INFLUENCE OF FOOD LITERACY ON DIETARY PATTERNS OF DIABETIC TYPE II PATIENTS IN TWIN CITIES

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List of Abbreviations

Abbreviation	Full Form
ADA	American Diabetes Association
BMI	Body Mass Index
FAO	Food and Agriculture Organization
HbA1c	Hemoglobin A1c
HBM	Health Belief Model
IDF	International Diabetes Federation
KAP	Knowledge Attitude Practice
NGO	Non Governmental Organization
SCT	Social Cognitive Theory
SFLQ	Short Food Literacy Questionnaire
SPSS	Statistical Package for the Social Sciences
T2DM	Type 2 Diabetes Mellitus
WHO	World Health Organization

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ABSTRACT

Type II diabetes is a rapidly increasing public health challenge in Pakistan, where dietary habits and nutrition-related knowledge play a significant role in disease management. Food literacy—defined as the ability to understand, interpret, and apply nutrition information—may influence how diabetic individuals make daily food choices. However, limited evidence exists on how food literacy affects the dietary behavior of diabetic patients in the twin cities of Rawalpindi and Islamabad. This study aimed to assess the level of food literacy among Type II diabetic patients and to examine whether food literacy is associated with their dietary intake patterns.

A quantitative, descriptive cross-sectional study design was used. Data was collected from 302 patients diagnosed with Type II diabetes using a structured questionnaire. The instrument included demographic questions, the Short Food Literacy Questionnaire (SFLQ) to measure food literacy, and the Feel4Diabetes tool to assess dietary intake. Descriptive statistics and Chi-square tests were conducted using SPSS to determine the relationship between food literacy and dietary intake.

The findings showed that participants generally had moderate levels of both food literacy and dietary intake. Despite this, the results demonstrated no statistically significant association between food literacy and dietary intake. This indicates that having nutritional knowledge or awareness does not automatically translate into healthier dietary behaviors among diabetic patients in this population. Factors such as cultural eating practices, financial constraints, habitual family food patterns, limited access to healthy foods, and motivational barriers may override the influence of food literacy alone.

This study highlights the need for multidimensional diabetes management strategies that go beyond knowledge-based education. Practical skill-building, culturally appropriate counseling, family involvement, and community-level support may be required to help diabetic patients translate food literacy into meaningful dietary behavior change. Future research should explore psychosocial, environmental, and economic determinants of dietary choices among diabetic patients in Pakistan.

Keywords: *food literacy, dietary patterns, diabetes management, nutrition education, Type II diabetes, Rawalpindi, Islamabad*

CHAPTER I

Introduction

Diabetes type 2 has become a major health problem in the world. The International Diabetes Federation (2019) estimates that there are almost 463 million diabetics in the world and the number is set to increase to 700 million by 2045. This momentum causes severe financial and health strain, especially to the underdeveloped nations (World Health Organization, 2021). Pakistan leads in the ratio of diabetes cases in all of the countries, with over 19.4 millions of adult patients (IDF, 2021). Saeedi et al. (2020) indicate that the consequences of this disease are extremely severe, which is renal failure, heart conditions, and amputation of body parts. Dietary nutritional education should be provided because unhealthy lifestyles that are characterized by poor dieting aggravate these health threats.

Food literacy is based on the ability to comprehend and apply information connected to the selection and preparation of healthy food (Vidgen and Gallegos, 2014). To manage the diabetes, patients have to learn the details of food labels, read about how much to eat at any given time, and learn about the methods of cooking (Truman et al., 2017). A Canadian study revealed that a very low percentage of diabetics with type 2 diabetes have proper food literacy, which affects their diets (Palumbo, 2016). Not many studies on the topic exist in Pakistan, but available information proves that most diabetic people are unaware of what they should eat (Ahmed et al., 2022). A nutritionally unbalanced diet due to dietary illiteracy may negatively affect the health condition and make a person more dependent on medication (Begley et al., 2019). It may be necessary to examine food literacy of diabetic patients in Pakistan in order to develop better nutritional education initiatives.

Eating the specific foods on regular basis is known as dietary habits. A balanced diet that contains fruits, vegetables, whole-grains, and lean proteins is necessary to control diabetes (American Diabetes Association, 2020). Research indicates that consuming much processed food and sugar worsens the symptoms of diabetes (Foster et al., 2018). Pakistan patients with diabetes consume a significant amount of high-carb diets rich in low amounts of protein and fibers, which is harmful to their health (Shah et al., 2021). The eating habits of these people may be helpful in designing tailored nutrition plans that will succeed in helping them manage diabetes.

It should also be noted that the pattern of eating should be influenced by culture and socioeconomic status. Cultural food fear, financial concerns, and inaccessibility to the nutritious food sometimes influences people into adopting the unhealthy eating patterns (Popkin, 2015). The local Pakistani diet is normally rich in fats, oils, and processed carbohydrates, which becomes a big hindrance to diabetic patients who may want to efficiently control the situation. It is important to understand these cultural factors in order to come up with effective and acceptable educational interventions within the community.

Food literacy and eating habits are closely associated. Increased food literacy has had a beneficial effect on their diabetes due to healthier food choices that were made based on information and understanding (Vaitkeviciute et al., 2015). The Australian study concluded that the patients with a strong knowledge of food would attend to dietary advice on healthy food (Grea Krause et al., 2018). Nevertheless, research conducted in less developed countries demonstrates that food illiteracy is often the cause of poor eating habits (Worsley, 2015). Moreover, it has been found out that in diabetic patients, improved nutrition levels and self-confidence along with the improved diabetes self-care behavior occur in relation to higher food literacy (Mohan et al., 2018). Thus, it is possible to conclude that in addition to changing the eating habits, increased food literacy can have more far-reaching health effects.

Food literacy has new opportunities to enhance using new technology. Eating habits of diabetic patients have been noted to be improved with the help of mHealth-related data collecting interventions, like smartphone applications and online courses (Bian et al., 2017). An intervention, which is based on technology and education about diabetes, may be quite useful at the moment, given the increasing use of mobile phones in Pakistan.

Community has great impact on type 2 diabetic patients in regards to type 2 diets, besides education treatments. Friends, family, and community organizations can have a major influence on the goals of the patients in adopting healthier eating habits. The study found out that patients with a positive attitude and support of their social support are at a higher risk of adhering to dietary advice and excelling their blood sugar regulation (Baig et al., 2015). With families being usually close together in Pakistan, the focus on family support may increase the effectiveness of food literacy efforts. Furthermore, since women do most of the cooking in the South Asian families, gender disparities in health-related education must be taken care of. Food literacy provision to women can also make a difference in their health, as well as their family health. Food literacy programs should thus be culturally sensitive, family friendly and accessible. Learning about the role of cultural and social factors could be helpful to make local initiatives more feasible and sustainable.

The study objective is to offer general interventions which can foster a long-term change in the dieting habits and overall health outcomes of type 2 diabetic patients in Rawalpindi and Islamabad, considering these wider factors which influence the dieting habits. Promotion of food literacy is a long-term and cost-effective method to empower patients and decrease health care system overload as well as improve the overall quality of life of diabetic patients.

The study will be intended to examine the dietary practices and food literacy among patients with diabetes type 2 in Rawalpindi and Islamabad. The identification of this correlation will enable us to design patient-focused interventions that would promote food literacy and support healthy food habits. However, it will also assist in uncovering the areas that require improvement in patient education and filling gaps in the current healthcare practices.

This research will positively influence the health of people because it will help to incorporate the concept of food literacy in diabetes management. The conclusions will be used as a basis in designing educational programs that would allow diabetic patients to establish a healthier way of eating. Politicians and healthcare professionals can also use this knowledge as a basis to ensure that healthier eating habits are placed in Pakistan. Along with the better approach to diabetic treatment, the broadening of food literacy would contribute to avoiding such effects as neuropathy, kidney damage, and cardiovascular disease. The proposed study aims at improving the health of type 2 diabetes patients in Rawalpindi and Islamabad by trying to close the existing gaps in the food literacy and dietary practices.

1.1 Research Gap

The research on the role of food literacy in the dietary habits of type II diabetic patients in Rawalpindi and Islamabad is very little, and significant research is lacking. The contribution of food literacy to the dietary habits and nutritional control of diet among diabetic individuals of this particular geographical region did not earlier come into notice in the study. The expertise required to come up with effective educational interventions and nutritionist plans that can fit into the unique needs of type II diabetic patients in such cities is insufficient due to the absence of pertinent studies. Also, there have not been sufficient researches that take into account the diverse socioeconomic backgrounds, education, and medical accessibility which are factual parameters to the levels of food literacy and food intake choice.

1.2 Problem Statement

Diabetes has emerged as a detrimental global health concern, but limited is known about how food literacy can help manage type 2 diabetes, especially in Pakistan. The majority of patients have bad eating habits because of inadequate food knowledge, which makes their illness worse. This study will assess how food literacy affects type 2 diabetic patients' eating patterns in Rawalpindi and Islamabad.

