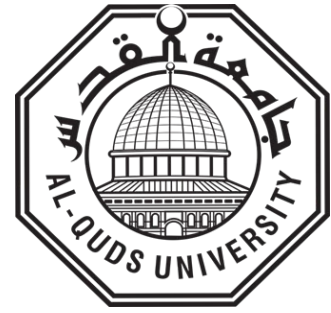


**Deanship of Graduate Studies
AL Quds University**



**Oral Health Knowledge, Attitudes, and Practices (KAP)
Among Diabetic Patients and Their Impact on Oral
Health-Related Quality of Life (OHRQoL): A Cross-
Sectional Study**

Iman Ayman Rajae Wahbeh

M.Sc. Thesis

Jerusalem – Palestine

1446/ 2025

**Oral Health Knowledge, Attitudes, and Practices (KAP)
Among Diabetic Patients and Their Impact on Oral
Health-Related Quality of Life (OHRQoL): A Cross-
Sectional Study**

Prepared by:

Iman Ayman Rajae Wahbeh

B.Sc. in Dentistry / Al-Quds University- Palestine

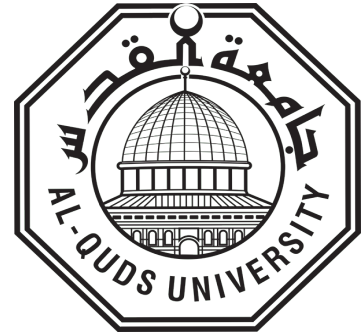
Supervisor: Dr. Elham Kateeb

Thesis submitted in partial fulfillment of the requirements for
the degree of Master of Public Health / School of Public
Health / Al-Quds University

Jerusalem – Palestine

1446/ 2025

Al-Quds University
Deanship of Graduate Studies
Faculty of Public Health



Thesis Approval

Oral Health Knowledge, Attitudes, and Practices (KAP) Among Diabetic Patients and Their Impact on Oral Health-Related Quality of Life (OHRQoL): A Cross-Sectional Study

Prepared by: Iman Ayman Rajae Wahbeh

Registration number: 22012097

Supervisor: Dr. Elham Kateeb

Master thesis submitted and accepted, Date: 6/1/2025 The names and signatures of the examining committee members are as follows:

1. Head of Committee: Dr. Elham Kateeb

Signature:..... 

2. Internal Examiner: Dr. Salam Alkhatib

Signature:.....

3. External Examiner: Dr. Faaiz Alhamdani

Signature:..... 

Jerusalem – Palestine

1446/ 2025

Dedication

To my loving family, my parents, brothers and sister, in-law family, my husband, and my children Elaine, Jamal, and Kenan, thank you for your constant encouragement and belief in me that fueled my determination to see this thesis through.

"To my esteemed advisor, Dr. Elham, I am deeply grateful for your unwavering guidance and support throughout this journey."

"To my husband, Mohamed, thank you for the countless cups of coffee, late-night brainstorming sessions, and unwavering friendship that kept me going."

"To my sanity (what's left of it!), for enduring the stress and late nights involved in this project."

To all with love and respect, I dedicate this work

Iman Ayman Rajae Wahbeh

2025

Declaration

I hereby certify that this master’s thesis in Public Health is the product of my own independent research, with appropriate acknowledgments of any external sources. Furthermore, I confirm that neither this thesis nor any part of it has been previously submitted for a higher academic degree at any other university or institution.

Signed:.....

Iman Ayman Rajae Wahbeh

Date: 6/1 2025

Acknowledgments

I would like to express my deepest gratitude to all those who have supported me throughout my thesis journey.

First and foremost, I would like to thank my God for giving me the strength, ability, and courage to stay and finish this thesis to the end.

My heartfelt thanks to my family, for their support and belief in me. To my husband and children, thank you for your love, understanding, and sacrifices. Your encouragement was a constant source of strength.

A special thanks to my supervisor Dr. Elham Kateeb for her invaluable guidance, patience, and encouragement. Your expertise and insights were crucial in shaping this work, and I am truly grateful for the countless hours you dedicated to helping me refine my ideas.

Finally, I would also like to extend my appreciation to all the experts who helped in the validation of the questionnaire, the staff of the faculty of public health at Al-Quds University, the data collection team, and staff in the Ministry of Health who helped in facilitating the process of this research.

Thank you all for being part of this journey.

Abstract

Background: Diabetes Mellitus (DM), a multifactorial condition characterized by elevated blood glucose levels, can lead to severe health complications when uncontrolled. Among its impacts, DM significantly affects oral health, contributing to periodontal diseases, tooth loss, dry mouth, and cavities. This study aimed to evaluate the knowledge, attitudes, and practices (KAP) of diabetic patients regarding oral health, examine the impact of these factors on their Oral Health-Related Quality of Life (OHRQoL), and explore correlations with socio-demographic characteristics, behavioral factors, diabetes management, healthcare access, and general and oral health status.

Methods: This cross-sectional study employed a mixed sampling approach, combining geographic clustering and convenience sampling techniques. A total of 510 participants aged 40 years and older with type 2 diabetes mellitus, attending Ministry of Health (MoH) Primary Healthcare Centers (PHCs), were recruited. Participants provided verbal consent and completed a structured questionnaire. Data analysis was conducted using SPSS version 26, with statistical significance set at $P < 0.05$. Descriptive, bivariate, and multivariate analyses were performed. Differences in KAP and OHRQoL across study variables were assessed using Mann–Whitney U and Kruskal–Wallis tests as appropriate. Correlations between KAP, OHRQoL, and associated characteristics were determined using Spearman’s rho. Predictors of OHRQoL were identified through stepwise multiple linear regression, confirmed by the forward method, with results reported as adjusted R^2 and 95% confidence intervals (CIs). No multicollinearity was detected in the regression model.

Results: The mean OHIP-14 (OHRQoL) score among participants was 17.84 ± 11.65 (range: 0–50), reflecting moderate Oral Health-Related Quality of Life in this population. The most frequently reported oral health issues were dry mouth (62.2%), tooth loss (48.6%), and caries (46.1%). Participants exhibited moderate knowledge levels, with an average score of 6.53 ± 2.07 (range: 1–10), and positive attitudes, with a mean score of 4.88 ± 1.65 (range: 0–6). However, their oral hygiene practices were generally unfavorable, with an average score of 1.99 ± 1.02 (range: 0–6).

Significant positive correlations were observed between practice and knowledge ($\rho = 0.160$, $P = 0.000$), practice and attitude ($\rho = 0.171$, $P = 0.000$), and knowledge and attitude ($\rho = 0.238$, $P = 0.000$). The regression analysis revealed several factors influencing OHRQoL. Full-time

employment ($\beta=-0.125$, $P=0.002$), higher income ($\beta=-0.128$, $P=0.001$), and a positive attitude ($\beta=-0.103$, $P=0.009$) were associated with better OHRQoL. In contrast, poorer OHRQoL was linked to dental visits primarily for pain relief ($\beta=0.139$, $P=0.000$), discussions with dentists about diabetes and its oral complications ($\beta=0.200$, $P=0.000$), poor general health status ($\beta=0.104$, $P=0.011$), and poor oral health status ($\beta=0.299$, $P=0.000$). Additional predictors of poorer OHRQoL included lower educational levels ($\beta=0.124$, $P=0.002$), no family history of diabetes ($\beta=0.126$, $P=0.001$), and long intervals (more than three months) since testing HbA1c ($\beta=0.098$, $P=0.012$).

Conclusions: This study identified a positive attitude as a key predictor of better OHRQoL among diabetic patients, emphasizing the need for targeted interventions to foster positive attitudes and improve diabetes management. Conversely, poorer OHRQoL was linked to limited healthcare utilization, such as dental visits focused primarily on pain relief. In addition, socio-economic disparities significantly impacted OHRQoL outcomes, underscoring the importance of addressing these inequalities to enhance healthcare access and outcomes. These findings underscore the need to enhance access to comprehensive dental care and integrate oral health management into diabetes care programs to address the disparities and improve outcomes for diabetic patients.

