The number of arbiters shall be one (1) and shall be appointed by the Court of Arbitration. In principle, the arbiter shall not have the nationality of either of the parties. The place of arbitration shall be Rotterdam. The arbitral procedure shall be conducted in the English language. The arbitral court shall decide in accordance with the rules of law.
3. Notwithstanding the foregoing, nothing shall affect either party's right to seek an immediate remedy of an injunction, specific performance or similar court order to enforce the defaulting party's obligations.
4. These Terms of Use shall be governed by and construed in accordance with the laws of the Netherlands.

b) Vested in the EU

1. If User is vested in the EU these Terms of Use shall be governed by, and construed in accordance with, the laws of the Netherlands.
2. All disputes arising out or in connection with these Terms of Use shall be finally settled by the competent court in Rotterdam, the Netherlands.

Agree | Disagree

Best regards,

Bernhard Slaap
Executive Director
EuroQol Research Foundation

EQ-5D

T +31 884400190 | *+31 882026890* | E www.euroqol.org | Marten Meesweg 107 | 3068 AV Rotterdam The Netherlands

ANNEXURE 6- IEC CLEARANCE LETTER

श्री चित्रा तिरुनाल आयुर्विज्ञान और प्रौद्योगिकी संस्थान, त्रिवेन्द्रम
तिरुवनन्तपुरम - ६९५०११, केरल, इंडिया
SREE CHITRA TIRUNAL INSTITUTE FOR MEDICAL SCIENCES AND TECHNOLOGY, TRIVANDRUM
Thiruvananthapuram - 695 011, Kerala, India
(An Institute of National Importance under Govt. of India)
Grams : Chitramet, Phone : +91-471-2443152, Fax : +91-471-2550728 / 2446433, E-mail : sct@sctimst.ac.in, Website : www.sctimst.ac.in

Institutional Ethics Committee

CDSCO Registration No: ECR/189/Inst/KL/2013/RR-21
DHR Registration No:EC/NEW/INST/2022/2775

SCT/IEC/2158/DECEMBER/2023 11.01.2024

Dr. Amritha Suresh
MPH Student, AMCHSS
SCTIMST, Thiruvananathapuram

Dear Dr. Amritha Suresh,

The Institutional Ethics Committee held on 30th December, 2023, reviewed and discussed your application to conduct the study titled "**GENDERED DIFFERENCES IN THE DIETARY MANAGEMENT AMONG TYPE 2 DIABETES PATIENTS IN PALAKKAD DISTRICT, KERALA (IEC /2158)** "

Principal Investigator	Dr Amritha Suresh, MPH Student, AMCHSS, SCTIMST
Co-Principal Investigator(s)	Dr Ravi Prasad Varma , Additional Professor, AMCHSS, SCTIMST
Duration of the study	6 months

The following members of the Ethics Committee were present at the meeting held on 30th December, 2023

SL. No.	Member Name	Highest Degree	Gender	Scientific /Non Scientific	Affiliation with Institution(s)
1.	Smt. Sathi Nair	MA (English Literature)	Female	Lay Person	No
2.	Dr. Kala Kesavan P	MBBS,MD	Female	Basic Medical Scientist	No
3.	Adv. Priya Kaimal	LLM, MBL	Female	Legal Expert	No
4.	Dr. P. Manickam	BSMS, MSc (Epid).,PhD	Male	Health Science Expert/ Social Scientist	No
5.	Dr. Christina George	MD Psychiatry	Female	Clinician	No
6.	Dr. Narayanan Namboodiri. K K	MBBS,MD,DM	Male	Clinician	Yes
7.	Dr. Biju Soman	MBBS,MD, DPH, MSc, DLSHTM	Male	Basic Medical Scientist	Yes

The following documents were reviewed:

Original submission

1. Checklist Form
2. Covering letter addressed to the Chairman, IEC, SCTIMST dated 30.11.2023
3. Copy of SRC comments
4. Responses /amendments made based on the Reviewer's comments
5. IEC Application Form
6. Declaration Form
7. Research Proposal
8. Cluster Sheet (For each ward) in English and Malayalam
9. In depth interview- T2DM Patient in English and Malayalam
10. In depth interview- Health care Provider in English and Malayalam
11. Information Sheet - Type 2 Diabetes patient in English and Malayalam
12. Information Sheet – Health care provider in English and Malayalam
13. Informed Consent - Type 2 Diabetes Patients-Cross sectional survey in English and Malayalam
14. Informed Consent- Type 2 Diabetes Patients-In depth Interview in English and Malayalam
15. Informed Consent -Healthcare Provider-In depth interview in English and Malayalam
16. CV of Principal Investigator and Co-PI
17. Permission letters from Municipality and Panchayats
18. Permission letter from EuroQol for using Malayalam version of EQ-5D-5L
19. SRC Recommendation Letter