1.3 Research Questions

- What are the current levels of food literacy among type II diabetic patients in Rawalpindi and Islamabad?
- What is present dietary level in type II diabetic patients in Rawalpindi and Islamabad?
- How does the level of food literacy influence or relate to the dietary patterns of type II diabetic patients in these cities?

1.4 Objectives

- To investigate the food literacy level among diabetic type II patients in Rawalpindi/Islamabad.
- To assess the level of dietary intake of diabetic type II patients in Rawalpindi/Islamabad.
- To analyze how does food literacy influences the dietary patterns of diabetes type II patients in Rawalpindi/Islamabad.

1.5 Hypotheses

- **Null Hypothesis (H_0):**
  "There is no significant association between food literacy levels and dietary patterns among type II diabetic patients in Rawalpindi and Islamabad."
- **Alternative Hypothesis (H_1):**
  "There is a significant association between food literacy levels and dietary patterns among type II diabetic patients in Rawalpindi and Islamabad."

1.6 Rationale of the Study

Type 2 diabetes is a growing health issue in Pakistan, yet there are only few research on how food literacy affects the dietary habits of diabetes patients. Lack of knowledge about nutrition, portion size and food labels makes many people with diabetes decide on the appropriate food they should eat. This contributes to bad eating habits which aggravates their status. The research is an important gap to fill because the majority of studies are centered on medical treatment as opposed to food education. Knowing the role played by food literacy in diet patterns, this research can assist medical practitioners, policymakers, and nutritionists to make effective education programs to diabetic patients. Healthier food choices and better disease management as well as contributed to the overall population health can be achieved through improving food literacy.

CHAPTER II

LITERATURE REVIEW & THEORETICAL FRAMEWORK

2.1 Type 2 Diabetes and Its Complications

Type 2 diabetes mellitus (T2DM) is a chronic health condition that occurs due to the inability of the body to utilize insulin, as well as, the inability of the pancreas to produce insulin adequately. It is the most widespread type of diabetes and it is closely associated with lifestyle issues like obesity, poor diets, and physical inactivity. As stated in the International Diabetes Federation (2021), approximately 537 million individuals are estimated to live with diabetes in the world (2021), and this will reach 643 million by 2030. Over 90 percent of them are type 2 diabetes (Saeedi et al., 2020).

It leads to serious condition due to the complications that arise in the long run. Prolonged elevated level of sugar impairs blood capillaries and nerves. This results in small (microvascular) and large (macrovascular) vessel (complications). Examples of microvascular complications are retinopathy, nephropathy, and neuropathy. The effects of retinopathy may be loss of sight and vision, nephropathy may cause kidney failure and dialysis, and neuropathy may cause some number of numbness and pain in individuals, as well as the development of foot ulcers and amputation (World Health Organization, 2021). Macrovascular complications involve heart attacks, heart failure, and strokes as heart related diseases that are the most common ways of people dying with type 2 diabetes (Magliano et al., 2021).

The other issues associated with type 2 diabetes are frequent infections and poor healing of wounds. Fevers, diabetes diminishes the immune system and leaves the body less susceptible to infections (Foster et al., 2018). The complications do not only escalate chances of disability, but also worsen the overall living standards of the patients.

The cost of diabetes, both economically and socially to the society is also excessive. The overall cost of diabetes is estimated to have reached approximately one trillion US dollars in 2021, and type 2 diabetes will be the primary contributor (International Diabetes Federation, 2021). This encompasses direct expenses such as hospital service and medication and indirect expenses such as lost productivity through illness.

It has been established that by the early intervention, the chances of these complications can be reduced. A healthy diet, physical activity, and self- transcendence about life-long education are lifestyle interventions that can control blood glucose. Lifestyle modification proved to be more effective than medication alone in most studies on the prevention of the complications of type 2 diabetes. (Foster et al., 2018).

2.2. Impact of Dietary Knowledge on People with Type 2 Diabetes

Food information is also critical in the management and treatment of type 2 diabetes. Patients who have the knowledge of the nutrition of food are better positioned to manage their blood glucose successfully (Truman et al., 2017). The reason is explained by Vidgen and Gallegos (2014) who further clarified that food literacy is not just knowing and understanding nutrition; it is also about having skills and attitudes required to make a good eating decision. This implies that individuals need to be educated on the ways to choose, cook, and eat foods that regulation of sugar in the blood.

Research has indicated that larger patients consider dietary guidelines are more adherent to patients who have greater nutrition knowledge. Palumbo (2016) discovered that such patients decreased in the consumption of high-fat and high-sugar products and increased the intake of fruits, vegetables, and whole grains. The same results were also described by Begley et al. (2019), who stated that diet-based education programs converted glycemic betterment and enhanced superior self-care practices. Garcia-Perez et al. (2013) also support these findings by indicating that nutrition education decreases hospitalization and enhances the outcomes of patients.

Conversely, poor knowledge in principles of diet may lead to poor eating habits. Uninformed patients can consume excessively processed foodstuffs, fried foods and high-calorie beverages, which causes ineffective glycemic control and predisposes patients to complications (Worsley, 2015). Similar difficulties have also been reported in studies in low- and middle-income countries, although in such cases nutrition knowledge is the most significant factor aggravating the dieting habits of diabetic patients (Salehi et al., 2020).

Dietary education is thus an important aspect of diabetes self-management education. With adequate dietary education, patients undergo more hopeful proportion control measures, balance in the dietary intake of carbohydrates, and meal arrangements that will stabilize the blood sugar levels (Miller & DiMatteo, 2013). Patients also become more confident to cope with their condition and can take an active role in their self-care due to education (Chrvala et al., 2016). It demonstrates that the idea of dietary knowledge does not reflect the awareness alone but is mainly connected to the behavioral transformation and type 2 diabetes lifelong administration.

2.3 Importance of Dietary Intake for People with Type 2 Diabetes

One of the most significant aspects of the treatment of type 2 diabetes is diet. According to the explanation given by the American Diabetes Association (2020), a balanced diet encompassing high fiber, lean protein, unsaturated fats, and low glycemic index foods allows reaching a stable level of blood glucose levels. This type of eating aids in slowing up the spikes of blood sugar levels following eating and puts glucose at bay. Healthy eating is also healthier diets and lower blood pressure, which decrease the chances of cardiovascular diseases among individuals with type 2 diabetes (Foster et al., 2018). Franz et al. (2015) agree with these advantages because the research discovered that dietary therapy has the potential to positively affect blood glucose levels in the long term and decrease complications.

An appropriate diet is involved in the management of blood sugar besides good health in general. Vegetables, whole grains and pulses are high fiber food properties that enhance satiety and curb overeating which can help in weight control (Ley et al., 2014). There is also an association between diets containing fruits and unsaturated fat and decreased level of inflammation as well as increased insulin sensitivity (Esposito et al., 2015). Conversely, high refined carbohydrate, saturated fats and added sugars are associated with poor glycemic control and the risk of complications (Hu et al., 2001).

World Health Organization (2020) also advises patients with diabetes reduce their consumption of free sugar and saturated fats and increase their consumption of complex carbohydrates and dietary fibers as well as foods that are rich in micronutrients. Whole grains and legumes provide the required volume of macronutrients like carbohydrates; lean and balanced protein sources should be used and fats should be primarily unsaturated. Essential vitamins (vitamin D) and antioxidants like magnesium are micronutrients that contribute to insulin sensitivity and decrease the oxidative stress to prevent chronic complications (Ley et al., 2014; Esposito et al., 2015).

Food practices in Pakistan are significant when it comes to the effectiveness of managing diabetes. According to Shah et al. (2021), the produced traditional food is mostly cooked with lots of oil, refined flour, and sugar. Such foods result in rapid increases in blood glucose and render patients finding it hard to keep the levels stable. The South Asian studies also demonstrate that people exposed to the use of fried foods, sweetened tea, and white rice frequently are more difficult to manage the diabetes (Misra & Gopalan, 2016). This implies that the diet-based interventions have to be based on cultural food preferences.

There is a need to promote nutrition education that enlightens the patients to make healthier decisions without compromising local culture and practices. Education on how to decrease consumption of oil, eat more vegetables, and switch refined carbohydrates with whole grains can be used to ameliorate the consequences of diabetes (Shah et al., 2021). Diet-based diabetes self-management education has been found to reduce the level of HbA1c, hospital readmission, and quality of life (Evert et al., 2019). Hence, dietary intake is not only a medical requirement but a useful means to enhance the health of type 2 diabetes patients in the long run.

2.4 Causal Relationship Between Food Literacy and Dietary Patterns of People with Type 2 Diabetes

Food literacy encompasses skills to organize, select, prepare as well as eat health-promoting foods and fundamental nutrition knowledge (Vidgen & Gallegos, 2014). Research has indicated that greater food literacy is associated with improved food decision-making and healthier eating habits that aid in meeting diabetes self-care objectives. Individuals with high food literacy tend to consume fruits, vegetables, and whole grains in their foods, which will promote optimal glycemic control (Vaitkeviciute et al., 2015). Conversely, poor food literacy is commonly associated with the frequent consumption of foods rich in fat, drinks with a large volume of sugar, and convenience foods that exacerbate the glycemic outcomes (Worsley, 2015).