Keywords: Diabetes, Oral health-related quality of life, knowledge, attitude, practice.

Table of Contents

Declaration	i
Acknowledgments.....	ii
Abstract.....	iii
Table of Contents	v
List of Tables.....	viii
List of Figures	ix
List of Appendices	x
List of Abbreviations.....	xi
1 Chapter One: Introduction	1
1.1 Background.....	1
1.2 Study justification	3
1.3 Problem statement.....	5
1.4 Aim of the study.....	6
1.5 Study Objectives.....	6
1.6 Study's Expected Outcome.....	6
1.7 Thesis structure	7
2 Chapter Two: Literature review	8
2.1 Introduction	8
2.2 Diabetes, its relation to oral complications and quality of life.....	8
2.3 KAP studies about diabetes and oral health and its relationship to socio-demographic, economic, general health, and healthcare access.....	10
2.3.1 Regional studies	13
2.4 OHRQoL, KAP and OHRQoL related diabetes	14
2.5 Diabetes, KAP, and OHRQoL studies in Palestine.....	18
3 Chapter Three: Theoretical and conceptual framework	21
3.1 Introduction	21
3.2 Study conceptual framework	21
3.3 Study variables and their conceptual Definition	23
3.3.1 Diabetes	23
3.3.2 The haemoglobin A1c	23
3.3.3 Socio-demographic and economic factors	23
3.3.4 Behavioural risk factors.....	23
3.3.5 Access to healthcare services.....	24

3.3.6	Satisfaction with health services	24
3.3.7	Self-reported health problems	24
3.3.8	Self-reported oral and dental problems	24
3.3.9	Knowledge, Attitude, and Practice	25
3.3.10	Oral Health-related Quality of Life.....	25
3.4	Study variables and their operational definitions	25
3.4.1	Dependent variables	25
3.4.2	Independent variables.....	29
4	Chapter Four: Methodology	37
4.1	Study design.....	37
4.2	Choice of study design.....	37
4.3	Setting.....	37
4.4	Sample frame.....	38
4.5	Inclusion-Exclusion criteria	38
4.6	Sample method	39
4.7	Sample size.....	40
4.8	Study tool	41
4.8.1	The questionnaire design, validation, and pilot testing.....	41
4.8.2	Oral health impact profile-14 (OHIP-14)	43
4.9	Data analysis	44
4.10	Ethical considerations	46
5	Chapter Five: Results	47
5.1	Introduction	47
5.2	Descriptive analysis	47
5.2.1	Socio-demographic characteristics of participants	47
5.2.2	Behavioural factors	48
5.2.3	Diabetes history	51
5.2.4	Self-reported health and oral issues	53
5.2.5	Healthcare Access	54
5.2.6	Knowledge, Attitude, and Practice (KAP) related to Diabetes	56
5.2.7	Oral Health-Related Quality of Life (OHRQoL) and diabetes.....	59
5.3	Bivariate analysis.....	62
5.3.1	Spearman's correlation test for knowledge	62
5.3.2	Spearman's correlation test for attitude	62
5.3.3	Spearman's correlation test for practice	62

5.3.4	Spearman’s correlation test for OHRQoL	63
5.3.5	Mann Whytney U and Kruskal Wallis H tests’ results for KAP variables	65
5.3.6	Mann Whitney U and Kruskal Wallis tests’ results for OHRQoL	71
5.4	Multivariate analysis.....	75
6	Chapter Six: Discussion, Strengths and Limitations, Conclusion and Recommendations	76
6.1	Introduction	76
6.2	KAP variables.....	76
6.3	KAP model with general and oral health.....	77
6.4	KAP model and Socio-demographic characteristics.....	78
6.5	KAP model and Diabetes History	78
6.6	KAP model and Healthcare Access	78
6.7	KAP model and Behavioural factors	79
6.8	OHRQoL and KAP model.....	79
6.9	OHRQoL and Socio-demographic.....	80
6.10	OHRQoL and Diabetes history	80
6.11	OHRQoL and Behavioural factors	80
6.12	OHRQoL and Healthcare access	81
6.13	OHRQoL and Self-reported oral and general health issues	81
6.14	Strengths and limitations.....	82
6.15	Conclusion.....	82
6.16	Recommendations:	83
	References	85
	Appendices	101
	الملخص بالعربي	118

List of Tables

Table 3.4.1.3.1 OHIP-14 Domains and Items	26
Table 3.4.1.3.2: Questions about Knowledge.....	27
Table 3.4.1.3.3: Questions related to attitude toward oral health	28
Table 3.4.1.3.4: Questions and answers about oral hygiene selfcare practices	29
Table 3.4.2.3.5: General Health issues categories	32
Table 3.4.2.3.6: Oral issues and problems categories	34
Table 3.4.2.3.7: Satisfaction with healthcare services.....	36
Table 5.2.1.5.1 : Distribution of participants based on governorates	48
Table 5.2.1.5.2: Sociodemographic characteristics of the participants.....	49
Table 5.2.2.5.3a: Behvaioural factors (smoking and diet)	50
Table 5.2.2.5.4b: Behvaioural factors (smoking and diet)	51
Table 5.2.6.5.5: Answers to questions about knowledge	57
Table 5.2.6.5.6: Attitude statements and responses	58
Table 5.2.6.5.7: Answers to questions of practice	59
Table 5.2. 7.5.8 OHIP-14 scale entries that negatively impacted participants (N = 510)	61
Table 5.9: OHIP-14 and KAP correlation.....	63
Table 5.10: OHRQOL, KAP, and associated factors correlation	64
Table 5.3.5.11: Sociodemographic factors and KAP scores.....	67
Table 5.3.5.12 Behvaioural factors and KAP scores differences	68
Table 5.3.5.13: Diabetes history and KAP scores	69
Table 5.3.5.14: Healthcare Access and KAP scores	70
Table 5.3.6.15a: OHIP-14 scores and socio-demographic factors8	71
Table 5.3.6.5.16b: OHIP-14 scores and socio-demographic factors	72
Table 5.3.6.5.17: Behavioral factors and OHIP-14 scores	73
Table 5.3.6. 5.18: OHIP-14 scores and diabetes history.....	73
Table 5.3.6.19: OHIP-14 scores and healthcare access	74
Table 5.4.5.20: Multiple linear regression was used for OHRQoL (OHIP-14 scores) influence factor analysis (N =510)	75

List of Figures

Figure 3.2.1: Conceptual Framework of the study variables.....	22
Figure 4.3.1: Number and percentage of PHC centres in each governorate.....	39
Figure 4.6.2: Flowchart of Sample technique	40
Figure 4.7.3: Sample size calculation	41
Figure 4.7.4: Sample size for this study	41
Figure 5.2.3.1: controlled and uncontrolled diabetic patients percentage based on HbA1c test	52
Figure 5.2.7.1: KAP and OHIP-14 scores distribution according to governorates	60

List of Appendices

Appendix 1: Consent form of participants.....	102
Appendix 2: Questionnaire of the study	102
Appendix 3: Approval from Al Quds University Research Ethical Committee.....	115
Appendix 4: Approval from the MoH	116
Appendix 5: Approval from the MoH for the data collection team	117