Revised submission

1. Checklist Form
2. Covering letter addressed to the Chairman, IEC, SCTIMST dated 11.01.2024
3. Copy of IEC Recommendation letter dated 09.01.2024
4. Responses /amendments made based on the Reviewer's comments
5. IEC Application Form
6. Declaration Form
7. Research Proposal
8. Cluster Sheet (For each ward) in English and Malayalam
9. In depth interview- T2DM Patient in English and Malayalam
10. In depth interview- Health care Provider in English and Malayalam
11. Information Sheet - Type 2 Diabetes patient in English and Malayalam
12. Information Sheet – Health care provider in English and Malayalam
13. Informed Consent - Type 2 Diabetes Patients-Analytical cross sectional survey in English and Malayalam
14. Informed Consent- Type 2 Diabetes Patients-In depth Interview in English and Malayalam
15. Informed Consent -Healthcare Provider-In depth interview in English and Malayalam
16. CV of Principal Investigator and Co-PI
17. Permission letters from Municipality and Panchayats
18. Permission letter from EuroQol for using Malayalam version of EQ-5D-5L

IEC Decision
The IEC approved the conduct of the study in the present form.

Remarks:
The Institutional Ethics Committee expects to be informed about the progress of the study, any SAE occurring in the course of the study, any changes in the protocol and patient information/informed consent and asks to be provided a copy of the final report.

There was no member of the study team / Guide who participated in voting / decision making process. The ethics committee is organized and operated according to the requirements of Good Clinical Practice and the requirements of the Indian Council of Medical Research (ICMR).

Sincerely,

Dr. G. Srinivas
Member Secretary, IEC

MEMBER SECRETARY
INSTITUTIONAL ETHICS COMMITTEE (IEC)
SCTIMST, THIRUVANANTHAPURAM

SREE CHITRA TIRUNAL INSTITUTE FOR MEDICAL SCIENCES & TECHNOLOGY
INSTITUTIONAL ETHICS COMMITTEE (IEC)
THIRUVANANTHAPURAM

ANNEXURE 7- PLAGIARISM CHECK REPORT

DrillBit

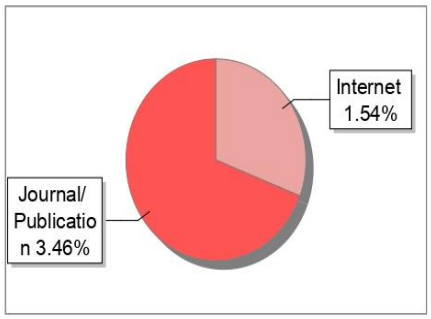
The Report is Generated by DrillBit Plagiarism Detection Software

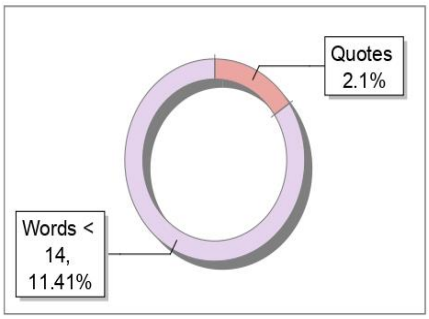
Submission Information

Author Name	Amritha Suresh
Title	'Gendered differences in the Dietary management among Type 2 Diabetes patients in Palakkad district, Kerala'
Paper/Submission ID	1700335
Submitted by	rpvarma@sctimst.ac.in
Submission Date	2024-04-26 12:06:49
Total Pages	93
Document type	Thesis

Result Information

Similarity **5 %**





Exclude Information

Quotes	Excluded
References/Bibliography	Excluded
Sources: Less than 14 Words %	Excluded
Excluded Source	**0 %**
Excluded Phrases	Not Excluded

Database Selection

Language	English
Student Papers	Yes
Journals & publishers	Yes
Internet or Web	Yes
Institution Repository	Yes

A Unique QR Code use to View/Download/Share Pdf File

DrillBit

DrillBit Similarity Report

5	36	A
SIMILARITY %	MATCHED SOURCES	GRADE

A-Satisfactory (0-10%)
B-Upgrade (11-40%)
C-Poor (41-60%)
D-Unacceptable (61-100%)

LOCATION	MATCHED DOMAIN	%	SOURCE TYPE
1	fmdiabetes.org	1	Publication
2	Thesis Submitted to Shodhganga, shodhganga.inflibnet.ac.in	<1	Publication
3	Psychometric Properties of the Modified Personal Diabetes Questionnair by Cheng-2016	<1	Publication
4	moam.info	<1	Internet Data
5	www.ilo.org	<1	Publication
6	dmsjournal.biomedcentral.com	<1	Publication
7	apjcn.nhri.org.tw	<1	Publication
8	clinmedjournals.org	<1	Internet Data
9	Gender and Nutrition Management by Wong-2005	<1	Publication
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12	The Role of Family Nutritional Support in Japanese Patients with Type 2 Diabetes by Watanabe-2010	<1	Publication
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