Theories of behavior have been applied in explaining the roles of food literacy. The Knowledge-Attitude-Behavior model indicates that after learning about healthy food, individuals develop a

positive attitude driving them to adopt healthily where they can manage their eating behavior (Contento, 2008). Health belief model explains that patients would tend to make positive food choices when they not only know their personal risk of diabetes complications but also hold a belief that change in diet reduces their risk (Rosenstock et al., 1988). The social cognitive theory brings out the importance that is attached to self-efficacy and social support where confidence in cooking and encouragement of family promote uptake of healthy diets (Bandura, 2004). These models describe the route in which food literacy is transformed into practical eating habits.

The process between food literacy and dietary decision-making is evident. The patients who are informed and capable of shopping, cooking, and eating intelligibly would be in better position to make food choices in terms of quantity, limit high-glycemic foods, and maintain nutrient balance. This has a direct beneficial effect on the level of blood sugar and minimizes the risks associated with heart disease and kidney failures in the long-term (Begley et al., 2019). More self-confidence, skills in problem-solving, and motivation toward diet plans are more common with better food literacy, all of which are important in diabetes self-management (Palumbo, 2016).

This relationship is evidenced by interventions. Dietary habits and self-efficacy of diabetes patients have been improved through cooking classes, tours of supermarkets, and training on food preparation (Grea Krause et al., 2018). It is also demonstrated in longitudinal studies that more food literate individuals continue to use healthier diets and have more favorable glycemic results (Begley et al., 2019; Vaitkeviciute et al., 2015) than people with a low food literacy. These results validate the fact that food literacy does not solely focus on knowledge but rather can deal with practical skills, which also result in the long-term effect of diabetes management.

2.5 Socio-Cultural Factors Influencing Dietary Practices in Pakistan

The type 2 diabetes mellitus (T2DM) has its root in the Pakistani food habits which are highly influenced by the sociocultural traditions of the people. Most of the meals in homes are made in great volume and they share tastes and recipes. This is typical in joint family systems, in which the nutritional requirements of a diabetic individual are likely to be ignored (Tariq et al., 2022). White rice, naan, parathas and sweet tea are some of the common dishes and thus result in a high consumption of carbohydrates. Ghee is also consumed heavily together with the consumption of fried foods like samosas, pakoras which contributes to consumption of calories as well as fats (Asif, 2011). Such eating habits result in the inability to adhere to a balanced diet on the part of the patients.

Food choices also have an influence by gender role. Women are the ones who normally do the cooking but they do not usually have access to nutrition education. The absence of knowledge can lead to the eating of meals that do not satisfy the requirements of diabetic members of the family (Bashir et al., 2019). Meanwhile, a sluggish diet change is administered by cultural ideas of healthy food being bland/less filling (Shah et al., 2021). Men, the key earners, may affect the purchase of food in the household, further determining what type of food is bought at home.

The control of the diet also is influenced by religious and social activities. When experiencing weddings, Eid and Ramadan, it is socially enforced that people consume foods that are fried and containing sugars. During Ramadan, fasting and feasting terms pose a difficulty in the management

of blood sugar, since patients can either skip taking medicine or overeat at the iftar meals (Hussain et al., 2017). Such traditions predispose the development of bad glycemic results in case the dietary recommendations are not adhered to.

There is also a difference in the food practices in the urban areas and the rural ones. Fast foods, bakery, and processed snacks are more prevalent in urban areas which increases the amount of sugar and fat that are taken. Whole wheat roti, lentils, and vegetables are consumed in rural regions, and the consumption of ghee or fried food remains high (Jafar et al., 2013). It is also aggravated by the limited access to both health services and nutrition education in the rural areas. These differences indicate that the sociocultural setting has a significant influence on the management of diabetes in Pakistan.

All these aspects together highlight the need of culturally sensitive food literacy programs. The interventions should consider the practices of eating in a family, gender roles, and religious practices in order to assist patients in managing diabetes. (Tariq et al., 2022).

2.6 Barriers to Food Literacy in Pakistan

Food literacy is highly significant as far as diabetic patients are concerned regarding understanding, selection and consumption of food. In Pakistan, people have many hindrances in order to be food literate and there are more in large cities such as Rawalpindi and Islamabad. These obstacles are social, economic, educational and cultural in nature and they restrict the individuals to make healthy nutrition decisions.

Low literacy is one of the factors that pose a tremendous impediment. The Pakistan Bureau of Statistics (2021) states that the adult literacy rate is approximately 58, however, the health literacy is still less. Majority lack access to knowledge on how to read and understand foods labels and therefore cannot access nutritional value of the packaged products. This poses a severe inconvenience to individuals with diabetes who require keeping the level of sugar and carbohydrates low (Afzal et al., 2020). Lack of awareness regarding the portion sizes and balanced meals also contributes to the difficulty (Salehi et al., 2020).

The other potent barrier is economic issues. There is a good number of families under low-income brackets concerned with costs and satiety over nutrition. Consequently, they have a tendency of purchasing low cost food rich in calories like white bread, fried foods, and soft drinks. These foods are satiating and aggravate the process of managing blood sugar levels and raising the risk of complications (Ahmed et al., 2022). The lack of access is also seen in that even patients who are aware of the issues with healthy foods cannot afford them.

Food literacy is also difficult due to language barriers. The majority of food labels and educational materials are in English which is not comprehended by a huge portion of the population. This compromises the quality of nutrition education and renders patients unable to put dietary guidelines to their everyday life (Irfan et al., 2019). There is a shortage of health promotion in a local language which requires most of the patients to depend on family recommendations or social beliefs rather than evidence-based recommendations.

Other significant aspects are misinformation and food myths. There is a lot of misinformation on whether natural sweet disciplines such as honey are good or not in the management of diabetes or bypassing meals can help to maintain normal blood sugar levels. These myths become viral in society and social media and drive patients out of healthy eating habits (Shabnam et al., 2021). Food preferences are also complicated by cultural beliefs like thinking that ghee cooked food is healthier than food cooked in oil.

Another obstacle is the inadequacy of campaigns and organized food educational programs. In most healthcare institutions, patients are prescribed medication without much or no advice on diet (Afzal et al., 2020). Food literacy is also not taught at schools, and young people do not have skills to manage their food options in the future (Salehi et al., 2020). These gaps demonstrate that food literacy should be integrated into healthcare and education systems so as to better support diabetic patients.

2.7 Global Insights: Impact of Food Literacy on Dietary Patterns of Type 2 Diabetes Patients

The role of food literacy on the dietary practices of patients with type 2 diabetes is not a local problem as it is a global issue. Researchers across the globe have analyzed the effects of food knowledge on self-management, foods, and healthy outcomes of diabetes. Results indicate that food literacy can assist patients in changing their eating habits to healthier ones, deal with complications, and live a better life (Truman et al., 2017).

Palumbo (2016) conducted a study in Canada and identified adults with type 2 diabetes showing that patients whose scores were higher on food literacy had healthier diets. They also took more of fruits, vegetables, whole grains and food rich in fiber, which minimized the occurrence of obesity, hypertension and cardiovascular diseases. Another thing that the study brought to my attention was the fact that food literacy is not simply knowing what to eat. It consists of shopping skills, food planning, food label reading skills, and food environment management. These competences facilitated improved glycemic regulation and the long-term health outcomes.

Australian public health initiatives have also been successful. According to Grea Krause et al. (2018), the eating pattern of the diabetes patients was improved after taking the food literacy courses. Patients who had attended the courses ate more fruits, vegetables and home cooked meals and ate less ultra-processed foods and sugary beverages. They also felt more confident about planning and cooking healthy food, which is a critical element to the long-term lifestyle change, which the program did.

Truman et al. (2017) believe that food literacy nutrition education in the states of the United States enhanced food-based management skills. When patients were exposed to control in portions, shopping and reading labels, their chances of making balanced meals were more likely to control their condition. Equally, Diabetes Self-management Education (DSME) programs have been extensively employed in the U.S and Europe. Such programs focus on food knowledge and self-decision, and they were associated with lower levels of HbA1c and the better self-care (Chrvala et al., 2016).

Diabetes care is also a factor of food literacy in Europe. The patients in the United Kingdom who were given dietary education followed structured nutrition sessions displayed better eating habits, less consumption of processed food, and better levels of HbA1c (Begley et al., 2019). The Feel4Diabetes program designed in various countries in Europe aimed at enhancing the food literacy of families and yielded good outcomes related to the decrease of unhealthy snacking and increased consumption of balanced food (Lakerveld et al., 2020).

Comparing the developed and the developing countries, some distinct differences can be identified. Patient outcomes of structures and access to programs and resources on food literacy improve in high-income countries. As a contrast, food literacy in most developing nations is poor because of poor health literacy, poverty, and lack of structured interventions (Salehi et al., 2020). Nonetheless, experience of world programs reveals that culturally sensitive delivery of food literacy lessons can greatly enhance dietary habits of diverse groups of citizens.