List of Abbreviations

Abbreviation	Definition
MoH	Ministry of Health
PHC	Primary Healthcare
UNRWA	United Nations Relief and Works Agency
NGOs	Non-governmental organizations
PMMSA	Palestinian Military Medical Services
DM	Diabetes Mellitus
HbA1c	Glycated Haemoglobin/ Cumulative sugar rate
T1DM	Type 1 Diabetes Mellitus
T2DM	Type 2 Diabetes Mellitus
KAP	Knowledge, Attitude, Practice
HRQoL	Health-Related Quality of Life
OHRQoL	Oral Health-Related Quality of Life
OHIP-14	Oral Health Impact Profile-14
GOHAI	General Oral Health Assessment Index
ADDQoL-19	Audit of Diabetes Dependent Quality of Life-19
DMFT	Decayed, Missing, Filling Tooth
CPI	Community Periodontal Index
HbA1c	Glycated Haemoglobin/ Cumulative sugar rate
N	Number of Participants
%	Percentage of Participants
M	Mean
SD	Standard Deviation
SPSS	Statistical Package for the Social Sciences
U	Mann Whitney U Test
H	Kruskal Wallis H Test
P	P-value

1 Chapter One: Introduction

1.1 Background

Four major types of non-communicable diseases (NCDs) identified by the World Health Organization (WHO), are cardiovascular disease, cancer, chronic respiratory diseases, and diabetes (WHO A, 2023). Diabetes Mellitus (DM) is a chronic metabolic condition that occurs when the pancreas cannot produce insulin, or the body cannot use the existent insulin (*Diabetes, NCD, 2024*). Insulin is the responsible hormone for the regulation of blood glucose (*Diabetes, NCD, 2024*).

The American Diabetes Association (ADA) classifies diabetes into different types, including type 1 diabetes (insulin deficiency) and type 2 diabetes (insulin resistance), gestational diabetes (in pregnancy), and other specific types of diabetes (neonatal diabetes and maturity-onset diabetes of the young) (Care & Suppl, 2020). Globally, according to the International Diabetes Federation (IDF) in 2021, 537 million people aged 20-79 years have diabetes. And 643 million by 2030, 783 million by 2045 (International Diabetes Federation, 2024), and 1.31 billion people by 2050 (Ong et al., 2023). Type 2 diabetes mellitus (T2DM) accounts for 90-95% of all diabetes cases worldwide (Miller & Ouanounou, 2020).

The aetiology of DM is multifactorial, involving a combination of genetic, environmental, and lifestyle factors (Imam et al., 2020a) (Burns & Francis, 2023). Obesity as a result of a bad lifestyle with rapid urbanization and lack of exercise could be the reason for the increase of T2DM in the Arab Countries (Imam et al., 2019).

The American Diabetes Association states that for most adults with diabetes, uncontrolled diabetes is indicated by an HbA1c of 7% or higher(ADA, 2024). An HbA1c level above 9% is considered very poor control(ADA, 2024). Uncontrolled diabetes can lead to numerous serious health complications, both short-term and long-term. These include kidney disease, heart disease, and diabetic foot ulcers(Zakaria et al., 2021). Diabetic patients also commonly experience various oral health problems, such as gingivitis, periodontitis, dry mouth, fungal infections, excessive plaque buildup, slow wound healing, and altered taste sensation(Borgnakke, 2019; Mian, Rashidi, Alshammary, Zubaidi, Shammery, & Siddiqui, 2020). The micro- and macrovascular complications of diabetes are major contributors to these oral complications(Zakaria et al., 2021). Furthermore, hyperglycemia can directly cause periodontal diseases, and there is a bidirectional relationship between diabetes and periodontal health - poorly controlled blood sugar can worsen periodontal disease, which in turn can negatively impact diabetes management(Borgnakke, 2019; Desai et al., 2021; Habashneh et al., 2012; Irani et al., 2015; P et al., 2020).

The Knowledge, Attitude, and Practice (KAP) theory posits that changes in human health behaviour occur through a three-step process: first, acquiring the necessary knowledge; next, developing the right attitudes; and finally, adopting the desired behaviours or practices(Kim, Tae Ryong, 1964). The KAP studies serve as an information source and precursor to awareness or intervention programs, focusing on specific problems within the study population(Sun et al., 2023).

The concept of "health-related quality of life (HRQOL)" means the patients' overall perception of how their illness and treatment impact their physical, psychological, and social well-being(Sitlinger & Zafar, 2018). Oral health-related quality of life (OHRQoL) is a relatively new component of this broader HRQOL concept, possibly due to the historical underappreciation of the impact of oral diseases on quality of life (Shamrany, 2006). OHRQoL is a multidimensional construct that includes a subjective evaluation of an individual's oral health, functional well-being, emotional well-being, expectations and satisfaction with care, and sense of self(Sischo & Broder, 2011). Despite its relatively recent emergence over the past few decades, (OHRQoL) has become an important consideration for the clinical practice of dentistry and dental research. It has wide-reaching applications in survey and clinical research and is recognized by (WHO) as an important component of their Global Oral Health Program in 2003(World Health Organization, 2003).

Oral health is closely linked to overall health, as they share common risk factors such as tobacco use, poor diet, physical inactivity, and alcohol consumption(WHO B, 2023; Wolf et al., 2021). Oral diseases and disorders are closely associated with the four most common non-communicable conditions(WHO B, 2023; Wolf et al., 2021). The 2022 WHO Global Oral Health Status Report urged the integration of oral health into initiatives addressing non-communicable diseases and universal healthcare coverage(Benzian et al., 2023; World Health Organization, 2022).

Effective promotion strategies including preventive oral hygiene measures, such as regular brushing, flossing, routine dental visits(Mark, 2018; Miller & Ouanounou, 2020), a healthy diet, rigorous glycemic control measures, and providing smoking cessation counselling(Moore, Paul A., 2000) can help manage many of these oral complications associated with diabetes. However, factors like lack of knowledge, economic constraints, and limited access to dental care can hinder adherence to proper oral hygiene practices, particularly in underserved diabetic patients populations(Ismaeil & Ali, 2013).

In Palestine, the mortality rate due to diabetes complications was 26.6 deaths per 100,000 population. In the West Bank specifically, diabetes was the 3rd leading cause of death, with a mortality rate of 39.9 deaths per 100,000 population. Diabetic patients aged 59 and above accounted for 85% of deaths resulting from diabetic complications(Palestinian Ministry of Health, 2022).

The estimated prevalence of diabetes in Palestine in 2020 was 20.8% and 23.4% by 2030 (N. M. Abu-Rmeileh et al., 2012). In the West Bank, patients with type 2 diabetes represented 94.4 % of cases among patients attending (PHC) clinics of MoH in 2022 (Palestinian Ministry of Health, 2022).

1.2 Study justification

Diabetes mellitus (DM) can lead to numerous oral complications, which have been well-documented in the literature(Mark, 2018). Proper dental management is crucial for maintaining good oral health in diabetic patients(Siddiqi et al., 2022). However, this alone is not enough - educating diabetic patients about the oral problems associated with their disease is also important to improve their knowledge and attitudes. This, in turn, can enhance their practice and their oral health-related quality of life.

The main oral complications of diabetes include periodontal disease, salivary gland dysfunction, halitosis, burning mouth sensation, and taste dysfunction(Shaikh & Badar, 2023). Diabetic individuals are also more susceptible to fungal and bacterial infections, oral soft tissue lesions, compromised oral wound healing, dental caries, and tooth loss. Uncontrolled diabetes can exacerbate these oral complications(Miller & Ouanounou, 2020).

A systematic review for Baniyadi in 2021 about the association between oral health status and socioeconomic status with oral health related quality of life, found that lower education levels and poorer general health were associated with lower OHRQoL among the elderly(Baniyadi et al., 2021). Another review revealed that people with diabetes tend to have poorer oral health attitudes, inadequate oral hygiene knowledge, and insufficient guidance from their diabetes care providers(Poudel et al., 2022). Knowledge about the increased risk of periodontal disease was the lowest compared to other diabetes-related health complications(Allen et al., 2008).

Diabetic patients generally have better knowledge and perception toward the main complications of diabetes than of its oral complications(Zakaria et al., 2021). Higher education patients had better knowledge about their health(Alhajaji, 2022). A scoping review of diabetes in South Asia showed that better oral health practices will be gained after good knowledge and positive attitudes toward their condition(Poudel et al., 2022). Most of the studies showed a negative impact of diabetes on OHRQoL (Baniyadi et al., 2021; Desai et al., 2021; Habashneh et al., 2012; Lipman et al., 2023; Mian, Rashidi, Alshammary, Zubaidi, Shammery, Siddiqui, et al., 2020; Verhulst et al., 2019) but in another studies showed that no impact of diabetes on OHRQoL (Irani et al., 2015; Khalifa et al., 2013; Mohsin et al., 2017).

According to the 2022 annual report from the Palestinian Ministry of Health, the reported incidence rate of diabetes was 214.4 per 100,000 population in the West Bank and 287.1 per 100,000 population in Gaza. The incidence rate was higher among females compared to males(Palestinian Ministry of Health, 2022).

The prevalence of diabetes among Palestinians aged 25 and older was estimated to be 9.7% in 2000, increasing to 15.3% in 2010. The prevalence increased from 9.1% to 16.9% in men and from 10.2% to 13.6% in women during these ten years (N. M. E. Abu-Rmeileh et al., 2013).

The literature has discussed various oral complications of diabetes, good dental management, and patient education about these issues are crucial for improving oral health and, consequently, oral health-related quality of life.

Many studies were found in the West Bank and Gaza regarding diabetes, overall complications, and general health-related quality of life (Abu Al-Halaweh et al., 2017; Asmar, Imad, 2021; Asmar et al., 2024; Badran et al., 2023; Eljedi et al., 2006; Ghandour et al., 2018; Hussein et al., 2000; Jebril et al., 2020; Khatib et al., 2018; Mosleh et al., 2017; Salameh et al., 2020; Shawahna et al., 2021; Zyoud et al., 2015, Tietjen et al., 2021). Some other studies assessed oral health in diabetic patients (Alqedra & Aljeesh, 2022, 2020a, 2020b) and one study as a master thesis was found related to the KAP of diabetic patients in Hebron Governorate (Harahsheh, 2022).

This research is essential to address a significant gap in the understanding of the relationship between diabetes, oral health-related quality of life (OHRQoL), and the Knowledge, Attitudes, and Practices (KAP) of diabetic patients in the West Bank. While diabetes and its general health impacts have been widely studied in the region, there is a lack of focused research on oral health complications among diabetic patients. This study will be the first to explore how patients' knowledge and attitudes toward oral health affect their quality of life. The findings will provide valuable insights into improving patient education, dental care strategies, and overall diabetes management. By targeting the local population, the research will contribute to more effective healthcare practices, ultimately enhancing the well-being of diabetic patients and reducing the risk of oral and systemic complications. It will also inform healthcare providers on how to better integrate oral health into diabetes care in the region.

1.3 Problem statement

The existing literature indicates a high prevalence of diabetes, particularly type 2, among Palestinians (N. M. Abu-Rmeileh et al., 2012). Diabetes can significantly impact various aspects of a person's life and health, including oral complications (Mark, 2018). Scientific evidence has associated diabetes with a range of oral health issues, such as dental caries, periodontal disease, salivary gland dysfunction, halitosis, burning mouth sensation, fungal and bacterial infections, oral soft tissue lesions, compromised oral wound healing, tooth loss, and taste dysfunction (Miller & Ouanounou, 2020).

Investigating the relationship between knowledge, attitudes, and practices regarding oral health, as well as the oral health-related quality of life among diabetic patients, is an important area of study, especially in Palestine, where no studies have been found related to this topic.

Conducting this study would provide a foundation for further investigations in this field, which could inform the planning of appropriate interventions and engage decision-makers.

1.4 Aim of the study

The main aim of this study is to assess the knowledge, attitudes, and practices (KAP) related to oral health among T2DM patients and their impact on oral health-related quality of life.

1.5 Study Objectives

1. To assess the oral health knowledge of T2DM patients and its association with socio-demographics, and access to healthcare services.
2. To assess T2DM patients' attitudes toward oral health and its association with self-reported general and oral health, smoking, diet, socio-demographics, and healthcare access.
3. To assess T2DM patients' self-care oral hygiene practices and their association with socio-demographics, healthcare access, smoking, diet, and self-reported general and oral status.
4. To assess the oral health related quality of life (OHRQoL) among type 2 diabetic patients.
5. To assess the association between knowledge, attitude, and practice.
6. To assess the impact of KAP on OHRQoL.
7. To assess the effect of diabetes itself, socio-demographics, smoking, diet, healthcare access, and self-reported general and oral health status on OHRQoL.

1.6 Study's Expected Outcome

We expect that diabetes will have a negative impact on the oral health, knowledge, attitudes, and oral health practices of diabetic patients, which in turn could affect OHRQoL. All these variables could be affected by other variables that we will assess like demographic, social, economic, and lifestyle factors, access to dental and healthcare services, satisfaction with these services, health literacy, and other general and oral health issues. We will use data from this study to suggest proper interventions for diabetic patients based on their needs. We will focus on the clarification of the relationship between oral health and diabetes. Involvement of oral

and dental health care in educational healthcare programs in the MoH for diabetic patients is as important as other general health issues related to diabetes.

1.7 Thesis structure

This thesis will be presented in 6 chapters as follows:

Chapter one: contains the background of the study, study justification, problem statement, study aim, objectives, and expected outcomes.

Chapter two includes a literature review of international, regional, and national studies and research conducted.

Chapter three: includes the study conceptual framework and the operational definitions.

Chapter four: includes the study area, study methods, population, sampling method, sample size, ethical consideration, data collection, and analysis.

Chapter five: presents the results of the study.

Chapter six: includes discussion, study strengths and limitations, conclusion, and recommendations.

2 Chapter Two: Literature review

2.1 Introduction

This chapter reviewed the international and national literature from past UpToDate related the topic of this research, starting from definition of diabetes and its oral complications and their impact on quality of life then the studies that assessed the KAP of diabetic patients toward oral health and the variables that could influence the KAP model. In addition to studies about the oral health related quality of life(OHRQoL

2.2 Diabetes, its relation to oral complications and quality of life

In a comprehensive article in 2003 on diabetes and oral health published in J. Ship., the author emphasized the increasing prevalence of diabetes, which is now affecting individuals across all age groups. The article pointed out that diabetes is not only a metabolic condition but also has significant oral manifestations, including an increased risk of periodontal disease, tooth decay, and dry mouth. The author concluded that promoting good oral health and raising awareness about the oral complications of diabetes are essential strategies for improving the quality of life for diabetic patients. By addressing the oral health needs of diabetic individuals, healthcare providers can mitigate the risk of serious oral health issues, thereby enhancing overall well-being and preventing further complications (Ship, 2003).

In a study by S. Norris in 2005 explored the broader impact of diabetes on health-related quality of life. Norris noted that diabetes affects not just the physical aspects of health but also has

profound psychological and social consequences, influencing the overall quality of life. The study highlighted that the increasing focus on quality-of-life research in chronic disease management reflects an understanding of the intricate relationship between the physiological impacts of diabetes and the psychological distress it causes. Social and cultural factors also play a role, further complicating the management of diabetes and its effects on daily living. The study underscored the importance of addressing both the physical and emotional well-being of diabetic patients to improve their quality of life (Norris, 2005).

An article from the University of Michigan examined the relationship between oral health behaviours and diabetes, shedding light on the oral health challenges faced by diabetic patients. The study found that diabetic individuals had poorer oral health status compared to non-diabetic individuals, with common issues such as tooth decay, gum recession, and tooth loss being more prevalent among the diabetic group. Moreover, the researchers compared oral health behaviours between diabetic and non-diabetic participants, finding that those who practiced good oral hygiene - such as regular brushing, flossing, and dental visits-had better oral health outcomes. This suggests that improving oral health behaviours in diabetic patients could lead to significant improvements in their oral health status, emphasizing the need for targeted interventions to promote good oral health practices among this population(Kanjirath et al., 2011).