2.8 National Insights (Pakistan): Impact of Food Literacy on Dietary Patterns of Type 2 Diabetes Patients

Literacy gaps in food of diabetic patients have been seen to be serious in Pakistan. The simplest rules in nutrition, like the types of food, the quantity of portions, and reading labels, are not always followed by people (Ahmed et al., 2022). Due to this, they prefer eating foods that elevate blood sugar as opposed to food ones that promote stable maintenance. The awareness of healthy eating habits among diabetic patients was also revealed to be very low by the Pakistan National Diabetes Survey where over half of the patients do not receive any formal nutrition education (Basit et al., 2018).

Pakistan has additional problems with traditional diets. Lifestyle foods such as white rice, naan, fried foods and sweet drinks are consumed on a day-to-day basis. Use of oil and ghee in making curries is also common. Such dietary practices raise the inconsistency of blood sugar and complications (Shah et al., 2021). Nevertheless, it has been found that even minor educational campaigns can be effective. Afzal et al. (2020) discovered that patients receiving elementary nutrition education reported an increment in the consumption of fruits, vegetables, and high-fiber meals, an action that enhanced their glycemic regulation.

Although this is evident, nutrition education has been disregarded by the healthcare system. Physicians tend to prescribe drugs, but they rarely give comprehensive food guidance, and patients are unskilled to handle diabetes by diet (Ahmed et al., 2022). Food literacy programs in Pakistan are also very few as compared to those in other countries. Majority of nutrition advice is informal e.g family tradition or community beliefs and may transmit misinformation (Shabnam et al., 2021).

Certain interventions that are community-based have been promising. Pilot initiatives in a local area, consisting of cooking shows, dinner planning sessions, and culturally prepared nutrition resources, had positive outcomes on the food habits of the patients (Afzal et al., 2020). Free nutrition counseling sessions at the hospitals, also allowed patients to learn how to take the right portion sizes and have healthier alternatives including using whole wheat flour instead of the white

flour. These findings demonstrate that the improvement in health outcomes can be achieved even using very straightforward interventions provided that they are culturally sensitive.

Food literacy should also be included in standard medical practice in order to enhance diabetes management in Pakistan. Practical skills, including portion control, recipe modification, and timing of meals, can be taught to the patients to help him learn to control the condition. Hospitals, schools, NGOs, and the leaders in the community should work together to provide education that is simple to learn and understand and accessible to everyone. The multi-sectoral approach would bridging the existing gaps in food literacy and minimizing the diabetes-related complications burden. (Basit et al., 2018).

2.9. Conceptualizing Food Literacy in Public Health:

Food literacy is too wide a notion that links nutrition knowledge to practical skills required in the making of healthy food selections. The concept of health literacy was defined in such a way that the information is acquired, comprehended, and acted upon to enhance health (Nutbeam, 2000). Continuing on this, Vidgen and Gallegos (2014) described food literacy as the capacity to plan, choose, prepare and consume food which supports the health and wellbeing. Food literacy as a set of skills, confidence and awareness to enable individuals dine on a sustainable diet was also emphasized by the Food and Agriculture Organization (FAO, 2013). These definitions demonstrate that food literacy is not solely about information, but it is an action that involves knowledge in daily activities.

Scholars have come up with a number of food literacy domains. They are planning food, choosing healthy food, food preparation and cooking safety and healthy eating (Vidgen and Gallegos, 2014). The other important field is critical thinking. It assists individuals to screen the food advertisements, labels, and evade misinformation (Truman et al., 2017). Combined, these areas provide individuals with the means to control their diets and prevent the emergence of such chronic illnesses as diabetes.

One should also know the distinction between food literacy, nutrition literacy, and health literacy. Nutrition literacy is typically simply concerned with nutrient and dietary insight (Silk et al., 2008). Health literacy refers to a broader concept that entails decision-making concerning all facets of health such as nutrition, physical activity as well as prescribed drugs (Nutbeam, 2000). Food literacy is however a combination of knowledge and practical skills like cooking, budgeting as well as meal planning. This renders food literacy particularly significant to patients of type 2 diabetes since they require knowledge and the ability to control their diet.

2.10. Theoretical and Conceptual Frameworks Linking Food Literacy and T2DM:

The associations between food literacy and the management of type 2 diabetes may be outlined in a number of theoretical frameworks. These models demonstrate the impact of knowledge, abilities and social setting on food preferences and ultimate healthiness.

Health belief model (HBM) is a widely applied model in teaching diabetes. It describes that individuals tend to follow healthy food habits more when they think they are facing risk of

complications, when they know the importance of changing their diets, and when they think there are no barriers to dietary change (Rosenstock et al., 1988). Patients who had stronger beliefs about the benefits of diet had better chances to read food labels, decrease the inverted sugar, and keep to portion control in the research on food literacy (Shabnam et al., 2021). This demonstrates that food literacy may alter changes in risk perception and diet.

The Social Cognitive Theory (SCT) dwells on self-efficacy, observational learning and social support. It proposes that individuals enhance their food literacy when they are assured with their cooking and shopping abilities and from seeing food literate model in the family or among their peers (Bandura, 2004). Research studies indicate that patients enjoying high self-efficacy will be more inclined to take balanced meals and experience improved glycemic outcomes (Begley et al., 2019). SCT is frequently involved in interventions like cooking classes and group sessions, since the interventions help build confidence and social encouragement.

According to the Ecological Model, food literacy is not a reasoning that solely happens individually, it is influenced by the environment. Healthy cuisine, prices, and cultural practices determine the food that people consume (Swinburn et al., 2011). The case of Pakistan is a good example, where the lack of access or increased cost may force the patient to purchase refined flour products despite obtaining information on the importance of whole grains (Ahmed et al., 2022). This model demonstrates how a personal education and favorable environments are needed to enhance food literacy.

Food literacy studies have also been carried out using other models including the Knowledge-Attitude-Behavior (KAB) model. According to this model, nutrition knowledge transforms the attitudes and the attitudes subsequently transform into healthier eating habits (Contento, 2008). In both developed and developing countries, the investigation involved the use of KAB to develop food literacy programs within diabetes patients (Vaitkeviciute et al., 2015).

Collectively, these frameworks describe the reasons why food literacy is something more than information. It is influenced by the perception of risk, confidence, culture, and the food environment around. With their models, researchers and practitioners can develop superior interventions to diabetes type 2.

2.11. Policy and Intervention Approaches:

Nutrition education has been emphasized in managing diabetes by the global health organizations. The World Health Organization (WHO, 2020) advises that the consumption of free sugar and saturated fats should be trimmed down, and the number of foods rich in fibre, including fruits, vegetables, and whole grains, has to be increased. The WHO also emphasises the fact that there should be culturally-competent nutrition interventions to promote nutritious eating habits in the communities. Similar recommendations are given by the American Diabetes Association(ADA, 2020). It recommends that the patients should observe balanced eating, portions, and sugar-sweetened beverages. The two organizations concur that nutrition education is to be included in the standard management of diabetes.

The national policies in the health sector in Pakistan are gradually becoming aware of the importance of diet in the management of diabetes. The National Diabetes Action Plan entails the measures on early diagnosis, treatment, and patient education (Basit et al., 2018). Nutrition education is however, practice-limited. Lifestyle counseling is mainly ignored in most hospitals, and they are more concerned with medication (Ahmed et al., 2022). There is also the issue of food policies since unhealthy food such as fried snacks and sugary drinks are unhealthy and affordable. There is a need to have greater implementation of dietary guidelines in order to decrease the burden of type 2 diabetes.

Some of these vacuums are being filled by non-governmental bodies (NGOs), and dieticians. The NGOs have come up with health camps, awareness walks, and free consultations, among others, to teach the patients how to eat healthily. Hospital-based and freestanding clinic dieticians offer customized diet food plans, guidance on portion control, and changes of recipes (Afzal et al., 2020). Another factor in the dissemination of the correct information and breaking myths about managing diabetes is the use of community campaigns that are usually led by the local leaders or health educators.

Media based, schools, and community center health literacy campaigns reach good number of population. As an illustration, local language-based education programs enable patients to have a more accurate translation of food labels and nutrition information (Shabnam et al., 2021). Integrating the medical care with the community level education establishes a better foundation towards food literacy.

Taken altogether, the world recommendations, national policies, and community interventions demonstrate that enhancement of food literacy needs the multi-level method. In cases where governments, non-governmental organizations, and healthcare providers collaborate, patients suffering type 2 diabetes have better chances of making lazier diets and complications are minimized.

2.12. Theoretical Framework

A theoretical framework in a thesis explains which theory or model guides your study and why it is relevant. It provides the foundation that links your variables, shows how they are expected to relate, and helps you interpret your findings in a structured way.

2.12.1. Knowledge–Attitude–Behavior (KAB) Model

The **Knowledge–Attitude–Behavior (KAB) Model** is the primary theoretical foundation guiding this research. This model is widely used in nutrition, public health, and health education research because it explains how individuals develop healthy behaviors through a sequence of three stages: **knowledge**, **attitude**, and **behavior**. According to the KAB Model, when people obtain correct and relevant knowledge, it shapes their beliefs, perceptions, and attitudes. When attitudes become positive, they are more likely to translate into actual healthy behaviors. This model is simple, linear, and highly applicable to dietary and nutrition-related studies, especially those involving chronic diseases such as Type II diabetes.