In a review article for Kudiyirickal & Pappachan (2014), they discussed diabetes and its oral complications and summarized that diabetes could result in local and systematic inflammation which could increase insulin resistance and cause worsening in the diabetes control. For this diabetes needs proper management for the disease itself and the oral infections(Kudiyirickal & Pappachan, 2014).

A Cochrane review examined the effects of diet, physical activity, or a combination of the two, compared to standard diabetes medication. The findings indicated that reduced calorie intake and increased physical activity led to a lower incidence of type 2 diabetes mellitus (T2DM) in high-risk individuals. As a result, a combination of dietary changes and increased physical activity is recommended as an initial intervention for both people with prediabetes and those already diagnosed with T2DM(Hemmingsen et al., 2017).

An article about oral health and diabetes published in 2019 for Borgnakke, discussed different oral health complications related to diabetes and concluded that there is a relationship between periodontitis and diabetes, both are chronic and inflammatory diseases and adversely affect each other. This article showed that uncontrolled diabetic patients of older ages and specifically

in men had a higher prevalence of moderate/severe periodontitis. As a result of the oral complications, it is concluded that the oral health-related quality of life will be diminished(Borgnakke, 2019).

A systematic review by Wu et al. in 2020 about the epidemiologic relationship between periodontitis and T2DM proved the bidirectional relationship between periodontitis and diabetes. A meta-analysis for a total of 53 observational studies showed that periodontitis patients had a significantly higher adjusted prevalence of T2DM compared to those without periodontitis. Significantly the T2DM patients had worse periodontal status with 0.61 mm deeper pockets, 0.89 mm greater attachment loss, and 2 more lost teeth compared to non-diabetic patients(Wu et al., 2020).

A study done in the United Kingdom published in 2021, by Radhika Desai et al., studied two groups T1DM and T2DM by using the Well-being Questionnaire (W-BQ12) and Audit of Diabetes Dependent Quality of Life 19 (ADDQoL-19) they concluded that there was an impact of diabetes on their quality of life but these questionnaires were not useful to observe the impact of periodontal status in the diabetic patients on the quality of life(Desai et al., 2021).

2.3 KAP studies about diabetes and oral health and its relationship to socio-demographic, economic, general health, and healthcare access

A cross-sectional study was done in Thailand in 2014 to assess the KAP of T2DM patients toward their oral health and their DM, they found moderate knowledge and, a neutral attitude, and studied the correlation between glycaemic control and the KAP and found that no association(Saengtipbovorn & Taneepanichskul, 2014).

In a quasi-experimental study, an interventional program was applied to a group of participants, this program included lifestyle change and dental care, and the result was an improvement in the KAP toward oral health of elderly diabetic patients type 2 (Saengtipbovorn & Taneepanichskul, 2015).

In the cross-sectional study that assessed the KAP of diabetic patients toward periodontal disease showed that while diabetic patients generally lacked awareness of the connection between diabetes and oral health, they demonstrated good overall oral hygiene practices. Most were knowledgeable about the medical complications of diabetes and its systemic effects but

did not fully appreciate the importance of proper dental care in managing their condition(Ramadan. et al., 2017).

A cross-sectional about KAP of Iranian diabetic patients toward their oral health emphasized the importance of educational programs to improve their knowledge, attitude, and practice and it was more effective for early-diagnosed patients(Niroomand et al., 2016).

A KAP study conducted in China on elderly diabetic patients showed that diabetic patients compared to non-diabetic had good knowledge and positive attitude toward oral health, more than one-third of diabetic brushed their teeth twice daily and this was significantly higher than those with no diabetes(C. X. Wang et al., 2018).

A cross-sectional study in Muda district in Malaysia about KAP of T2DM patients showed that there was a significant correlation between knowledge and attitude and between knowledge and practice. They had accepted knowledge and moderate positive attitudes with moderate self-care oral health practices. Females had more positive attitudes than males, age, educational level, employment, monthly income, educational programs for diabetic patients and other health issues were significantly correlated with KAP. Health status stratification significantly correlated with attitude(Abbasi et al., 2018).

In a systematic review article done in 2018 by Poudel et al., various studies analysed the knowledge about the relation between diabetes and oral hygiene. They found that more than half of the people with diabetes were not aware of the importance of maintaining a good oral health routine. Some studies showed that those with good knowledge about the link were more likely to adopt healthy lifestyle behaviours. This systematic review revealed that people with diabetes have a poor oral health attitude and inadequate knowledge about their oral hygiene. They also do not receive adequate care advice from their diabetes care providers(Poudel et al., 2018).

A cross-sectional study in Kerman diabetes clinics in Iran about the knowledge and attitude of diabetic patients regarding oral and dental disorders showed moderate knowledge and attitude. Significantly females and patients with a longer duration of diabetes had more knowledge scores, but patients with a family history of diabetes had lower scores of knowledge(Kakooei et al., 2020).

A study about knowledge of diabetic patients regarding their disease and its oral manifestations conducted with oral examination by DMFT(decayed, missing, filling teeth) and

CPI(communit y periodontal index) showed poor knowledge and significantly high scores of DMFT and CPI which means more decay(caries) and more gingival problems(Parakh, M. K., Kasi, A., Ayyappan, V., & Subramani, 2020).

Another cross-sectional study with a convenience sample was done in Bangladesh and showed that there was a significant difference in knowledge and behaviours scores of diabetic patients based on their sociodemographic characteristics. The study found that 65% had good knowledge. Conversely, only 7.5% had good practices. There was a statistically significant association between participants' oral health knowledge/practices and their gender, education, occupation, and marital status. Additionally, there was a strong correlation between participants' level of oral health practices and their monthly income(Arefin et al., 2021).

A cross-sectional study in Punjab, Pakistan assessed the relationship between diabetic patients' knowledge, attitude, and their demographic, and socio-economic characteristics. The study found that oral health knowledge was significantly associated with gender, educational status, monthly income, and marital status. Additionally, higher levels of education and income were strongly linked to greater oral health awareness and more positive attitudes(Riaz et al., 2022).

In a study about oral health knowledge among diabetic patients type 1 and 2, the study population consisted of members of the International Diabetes Federation and their local communities, 307 participants from 60 different countries, high respondents from Croatia, Lebanon, Finland, and Hungary. The study found high rates of unhealthy behaviours among the participants such as alcohol consumption and smoking. The majority also regularly indulged in unhealthy snacks (biscuits, sweets, and drinking soft drinks). Dental health was also a concern, with over a quarter of participants reporting fear of dental treatment. Nearly half experienced dry mouth and other oral complications. However, the frequency of dental visits was relatively high, with over 70% reporting a visit in the past year. The data showed gender differences, with females exhibiting better oral hygiene habits compared to males(Banyai et al., 2022).

A KAP study conducted in Pakistan showed that diabetic patients had adequate knowledge but poor attitudes and practices toward their diabetes and oral health. Some of the sociodemographic factors assessed in this study significantly influenced the scores of KAP(Shaikh & Badar, 2023).

A KAP cross-sectional study conducted in Tanzania, a total of 384 participants type 1 and 2 diabetes were included, the study found that among participants diagnosed with diabetes, the

percentages with good knowledge, attitude, and practice related to oral health were 51.0%, 82.3%, and 20.6%, respectively. Oral health knowledge was significantly associated with the level of education and previous referral to a dentist. Similarly, the level of education and oral health knowledge were significantly associated with participants' attitudes towards oral health. Regarding oral health practices, these were significantly associated with the level of education, previous referral to a dentist, oral health knowledge, and attitude toward oral health(Sohal et al., 2024).