- **Knowledge Component and Its Relevance to the Study**

The first stage of the KAB Model is **knowledge**, which includes information, awareness, understanding, and practical skills related to a particular health behavior. In the context of this study, food literacy is the knowledge component. Food literacy includes the ability to read food labels, understand nutritional information, recognize healthy and unhealthy foods, plan meals, and prepare foods appropriately for diabetes management. Individuals with Type II diabetes are expected to make daily dietary decisions that directly affect their blood sugar levels and long-term health. Therefore, their level of knowledge is an essential starting point.

The model suggests that when diabetic patients are equipped with clear and accurate nutrition knowledge, they should theoretically be able to select foods that support stable blood sugar levels, limit unhealthy items, and follow dietary guidelines recommended for diabetic individuals. This study measures this component through a structured food literacy questionnaire that assesses the participants' awareness, familiarity with guidelines, confidence in reading nutrition information, and ability to judge the healthfulness of different foods.

- **Attitude Component and Its Link to Dietary Choices**

The second stage of the KAB Model is **attitude**, which includes beliefs, motivation, feelings, preferences, and personal evaluations of healthy behaviors. In the case of diabetes, attitudes may include how individuals feel about healthy eating, whether they believe it is beneficial, whether they think it is difficult or unnecessary, and how motivated they are to follow dietary recommendations. Even if individuals possess adequate knowledge, their attitudes play an essential role in determining whether they will act on that knowledge.

This model assumes that when food literacy improves, attitudes toward healthy eating should also become more positive. For example, patients who understand the long-term benefits of healthy food choices may feel more motivated to adopt them. Those who feel confident in their ability to understand dietary guidelines may be less resistant to modifying their routine eating patterns. However, attitudes can also be shaped by cultural norms, family traditions, taste preferences, and financial factors. In Pakistan, food culture emphasizes high carbohydrate intake, fried food, and strong tea with sugar. These cultural attitudes may challenge the impact of food literacy, even when individuals are aware of healthier choices.

This study indirectly captures the attitude component by examining whether food literacy is reflected in healthier dietary practices. When high food literacy does not lead to better dietary intake, it may indicate that attitudes or external factors are overriding knowledge.

- **Behavior Component and Application to Dietary Intake**

The final stage of the KAB Model is **behavior**, which includes the actual actions individuals take. In this research, dietary intake is the behavioral component. It includes the types of foods participants eat, their eating frequency, their intake of fruits, vegetables, sweets, sugary drinks, snacks, and overall meal patterns. According to the KAB Model, individuals who have higher food literacy and positive attitudes should ideally demonstrate healthier dietary behaviors.

However, the findings of this study showed that even though participants had moderate food literacy, their dietary behaviors did not fully align with recommended diabetic eating practices. This indicates that knowledge alone may not be sufficient to produce behavior change. Other factors such as affordability, cultural expectations, family eating habits, convenience, and limited access to healthy foods may interfere with the knowledge-attitude-behavior sequence. This outcome also aligns with modern research, which shows that behavior is influenced by many environmental and social factors beyond knowledge.

- **Why the KAB Model is Most Suitable for This Research**

The KAB Model is the most suitable theoretical foundation for this research because it directly explains the relationship between **food literacy (knowledge)** and **dietary intake (behavior)**, which is the main purpose of the study. Unlike the Social Cognitive Theory or Health Belief Model, the KAB Model is simple, direct, and focused on how nutrition knowledge shapes attitudes and leads to dietary actions. This model supports the structure of the study, which measures food literacy levels, evaluates dietary intake patterns, and analyzes the relationship between the two.

By using the KAB Model, this research provides a clear theoretical explanation for why food literacy might influence dietary intake among diabetic patients, and it also helps interpret why, in some cases, behavior does not change even when knowledge is present. This makes the model highly relevant for understanding both the expected and unexpected findings of the study.

CHAPTER III

RESEARCH METHODOLOGY

3.1 Research Design

The study design used in this research was a cross-sectional study that was used to determine the effects of food literacy on the nutrition of type II diabetic patients in the two twin cities of Rawalpindi and Islamabad.

3.2 Sampling and data collection method

Purposive sampling technique was applied in this study. The non-probability technique of sampling is called purposive, whereby the participants are selected according to given characteristics and research purposes (Acharya et al., 2013). It is employed in circumstances where the researcher is interested in investigating a specific population that fulfill his or her inclusion parameters. This was done to ensure that only persons who possessed the necessary condition or knowledge were chosen.

Purposive sampling was best applicable in this study since this research was concerned with type II diabetic patients residing in Rawalpindi and Islamabad. Given that the purpose of the research was to address the argument on food literacy as a determinant of dietary consumption among this population, the purposive sampling was useful in ensuring that only patients with appropriate information were included. As opposed to random methods, it also enabled the researcher to select the participants that were strategically chosen according to the study goals. This turned out to be a more significant piece of information and closer to the research question (Etikan et al., 2016).

Primary data were collected using a pre-tested scale. The patients of Type II diabetes in the twin cities were requested to fill online and physical questionnaires. This methodology facilitated the delivery of information to a larger group of people both to hospital and clinic patients and those who may be approached using online communities or community networks. The combination of purposive sampling and a structured questionnaire also guaranteed that the data covered the experiences and food literacy of the target population.

3.3 Universe

The researchers conducted the research in the twin cities of Rawalpindi and Islamabad. It especially involved people with type II diabetes that were undergoing healthcare services in these cities. The data collection was to be directed at patients with type II diabetes engaged in various healthcare institutions in Rawalpindi and Islamabad and the goal of this research was to determine the effect of food literacy on their diet.

3.4 Population Frame

To ensure that the study focused on the most relevant population, specific inclusion and exclusion criteria were defined. The inclusion criteria for this research required that participants be adults aged 30 years and above, as Type II diabetes commonly appears during adulthood. Only individuals who had a confirmed diagnosis of Type II diabetes, were living in Rawalpindi or Islamabad**,** and were visiting or receiving care at healthcare facilities in these cities were included. Participants also needed to be able to understand and complete the questionnaire on their own and provide informed consent to take part in the study.

On the other hand, the exclusion criteria removed any individuals who did not fit the purpose of the research. This included patients diagnosed with Type I diabetes or gestational diabetes, as their dietary needs and disease patterns differ from Type II diabetic patients. Individuals with severe physical or cognitive limitations that prevented them from filling out the questionnaire were also excluded. Similarly, patients who were critically ill, admitted in intensive care units, or medically unstable were not included in the study. Finally, anyone who did not agree to participate or failed to provide informed consent was excluded.

3.4.1 Instrument for Data Collection

The records had been taken with the help of a structured questionnaire, although the majority of answers were collected on Google Forms and a minor part on paper. The tool had three sections. The initial part captured the socio-demographic information including the age, gender, educational background, and place of residence. The second part consisted of the Short Food Literacy Questionnaire (SFLQ) to measure the level of food literacy among adults because it was a validated and reliable indicator to do so (Koch et al., 2017). The third segment was dealing with the application of the Feel4Diabetes questionnaire to assess the diet and dietary habits of patients with type II diabetes in Rawalpindi and Islamabad, as this tool was developed and tested in large community-based collaboration on the context of diabetes prevention and management (Rangelov et al., 2018). SFLQ and Feel4Diabetes were administered concurrently, but different survey questionnaires could be used, this meant that the diet behaviors could be compared with the state of literacy easily on the same survey in this population. (Koch et al., 2017; Rangelov et al., 2018).

3.4.2 Sample size calculation

The sample was determined using the openEpi and was 311 with a confidence rate of 95 and a margin of error of 5. The article of Diabetes Prevalence Survey of Pakistan (DPS-PAK): Prevalence of diabetes, prediabetes and associated risk factors in Pakistan was used to obtain the information on the sample size.’

3.4.3 Data analysis type and technique

The aim of the study was to determine the impact of food literacy on the eating habits of Type 2 diabetes patients in Rawalpindi and Islamabad. Data was analyzed with the help of SPSS version 23 which helped to provide the descriptive statistics and summarize the dietary habits and food literacy levels of the respondents. To display the results adequately, we applied such data visualization techniques as pie charts and tables.

3.5 Ethical Considerations

When performing this very research, I followed ethical principles with the aim of preserving the rights and well-being of the participants. All the participants consented to participate in the process and were told that the data they were giving would remain confidential. Participation was voluntary and the respondent had an option of opting out at any given moment without repercussions. Data were managed sensibly, kept in a secured place, and they were used to accomplish this study.

CHAPTER IV

FINDINGS AND RESULTS

This chapter will give the results of the study about food literacy and dietary intake of Type II diabetic patients in Rawalpindi and Islamabad. It includes demographic statements of the participants, the statistical descriptions of the key variables, and the discussion of the association existing between food literacy and the dietary intake. The latter is presented in tables to obtain a clear picture of the profile of the participants and their knowledge and behaviors on food-related issues.