The 2017 scoping review by Poudel highlights that healthcare access for diabetic patients is important to manage their oral health and this will lead to a better diabetes management. Many providers do not consistently incorporate oral health advice or referrals into patient care. The review emphasizes the need for improved training and education to enhance providers' understanding of the connection between diabetes and oral health. Strengthening the collaboration between medical and dental professionals is crucial to effectively promote oral health and improve diabetes care, ultimately benefiting patient outcomes(Poudel et al., 2017).

A study about the importance of the integration between medical and dental health care for diabetic patients for improving their health outcomes, as oral health directly impacts diabetes management. Providers acknowledge the importance of collaboration between healthcare teams, but face challenges such as communication barriers, time constraints, and logistical issues. Overcoming these barriers through better coordination, shared responsibilities, and patient education could enhance care. Policy changes and training for healthcare providers are recommended to facilitate this integration, ultimately benefiting diabetic patients by addressing both their medical and dental needs(Glurich et al., 2018).

2.3.1 Regional studies

In a study done in 2020 in Saudi Arabia about the knowledge and oral health status of diabetic patients by Mian et al., they studied diabetic and non-diabetic patients age group 30-40 male and female, the result was that the diabetic patients had more oral health complications than non-diabetic the result was the same for men and women, for the knowledge assessment they found that 63.4 % of participants knew the effect of DM on their oral health, 82.7% knew that diabetes needed special health care, 75.25% had never spoken to their doctors about their oral

health and 81.19 had never talked to their dentists regarding diabetes(Mian, Rashidi, Alshammary, Zubaidi, Shammmary, & Siddiqui, 2020).

Another study in Saudi Arabia discussed the knowledge, perception, and practice of diabetic patients and oral health for Zakaria et al., they concluded that good general oral hygiene practice was noticed among the participants, on the other hand, there was an obvious shortage of perception and knowledge about the dental and oral complications among diabetic patients. The results showed that there was good perception and knowledge about the main complications of diabetes rather than oral complications(Zakaria et al., 2021).

A cross-sectional study in Kuwait about the knowledge and practice of diabetic patients demonstrated a good understanding of how diabetes affects their overall health but had less awareness about the impacts on their oral health. While general health knowledge was high, the patients' dental health practices were lacking. This highlights the need for healthcare providers, including physicians and dentists, to educate diabetic patients on the full spectrum of health implications of their condition and provide the necessary information to improve their self-care(Alhuwais et al., 2021).

A cross-sectional KAP study in Saudi Arabia showed accepted knowledge with highly positive attitude and practice toward oral health in diabetic patients, Longer diabetes duration was positively and significantly associated with higher knowledge and practice scores, participants who had first-degree relatives with T2DM had a higher knowledge score compared to individuals with no relatives with T2DM, high educational level had more knowledge, older individuals and families with low monthly income had significantly lower practice scores and for marital status, widowed and divorced participants had lower attitude scores than married and single participants(Mahzari et al., 2022).

2.4 OHRQoL, KAP and OHRQoL related diabetes

In a study on attitudes, awareness, and oral health-related quality of life in patients with diabetes in 2008 by Allen et al., they found that the knowledge percentage of participants toward their increased risk for health problems was the lowest for periodontal disease. The result was for heart disease 84%, eye disease 98%, circulatory problems 99%, kidney problems 94%, and periodontal disease 33%. Of the 33% of participants who were aware of their increased risk for periodontal disease, 51% (16% of the total group) had received this information from their dentist, 32% from the diabetic team, 7% from a dental hygienist, and 10% from other sources.

For diabetic patients with oral health problems reported a poor quality of life related to their oral health, particularly in areas such as eating, speaking, and social interactions. (Allen et al., 2008).

A critical review discussed the concept of oral health-related quality of life and built a model for the factors affecting this concept, social, cultural, educational, and environmental factors and access to facilities could participate but these factors could differ depending on each situation or studied population. The importance of studying this concept of OHRQoL is for assessment to change from traditional medical/dental care to special care that focuses on a person's social and emotional experience and perceptions for better treatment goals and outcomes(Sischo & Broder, 2011)

A cross-sectional study was done in Jordan by Habashneh et al., to evaluate the impact of periodontal disease on the oral health-related quality of life among diabetic patients using the OHIP-14 instrument, severe chronic periodontitis had the highest scores of OHIP-14 which means it had a significant bad impact on quality of life. Physical pain and physical disability were the main affected dimensions in this study(Habashneh et al., 2012).

In a study done in 2014 used OHIP-14 and GOHAI questionnaires for the oral health-related quality of life for Nikbin et al., the results were 56% of participants had good oral health, with 31.7% moderate and 12.3% bad oral health. 32% of subjects were with proper systemic health, 50.3% moderate, and 17.7% with bad systemic health. The study concluded that oral health-related quality of life (OHRQoL) in diabetic patients was significantly impacted by their oral health conditions, with diabetes-related complications exacerbating oral health problems. (Nikbin et al., 2014).

An analytical cross-sectional study in 2014 about OHRQoL showed that there was no significant association between OHRQL and gender, smoking, type of diabetes, and the number of dental visits. On the other hand, significant correlation between age, knowledge about diabetes and oral health, educational level, being referred for dental visits by their physicians, frequency of brushing, and the duration of diabetes(R. Sadeghi et al., 2014).

In a study done in 2015 by F. Irani et al., to assess the impact of periodontal status on oral health-related quality of life among diabetic type 2 patients and non-diabetic, the result was that T2DM did not affect the overall quality of life, they measured it by OHIP-49. The non-diabetic group with chronic periodontitis and gingivitis had poorer OHRQoL. They explained this result that healthy patients(non-diabetic) were more concerned about the effects of periodontitis and

gingivitis on their oral health status and so their quality of life. And we think that their study had a small sample size so there would be bias so we cannot generalize it(Irani et al., 2015).

In a cross-sectional study about quality of life and oral health in the elderly in Spain, they used the OHIP-14 questionnaire and oral status evaluation. The result of this study was that there is no relation between quality of life and the number of remaining teeth or the number of ingested drugs, but there was an association between xerostomia (dry mouth) and quality of life and had a bad impact. The measures the diabetic patients took to solve the dry mouth problem were drinking water and eating sugarless candies(Torrijos-gómez & González-serrano, 2016).

In a study of the effect of T2DM on oral health-related quality of life done in Pakistan in 2017 by Mohsin et al., they found that there is no effect of diabetes oral complications on OHRQoL, but they found that females scores of OHIP-14 questionnaire they used were higher than males scores in terms of functional limitations and physical pain and these differences were statistically significant(Mohsin et al., 2017).

In a cross-sectional study about oral health status and quality of life used the GOHAI(General Oral Health Assessment Index) questionnaire in Australia for S.Azogui, they found that diabetic patients had poor quality of life when they had bad oral health(Azogui-Levy et al, 2018).

In a review article about diabetes, oral health, and oral health-related quality of life in 2019, in this article, they define the disease and its local and systematic complications and how these complications could lower the quality of life. They found that periodontal disease is the main oral complication in diabetic patients(Cervino et al., 2019).

A cross-sectional study done in Amsterdam by Verhulst et al., studied the general and oral health-related quality of life for T2DM, they used the OHIP-14 questionnaire to study OHRQoL, and the result was that diabetic patients had impaired quality of life because of pain in the mouth, xerostomia, and bad breath. The patients with periodontitis had worse OHRQoL(Verhulst et al., 2019).

A matched case-control study done in the United Arab Emirates in 2020 by Khalifa et al., used the OHIP-14 questionnaire and did clinical examination for dental caries and periodontal status, they found that there was no significant difference between diabetic and non-diabetic in OHIP-14 scores. They explained the reason why there is no association between diabetes and OHRQoL in their study that diabetic patients are concerned more about other health issues related to their disease rather than oral health(Khalifa et al., 2020).