4.1 Demographic Characteristics of Participants

The study included a total of 302 participants, with 46.4% (n = 140) male and 53.6% (n = 162) female. The age distribution showed that most participants were between 31–40 years (32.5%, n = 98), followed by 51–60 years (26.8%, n = 81), above 60 years (20.5%, n = 62), and 41–50 years (20.2%, n = 61).

Regarding residence, 45.4% (n = 137) of participants lived in Rawalpindi, while 54.6% (n = 165) were from Islamabad. Education levels varied, with 10.9% (n = 33) having no formal education, 7.9% (n = 24) with primary/secondary education, 20.5% (n = 62) intermediate level, 33.4% (n = 101) graduates, and 27.2% (n = 82) postgraduates.

Employment status showed that 30.5% (n = 92) were employed, 15.9% (n = 48) self-employed, 29.5% (n = 89) homemakers, 17.5% (n = 53) retired, and 6.6% (n = 20) unemployed.

The duration of diabetes diagnosis varied among participants: less than 1 year (20.9%, n = 63), 1–5 years (28.8%, n = 87), 6–10 years (23.8%, n = 72), and more than 10 years (26.5%, n = 80). Family history of diabetes was present in 70.2% (n = 212) of participants.

For current treatment, 25.8% (n = 78) followed diet only, 37.7% (n = 114) used oral medicines, 10.3% (n = 31) used insulin injections, and 26.2% (n = 79) used both medicines and insulin.

Table 1.1: Demographic Characteristics of Participants

Item		Percentage	Frequency
GENDER:	Male	46.4%	140
	Female	53.6%	162
AGE:	31 – 40 years	32.5%	98
	41 – 50 years	20.2%	61
	51 – 60 years	26.8%	81
	Above 60 years	20.5%	62
RESIDENCE:	Rawalpindi	45.4%	137
	Islamabad	54.6%	165
EDUCATION LEVEL:	No formal education	10.9%	33
	Primary/Secondary school	7.9%	24
	Intermediate (F.A/F.Sc/Matric)	20.5%	62
	Graduate (Bachelor's)	33.4%	101
	Postgraduate (Master's/PhD)	27.2%	82
EMPLOYMENT STATUS:	Employed (full-time/part-time)	30.5%	92
	Self-employed	15.9%	48
	Homemaker	29.5%	89
	Retired	17.5%	53
	Unemployed	6.6%	20
DURATION OF DIABETES DIAGNOSIS:	Less than 1 year	20.9%	63
	1–5 years	28.8%	87
	6–10 years	23.8%	72
	More than 10 years	26.5%	80
FAMILY HISTORY OF DIABETES:	Yes	70.2%	212
	No	29.8%	90
CURRENT TREATMENT FOR DIABETES:	Diet only	25.8%	78
	Oral medicines	37.7%	114
	Insulin injections	10.3%	31
	Both medicines and insulin	26.2%	79

4.2 Descriptive Statistics of Food Literacy and Dietary Intake

The participants' food literacy was measured using the SFLQ questionnaire. The mean food literacy score was **32.33 ± 6.85**. Responses showed varying levels of knowledge and skills related to nutrition information, food labels, and dietary guidelines. For example, only 31.8% of participants reported being moderately to extremely familiar with Pakistan's dietary guidelines, and 63.2% could evaluate if a specific food is healthy for their diet.

Table 1.2: Short Food Literacy Questionnaire Frequencies

Item	Not at all well	Slightly well	Moderately well	Very well	Extremely well
Nutrition information leaflets (from hospitals/clinics)	69 (22.8%)	122 (40.4%)	67 (22.2%)	33 (10.9%)	11 (3.6%)
Food label information (on packaged foods)	81 (26.8%)	98 (32.5%)	83 (27.5%)	34 (11.3%)	6 (2.0%)
TV or radio programs about nutrition	28 (9.3%)	88 (29.1%)	97 (32.1%)	61 (20.2%)	28 (9.3%)
Oral recommendations from doctors/nutritionists	22 (7.3%)	53 (17.5%)	73 (24.2%)	84 (27.8%)	70 (23.2%)
Advice about food from family members or friends	28 (9.3%)	77 (25.5%)	25 (8.3%)	88 (29.1%)	84 (27.8%)

Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly agree
When I have questions about healthy nutrition, I know where I can find reliable information on this issue.	22 (7.3%)	36 (11.9%)	93 (30.8%)	136 (45%)	15 (5%)
I know the official recommendations about daily fruit and vegetable consumption.	51 (16.9%)	58 (19.2%)	101 (33.4%)	66 (21.9%)	26 (8.6%)
I know the official recommendations about salt intake in Pakistan.	43 (14.2%)	73 (24.2%)	96 (31.8%)	75 (24.8%)	15 (5%)
With so much nutrition information available today, I can manage to choose what is relevant for me.	8 (2.6%)	50 (16.6%)	80 (26.5%)	152 (50.3%)	12 (4%)
I can judge whether media information on nutrition (TV,	17 (5.6%)	54 (17.9%)	95 (31.5%)	124 (41.1%)	12 (4%)

newspapers, social media) is trustworthy.					
When I see food advertisements, I can judge whether the health claims are correct.	20 (6.6%)	51 (16.9%)	94 (31.1%)	115 (38.1%)	22 (7.3%)
I can evaluate if a specific food is healthy and relevant for my diet.	-	9 (3.0%)	73 (24.4%)	191 (63.2%)	29 (9.6%)
I can evaluate the long-term impact of my dietary habits on my health.	11 (3.6%)	44 (14.6%)	79 (26.2%)	132 (43.7%)	36 (11.9%)

Item	Not at all familiar	Slightly familiar	Moderately familiar	Very familiar	Extremely familiar
How familiar are you with the Pakistan Ministry of National Health Services' dietary guidelines?	144 (47.7%)	92 (30.5%)	57 (18.9%)	9 (3.0%)	-

Item	Very difficult	Difficult	Neither easy nor difficult	Easy	Very easy
On a usual day, how easy or difficult is it for you to prepare a balanced meal at home?	18 (6%)	74 (24.5%)	105 (34.8%)	91 (30.1%)	14 (4.6%)

Item	Never	Rarely	Sometimes	Often	Always
In the past, how often were you able to help family members or friends with questions concerning nutrition?	6 (2%)	58 (19.2%)	145 (48.0%)	65 (21.5%)	28 (9.3%)

Dietary intake was assessed using the Feel4Diabetes questionnaire. The mean dietary intake score was **34.39 ± 5.80**, indicating moderate dietary patterns among participants. Most participants consumed fruits and vegetables 1–2 times per day, and over half ate breakfast every day. High

consumption of rice and roti was reported, while fried snacks, fast food, and sugary drinks were consumed less frequently but still present.

Table 1.3: Feel4Diabetes Frequencies

Item	Never	1 time per day	2 times per day	3 times per day	4 or more times per day
How often do you eat fresh fruit per day?	23 (7.6%)	149 (49.3%)	117 (38.7%)	13 (4.3%)	-
How often do you eat vegetables with meals per day?	48 (15.9%)	137 (45.4%)	86 (28.5%)	31 (10.3%)	-
How often do you eat roti (chapati) in a day?	9 (3%)	37 (12.3%)	171 (56.6%)	78 (25.8%)	7 (2.3%)

Item	Never	1–2 days/week	3–4 days/week	5–6 days/week	Every day
How often do you eat breakfast in a week?	5 (1.7%)	25 (8.3%)	63 (20.9%)	37 (12.3%)	172 (57%)
How often do you eat pulses (daal/lentils, chickpeas, beans)?	9 (3.0%)	158 (52.3%)	125 (41.4%)	10 (3.3%)	-
How often do you eat meat (chicken, beef, mutton, fish)?	5 (1.7%)	121 (40.1%)	131 (43.4%)	27 (8.9%)	18 (6%)
How often do you eat eggs?	11 (3.6%)	113(37.4%)	74 (24.5%)	24 (7.9%)	80 (20.6%)
How often do you eat fried snacks (samosa, pakora, chips)?	58 (9.2%)	169 (56%)	57 (18.9%)	10 (3.3%)	8 (2.6%)

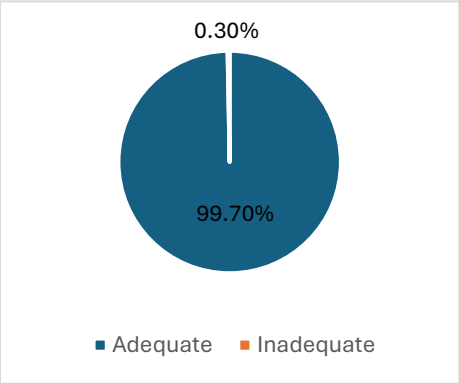
How often do you eat fast food (burgers, pizza, shawarma)?	90 (29.8%)	160 (53%)	37 (12.3%)	12 (4%)	3 (1%)
How often do you eat sweets/desserts (mithai, cakes, biscuits, chocolate)?	50 (16.6%)	160 (53%)	61 (20.2%)	10 (3.3%)	21 (7%)
How often do you drink sugary drinks (cola, juice, energy drinks)?	114 (37.7%)	126 (41.7%)	52 (17.2%)	3 (1%)	7 (2.3%)
How often do you drink tea with sugar?	107 (35.4%)	69 (22.8%)	52 (17.2%)	31 (10.3%)	43 (14.2%)
How often do you eat rice in a week?	3 (1%)	185 (61.3%)	100 (33.1%)	7 (2.3%)	7 (2.3%)

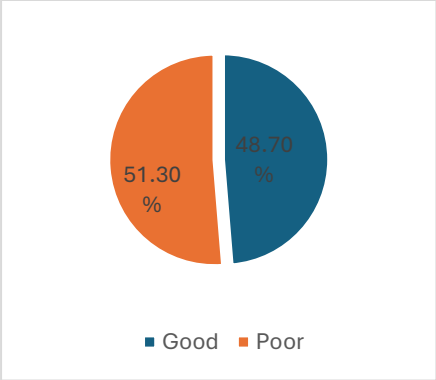
Item	1 meal per day	2 meals per day	3 meals per day	4 meals per day	5 or more meals per day
How many meals per day do you usually have (including breakfast, lunch, dinner, snacks)?	17 (5.6%)	52 (17.2%)	138 (45.7%)	81 (26.8%)	14 (4.6%)

Item	0–2 glasses per day	3–4 glasses per day	5–6 glasses per day	7–8 glasses per day	More than 8 glasses per day
How often do you drink plain water per day (glasses)?	14 (4.6%)	74 (24.5%)	119 (39.4%)	61 (20.2%)	34 (11.3%)

1.1 Levels of food literacy and dietary intake among population of twin cities

Food Literacy: **Dietary Intake:**





4.3 Analytical Statistics: Association between Food Literacy and Dietary Intake

To examine the relationship between food literacy and dietary intake among Type II diabetic patients, a **Chi-square test of independence** weas conducted. The analysis included 302 participants, with food literacy categorized as adequate or inadequate and dietary intake categorized as good or poor.

The results of the Chi-square test showed no significant association between food literacy and dietary intake ($\chi^2 = 1.06$, $p = 0.304$). Similarly, the Likelihood Ratio ($p = 0.230$) and Continuity Correction ($p = 0.979$) confirmed the lack of significant association.

These findings suggest that in this sample, the level of food literacy does not have a statistically significant impact on the dietary intake of diabetic patients. In other words, participants with adequate food literacy were not necessarily following better dietary practices than those with inadequate food literacy.

Table 1.4: Chi-square Test Results for Food Literacy and Dietary Intake

Test	Value	df	Asymptotic Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.058[a]	1	.304	—	—
Continuity Correction[b]	.001	1	.979	—	—
N of Valid Cases	**302**	—	—	—	—

In this study of 302 Type II diabetic patients in Rawalpindi and Islamabad, the demographic analysis showed a balanced gender distribution (46.4% male, 53.6% female) and a wide age range, with the largest group aged 31–40 years. More than half of the participants lived in Islamabad, and education levels varied from no formal education to postgraduate degrees. A majority (70.2%) had a family history of diabetes, and most had been diagnosed between one to ten years ago. In terms of treatment, participants used diet only (25.8%), oral medications (37.7%), insulin injections (10.3%), or a combination of medicines and insulin (26.2%).

The mean food literacy score was **32.33 (SD = 6.85)** and the mean dietary intake score was **34.39 (SD = 5.80)**. Responses on the SFLQ (food literacy) indicated moderate familiarity with nutrition information, food labels, and dietary guidelines; however, many reported limited skill in evaluating nutritional information and applying it to their own diets. For dietary intake, the Feel4Diabetes data showed that fruits and vegetables are consumed relatively frequently, but there is still considerable intake of staples like roti/chapati and rice, and moderate consumption of fried snacks, sugary drinks, and sweets.

Inferential analysis using a Chi-square test indicated **no statistically significant association** between food literacy (adequate vs. inadequate) and dietary intake (good vs. poor), with p-values well above 0.05. This suggests that in this sample, food literacy level does not significantly influence dietary behavior among diabetic patients.

Table 1.5 Mean and Standard Deviation of Food Literacy & Dietary Intake

Item	Mean	Standard Deviation
Food literacy	32.3278	6.85021
Dietary Intake	34.3907	5.79549

4.4 Discussion

The findings of this study revealed no statistically significant association between food literacy and dietary intake among Type II diabetic patients in Rawalpindi and Islamabad. Although this result contrasts with several international studies, it aligns with a growing body of regional and South Asian evidence showing that knowledge alone often does not translate into healthier dietary behaviors, especially in low and middle-income settings. Understanding why this pattern occurred in this population requires looking at the broader socio-cultural, economic, and environmental context, as well as measurement factors.

Several international studies have demonstrated that higher food literacy tends to improve dietary habits. For example, Vaitkeviciute et al. (2015) found that individuals with higher food literacy exhibited healthier eating patterns. Similarly, Gréa Krause et al. (2018) reported that food literacy significantly supported adherence to nutritional recommendations among adults. However, the

results of this study diverged from those findings. One possible explanation is that Pakistan's food environment may act as a strong moderating factor, reducing the impact of literacy on behavior.

In the Pakistani context, various studies have emphasized the dominant role of cultural food practices, limited access to healthy foods, household routines, and affordability concerns**.** For example, Shah et al. (2021) found that although many diabetic patients in Islamabad had awareness about dietary recommendations, they struggled to implement them due to household food norms, traditional cooking styles, and lack of family cooperation. Similarly, Ahmed et al. (2022) identified socioeconomic barriers, particularly the high cost of diabetic-friendly foods as a major obstacle in adhering to recommended diets. Such barriers may explain why patients in this study, even with adequate food literacy, were not able to consistently translate that knowledge into healthier dietary intakes.

Another critical factor is the knowledge–behavior gap, which has been widely documented in diabetes research. Educational Interventions for Promoting Food Literacy (2021) showed that while nutritional education can increase knowledge, it often fails to change actual eating behavior without continuous reinforcement, motivation, and supportive environments. This suggests that food literacy alone cannot overcome deeply rooted behaviors, especially in chronic illness management. In this study, many participants might have understood nutritional concepts but lacked the practical skills, emotional readiness, or supportive family systems to apply them consistently.

Additionally, studies from South Asia reflect similar challenges. Misra and Gopalan (2016) found that despite improved nutrition knowledge, many South Asian diabetic patients continued to consume high-carbohydrate diets because these foods were cheaper, culturally popular, and readily available. This aligns with Adams et al. (2018), who reported that individuals with low socioeconomic status may rely on inexpensive and processed foods regardless of their nutrition knowledge. Such findings reinforce the idea that economic and environmental constraints may override the influence of literacy**.**

Another important consideration is measurement limitations**.** In this study, both food literacy and dietary intake were categorized into binary groups (adequate/inadequate; good/poor). While this approach is simple, it may overlook subtle variations. A participant with moderate literacy and partially improved eating habits may be classified the same as someone with very low literacy and poor intake. This simplification could mask weak associations that might have emerged if more nuanced scales were used.

The results of this study are also consistent with some regional findings that report no direct link between literacy and actual behavior. For instance, Afzal et al. (2020) found that although health literacy improved diabetes self-management behaviors in Karachi, dietary practices showed weaker associations due to environmental constraints and psychological resistance to lifestyle

change. This echoes the current study's finding that awareness alone does not drive dietary compliance**.**

Looking beyond Pakistan, behavioral intervention research also supports the idea that multi-dimensional strategies are more effective than literacy alone. Mukhtar et al. (2021) demonstrated that nutrition education combined with community involvement significantly improved diet quality among diabetic adults in Uganda. Similarly, Phuengphasook et al. (2024) found that elderly diabetic patients in Thailand showed improved dietary behavior only when food literacy interventions included hands-on training, family counseling, and regular follow-up**.** These studies highlight that sustainable behavior change requires a supportive system—not just knowledge.

Overall, the findings of this study reinforce the idea that food literacy is necessary but not sufficient for improving dietary intake among diabetic patients in Pakistan. Dietary behaviors are shaped by a complex interaction of cultural norms, income levels, household eating practices, food accessibility, health system support, and personal motivation. Therefore, effective interventions must combine nutritional education with practical skills training, family engagement, affordable food options, culturally appropriate counseling, and community-based support structures**.**

CHAPTER V - CONCLUSION

This study examined the relationship between food literacy and dietary intake among Type II diabetic patients in Rawalpindi and Islamabad. The findings showed that **food literacy levels were extremely high, with 99.7% of participants being food literate**, while only 0.3% were not literate. Despite this high literacy, the participants' dietary practices were not equally strong; **51.3% had poor dietary intake**, while only **48.7% demonstrated good dietary intake**. Surprisingly, the statistical analysis revealed **no significant association** between food literacy and dietary intake, indicating that knowledge and skills alone were not enough to influence actual eating behavior among diabetic patients.