A systematic review and meta-analysis investigated the relationship between poor Oral Health-Related Quality of Life (OHRQoL) and various oral health factors among the elderly population. These factors included advanced age (75+ years), marital status, smoking, denture use, depression, low education (≤ 8 th grade), poor general health, caries history, tooth pain, decayed/missing/filled teeth (DMFT), and periodontal disease. A positive association between low educational level, marital status, depression, smoking, wearing dentures, poor general health, tooth-related pain, periodontal diseases, and poor (OHRQoL). And a negative association between decayed, missing, and filled teeth (DMFT) and poor OHRQoL in those over 75 years of age (Baniasadi et al., 2021).

A systematic review of the effect of tooth loss on the functional impact of the OHRQoL using the OHIP instrument in their search, results showed that people with complete dentures had more impact on their oral function than those with partial dentures or with some missing teeth (Schierz et al., 2021).

A cross-sectional study with a convenience sample (260 participants) in Sydney, Australia showed that over half of them reported good to excellent oral health status, yet more than half also reported having one or more oral health problems. The most common issues were dry mouth, gaps between teeth, tooth/gum pain, and loose teeth. The OHIP-14 scores showed that a majority reported their oral condition impacted at least one of the seven domains, with physical pain being the most affected and social disability the least. The average OHIP-14 score was 11.38 (range 0-56). Which indicated a good quality of life. Notably, poor knowledge was observed around the bidirectional link between diabetes and oral health, as well as the benefits of dental treatment for blood glucose management. For their behaviour over half of them had seen a dentist in the last year, primarily for dental problems/treatment, followed by checkups/cleanings. Two factors were significant predictors of adequate oral health knowledge: the first one was receiving oral health information from diabetes care providers (2.6 times higher odds) and having a technical, or university-level education (3 times higher odds than primary only) (Poudel et al., 2021).

In a study assessed OHRQoL in India found that there is an association between poor OHRQoL is associated with various factors, including age, gender, marital status, education level, family type, socioeconomic status, tooth loss, body mass index (BMI), diabetes, hypertension, and tobacco use. Oral examinations revealed a prevalence of dental caries and edentulism. Half of

the participants had poor OHRQoL based on the General Oral Health Assessment Index (GOHAI) tool scores (Vaddi et al., 2024).

2.5 Diabetes, KAP, and OHRQoL studies in Palestine

According to the World Diabetes Foundation and their Palestinian national diabetes program. The prevalence of diabetes is exceptionally high among Palestinians living in the West Bank, Gaza, and East Jerusalem, with a published rate of 15.3% - more than double the global average of 6%. However, anecdotal evidence suggests the actual rate may be even higher, potentially reaching 18-21%. The majority (95.3%) of the total diabetic population in Palestine have type 2 diabetes, while only a small fraction (4.4%) is diagnosed with type 1 diabetes (World Diabetes Foundation, 2024).

In a chapter about diabetes done in Palestine 2019 by Dr. El-Sharif and Dr. Imam discussed the effect of diabetes on general health-related quality of life, they said that HRQoL is a relatively new research field in Palestine, and they just found in that time three published studies related to quality of life on Palestinian diabetic patients (Abu Awad 2013, Eljedi et al. 2006 and Khatib et al. 2018) and one unpublished doctoral dissertation (Imam et al., 2019).

Many studies conducted in Gaza and West Bank about diabetes (Husseini et al., 2000; Imam et al., 2020b), its prevalence (N. M. Abu-Rmeileh et al., 2012; Abu Al-Halaweh et al., 2017; Jebril et al., 2020; Mikki & Mactaggart, 2022), risk factors (Imam et al., 2020b; Salameh et al., 2020), complications (Abu Al-Halaweh et al., 2017; Dweib & El Sharif, 2023; Ghandour et al., 2018), prevention (N. M. E. Abu-Rmeileh et al., 2013; Jebril et al., 2020) and management (Ashour et al., 2024; Mosleh et al., 2017; Zyoud et al., 2015) and its effect on general health like kidney (Badran et al., 2023; Khatib et al., 2018), eyes (Mikki & Mactaggart, 2022), and the negative impact on health related quality of life (Abuawad, 2013; Asmar, Imad, 2021; Eljedi et al., 2006; Tietjen et al., 2021; Zyoud et al., 2015).

A KAP cross-sectional study on diabetes and its general complications conducted in the West Bank by Shawahna et al., in primary healthcare centres of the Ministry of Health, showed that there was a moderate positive correlation between knowledge, attitude, and practice scores. Almost half of them (52.2%) had good knowledge, 58.7% had positive attitudes and only 36.4% had good practice. Higher educational level patients had better knowledge and practice, also who attended an educational program regarding diabetes had better practice, and those who had

controlled diabetes had better knowledge and practice. All these results were statistically significant(Shawahna et al., 2021).

A cross-sectional study in Gaza Governorates analysed oral health data from 406 patients with type 2 diabetes, selected through systematic random sampling across 5 UNRWA health centres. This study consisted of 2 parts one about the periodontal disease and the other about the Decayed, Missing, and Filled Teeth (DMFT) index. The results of the DMFT part showed a mean (DMFT) score of 18.6. The DMFT index was statistically associated with age, education level, employment status, brushing frequency, diabetes duration, and HbA1c levels. DMFT scores were higher among males and those below the poverty line. The results of the periodontal study showed that patients with T2DM often had worsened chronic periodontitis due to their condition, 36.3% of participants never brushed their teeth, and only 16.5% brushed twice or more per day. The percentage of patients with gingival bleeding was 83.6%. Gingival bleeding was significantly associated with gender and frequency of teeth brushing which means being a female and never brushing teeth increased bleeding. (Alqedra & Aljeesh, 2020a, 2020b).

Another analytical cross-sectional study by Alqedra & Aljeesh in 2022 about oral health problems among T2DM patients summarized that these patients suffer from various oral health issues, and they were unaware of the connection between diabetes and oral health. And assured the importance of educational programs related to oral health diabetes for both the patients and other healthcare providers(Alqedra & Aljeesh, 2022).

For Dr. Harahsheh, a master thesis study at Al-Quds University in 2022 about oral health and KAP of diabetic patients in Hebron Governorate The study included 309 patients with both type 1 and type 2 diabetes mellitus. It was conducted at 5 diabetes clinics in primary healthcare centres. The results of the study showed that people with diabetes had a moderate level of oral health knowledge (60%), high oral health attitudes, and moderate oral hygiene practices. The study found that 66.99% of patients attending the primary healthcare centres in Hebron were those with type 2 diabetes, 57.28% had been diabetic for more than 5 years, 61.81% were non-smokers, and 56.63% had poor HbA1c levels. The study showed a low awareness level that smoking with diabetes increases the incidence of oral problems. There was a significant relationship between controlled and uncontrolled diabetic patients in terms of their knowledge and practices - those with controlled diabetes had better knowledge and practices. Providing oral health education to diabetes patients and referring them to dentists could improve their oral hygiene practices(Harahsheh, 2022).

The literature review revealed extensive research on health-related quality of life, as well as the specific topic of oral health-related quality of life (OHRQoL). The importance of studying OHRQoL lies in its potential to influence patient treatment preferences, which can be shaped by their perceptions, knowledge, and various social, cultural, economic, and environmental factors. While some studies have found diabetes to impact OHRQoL, others have not, likely due to differences in sample characteristics, region, and patient expectations. Despite limited research that is connecting KAP with OHRQoL, this could provide a comprehensive framework for improving oral health interventions for diabetic patients, ultimately leading to better health outcomes and overall well-being. This is the first study in this area that investigates the KAP of diabetic patients toward oral health and the first that connects KAP with OHRQoL in addition to other influencing factors based on the literature. This will be useful for researchers for future studies that may expand the research in this field.

3 Chapter Three: Theoretical and conceptual framework

3.1 Introduction

This chapter contains the conceptual framework of this study with the conceptual variables and their operational definitions.