Several contextual factors may explain this mismatch. In Pakistan, cultural food patterns, household meal routines, economic constraints, and limited access to healthier options play a substantial role in shaping dietary habits (Shah et al., 2021). Even highly literate individuals may struggle to translate knowledge into daily practices if healthier foods are too expensive, unavailable, or not supported in the household. This aligns with Afzal et al. (2020), who found that high health literacy among diabetic patients in Pakistan did not always lead to improved dietary behavior.

The **knowledge–behavior gap** further supports these findings. Research shows that simply knowing what to eat is not enough; people require motivation, ongoing support, practical skills, and a supportive environment to make lasting changes. Educational Interventions for Promoting Food Literacy (2021) concluded that nutrition education increases awareness but does not always improve dietary behavior unless it involves skill-building and follow-up reinforcement. Similar patterns have been reported in South Asian contexts, where cultural norms and affordability strongly influence dietary practices (Misra & Gopalan, 2016).

Overall, this study highlights that **food literacy is essential—but not sufficient—to drive healthy eating** among Type II diabetic patients. To bring meaningful change, dietary behavior must be supported through multi-level approaches that combine education with practical guidance, culturally relevant counseling, family involvement, and improved access to healthy foods. Adopting such holistic strategies can strengthen diabetes management and improve the overall health and well-being of patients in Rawalpindi and Islamabad.

Recommendations

Based on the findings, several recommendations are suggested:

1. Enhance practical nutrition skills such as meal planning, label reading, and affordable healthy cooking methods through hands-on interventions.
2. Strengthen family and household involvement, since family routines heavily determine the diet of diabetic patients in Pakistan (Shah et al., 2021).
3. Improve accessibility and affordability of healthy foods by promoting community-level nutrition initiatives and low-cost healthy options.

4. Develop multi-component behavioral interventions, including continuous follow-up and personalized counseling, rather than relying solely on educational programs (Mukhtar et al., 2021).
5. Use more detailed measurement tools in future studies to capture intermediate levels of literacy and dietary patterns.
6. Expand research to other provinces to understand regional variations in food literacy and diet-related barriers.

CHAPTER VI – REFERENCES

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Research Study Consent Form

Title: Impact of Food Literacy on Dietary Intake of Type 2 Diabetes Patients in Rawalpindi and Islamabad
Researcher: Inabat Siddiqui , Public Health Student

You are invited to participate in this research study. The purpose of this study is to understand how food literacy influences dietary intake among people living with type 2 diabetes in Rawalpindi and Islamabad.

Your participation is voluntary. The questionnaire will take about 10–15 minutes to complete. All responses will be kept confidential and used only for research purposes. You have the right to withdraw at any point without providing a reason.

By proceeding, you indicate that

- You have read the above information
- You voluntarily agree to participate in this study.

I agree to participate.

Demographic Information

1. Gender
    - Male
    - Female

2. Age
    - 31–40 years
    - 41 – 50 years
    - 51 – 60 years
    - Above 60 years

3. Area of Residence
    - Rawalpindi
    - Islamabad

4. Education Level
    - No formal education
    - Primary/Secondary school
    - Intermediate (F.A/F.Sc/Matric equivalent)
    - Graduate (Bachelor's)
    - Postgraduate (Master's/PhD)

5. Employment Status
    - Employed (full-time/part-time)
    - Self-employed
    - Homemaker
    - Retired
    - Unemployed

6. Duration of Diabetes Diagnosis
    - Less than 1 year
    - 1–5 years
    - 6–10 years
    - More than 10 years

7. Family History of Diabetes (Type 2)
    - Yes
    - No

8. Current Treatment for Diabetes
    - Diet only
    - Oral medicines
    - Insulin injections
    - Both medicines and insulin

Short Food Literacy Questionnaire

"This section measures your food literacy – that is, your ability to find, understand, and use nutrition information in daily life."

1. When I have questions about healthy nutrition, I know where I can find reliable information on this issue.
    - Strongly Disagree
    - Disagree
    - Neutral
    - Agree
    - Strongly agree

2. In general, how well do you understand the following types of nutritional information? *

3. How familiar are you with the Pakistan Ministry of National Health Services' dietary guidelines?

    - Not at all familiar
    - Slightly familiar
    - Moderately familiar
    - Very familiar
    - Extremely familiar

4. I know the official recommendations about daily fruit and vegetable consumption.
    - Strongly disagree
    - Disagree
    - Neutral
    - Agree
    - Strongly agree

5. I know the official recommendations about salt intake in Pakistan.
    - Strongly disagree
    - Disagree
    - Neutral
    - Agree
    - Strongly agree

6. On a usual day, how easy or difficult is it for you to prepare a balanced meal at home?
    - Very difficult
    - Difficult
    - Neither easy nor difficult
    - Easy
    - Very easy

7. In the past, how often were you able to help family members or friends with questions concerning nutrition?
    - Never
    - Rarely
    - Sometimes
    - Often
    - Always

8. With so much nutrition information available today, I can manage to choose what is relevant for me.
    - Strongly Disagree
    - Disagree
    - Neutral
    - Agree
    - Strongly Agree

9. I can judge whether media information on nutrition (TV, newspapers, social media) is trustworthy.
    - Strongly disagree
    - Disagree
    - Neutral
    - Agree
    - Strongly agree

10. When I see food advertisements, I can judge whether the health claims are correct.
    - Strongly disagree
    - Disagree
    - Neutral
    - Agree
    - Strongly agree

11. I can evaluate if a specific food is healthy and relevant for my diet.
    - Strongly disagree
    - Disagree
    - Neutral
    - Agree
    - Strongly agree

12. I can evaluate the long-term impact of my dietary habits on my health.
    - Strongly disagree
    - Disagree
    - Neutral
    - Agree
    - Strongly agree

Feel4Diabetes Healthy Diet Score

"This section asks about your usual eating and drinking habits. It will help us understand the type and frequency of foods you consume in daily life."

Fruits & Vegetables

1. How often do you eat fresh fruit per day? 1
   - Never
   - 1 time per day
   - 2 times per day
   - 3 times per day
   - 4 or more times per day
2. How often do you eat vegetables with meals per day?
   - Never
   - 1 time per day
   - 2 times per day
   - 3 times per day
   - 4 or more times per day

Staples & Meals

1. How many meals per day do you usually have (including breakfast, lunch, dinner, snacks)?
   - 1 meal per day
   - 2 meals per day
   - 3 meals per day
   - 4 meals per day
   - 5 or more meals per day
2. How often do you eat breakfast in a week?
   - Never
   - 1–2 days/week
   - 3–4 days/week
   - 5–6 days/week
   - Every day

Protein & Lentils

1. How often do you eat pulses (daal/lentils, chickpeas, beans)?
   - Never
   - 1–2 days/week
   - 3–4 days/week
   - 5–6 days/week
   - Every day

2. How often do you eat meat (chicken, beef, mutton, fish)?
   - Never
   - 1–2 days/week

- 3–4 days/week
- 5–6 days/week
- Every day

3. How often do you eat eggs?
   - Never
   - 1–2 days/week
   - 3–4 days/week
   - 5–6 days/week
   - Every day

Snacks & Processed Foods

1. How often do you eat fried snacks (samosa, pakora, chips)?
   - Never
   - 1–2 days/week
   - 3–4 days/week
   - 5–6 days/week
   - Every day

2. How often do you eat fast food (burgers, pizza, shawarma)?
   - Never
   - 1–2 days/week
   - 3–4 days/week
   - 5–6 days/week
   - Every day

3. How often do you eat sweets/desserts (mithai, cakes, biscuits, chocolate)?
   - Never
   - 1–2 days/week
   - 3–4 days/week
   - 5–6 days/week
   - Every day

Beverages

1. How often do you drink sugary drinks (cola, juice, energy drinks)?
   - Never
   - 1–2 days/week
   - 3–4 days/week
   - 5–6 days/week
   - Every day

2. How often do you drink tea with sugar?

   - Never
   - 1–2 days/week
   - 3–4 days/week
   - 5–6 days/week
   - Every day

3. How often do you drink plain water per day (glasses)?

   - 0–2 glasses per day
   - 3–4 glasses per day
   - 5–6 glasses per day
   - 7–8 glasses per day
   - More than 8 glasses per day

Bread & Rice

1. How often do you eat roti (chapati) in a day?

   - 0 times per day
   - 1 time per day
   - 2 times per day
   - 3 times per day
   - 4 or more times per day

2. How often do you eat rice in a week?

   - Never
   - 1–2 days/week
   - 3–4 days/week
   - 5–6 days/week
   - Every day

PLAGIARISM CERTIFICATE

This is to certify that the thesis entitled:
"Impact of Food Literacy on Dietary Patterns of Type II Diabetic Patients in Twin Cities (Rawalpindi and Islamabad)"
submitted by Inabat Siddiqui, Roll No. 01-152221-011, in partial fulfillment of the requirements for the degree of BS Public Health, is an original piece of research carried out under my supervision.
I further certify that this thesis has been checked for plagiarism using Turnitin, and the similarity index is 6%, which is within the acceptable limits as per the policies of the university. The work has not been copied from any source except where due acknowledgment and proper referencing have been provided.
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Supervisor Name: Dr. Sidra Shahid
Department: Humanities & Social Sciences
Institution: Bahria University
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