Based on literature and the established KAP models(Y. Wang et al., 2023; Zheng et al., 2021,Rav-Marathe et al., 2016), the conceptual framework as shown in Figure 1 had been designed with three main dependant variables and other factors as independent variables.

Some studies combined the KAP variables with OHRQoL and despite their scarceness, also their target group was not the same as our target population in this study, like students with diabetes or stroke patients. But we built the conceptual model of this study based on the conventional model of KAP and the logical impact of this model on the OHRQoL in addition to other variables that could influence the dependent variables of this study. For further future studies other models could be used like the biopsychosocial model based on the results of this study that showed the significant relationships between these variables with the KAP and OHRQoL.

3.2 Study conceptual framework

Dependent and independent variables are shown in (Figure 3.2.1)

The main **dependent variables** of the model:

- Knowledge about diabetes and its effects on oral health.
- Attitudes of T2DM patients toward oral health.
- Oral health self-care practices.
- Oral health-related quality of life (OHRQoL)

The **independent variables** that could affect the model:

- Socio-demographic and economic factors: age gender marital status education family size and place of residence employment household monthly income
- Behavioural or lifestyle factors: (smoking and diet)
- Access to dental and healthcare services
- Diabetes history: family history, duration, medication, HbA1C test
- Other self-reported chronic health issues and conditions
- Self-reported oral issues and conditions
- The KAP variables as an independent variable for OHRQoL

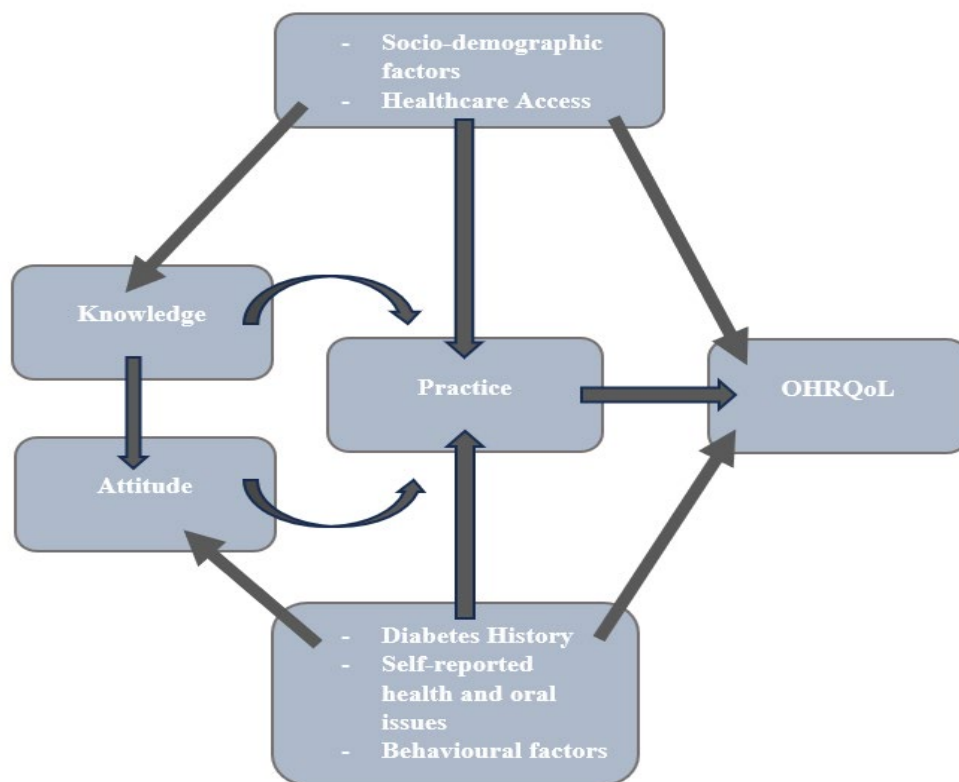


Figure 3.2.1: Conceptual Framework of the study variables

3.3 Study variables and their conceptual Definition

3.3.1 Diabetes

It is a multifactorial disease, with both genetic and lifestyle factors contributing to its development. Studies have shown that individuals with a family history of diabetes face a significantly higher risk of developing the condition themselves. For example, a study conducted in Saudi Arabia found that those with a diabetic father have a 41.1% chance of developing diabetes, while the risk is 39.3% for those with a diabetic mother. The risk is also elevated, at 24%, for participants who have a sibling with diabetes (Abdulaziz Alrashed et al., 2023). Duration of diabetes and medication also affect the status of diabetes which in turn could affect the other studied variables.

3.3.2 The haemoglobin A1c

(HbA1c) test is a valuable tool for evaluating a person's long-term glucose control. Also known as glycated or glycosylated haemoglobin, this test provides an average of blood sugar levels over the past 90 days, represented as a percentage. An HbA1c below 5.7% is considered normal, while values between 5.7% and 6.4% indicate prediabetes. Diabetes is diagnosed when the HbA1c reaches 6.5% or higher. By reflecting the average blood sugar over the previous three months, the HbA1c test serves as a reliable indicator of overall glycaemic control (Eyth E, 2023).

3.3.3 Socio-demographic and economic factors

Socio-economic status is a complex, multifaceted construct influenced by interrelated factors like income, education, and employment. These socioeconomic factors can significantly impact an individual's capacity to engage in healthy behaviours, access medical care and adequate housing, and manage stress effectively. Moreover, socioeconomic factors can interact with or obscure the relationships between other variables and overall health (CDC, 2024).

3.3.4 Behavioural risk factors

They are strongly influencing health, including tobacco use, alcohol consumption, physical activity, diet, sexual practices, and disease screening. Previous sophisticated research had

strengthened causal conclusions, clarified dose-response relationships, quantified the public health impact of these behaviours, and led to the development of scientific guidelines(Institute of Medicine (US) Committee on Health and Behavior, 2001).

3.3.5 Access to healthcare services

Accessing quality, comprehensive healthcare is essential for promoting good health, preventing and managing disease, reducing disability and premature mortality, and achieving health equity for all. Achieving adequate access to care requires having health insurance to facilitate entry into the healthcare system, timely access to needed services, a regular provider with whom to build a relationship, and the ability to receive care when one perceives a need for it(Rockville (MD): Agency for Healthcare Research and Quality (US), 2021).

3.3.6 Satisfaction with health services

Measuring patient satisfaction with care is a complex challenge. Satisfaction is a multifaceted psychological concept, influenced by factors like time, personal experiences, expectations, and social connections(Tibeica et al., 2024). Recently, there has been a growing emphasis on patient-centred care in healthcare, underscoring the importance of understanding and improving patient happiness. (Tibeica et al., 2024). Providing high-quality dental services is essential for maintaining patient health, satisfaction, and well-being.

3.3.7 Self-reported health problems

This refers to medical conditions that a person states a health professional has diagnosed them with, and that are expected to last six months or more(Statistics Canada, 2024).

3.3.8 Self- reported oral and dental problems

This refers to the oral and dental issues that are related to other health status and accepted and validated techniques in research(Pitiphat et al., 2002).

3.3.9 Knowledge, Attitude, and Practice

The (KAP) surveys originated in the 1950s in the fields of family planning and population research and are now a well-established tool for investigating health-seeking behaviours. They aim to elicit what is known (knowledge), believed (attitude), and done (practiced) by a representative sample of a target population concerning a specific health topic(Andrade et al., 2020).

Data is typically collected through self-administered or interviewer-administered semi-structured or structured questionnaires, which can capture both qualitative and quantitative information. Overall, the KAP survey provides a comprehensive snapshot of a population's knowledge, attitudes, and practices around a particular health issue(Andrade et al., 2020; USAID, 2011).

3.3.10 Oral Health-related Quality of Life

It refers to an individual's perception of how their oral health affects their overall well-being and daily functioning(Schütte, U., Heydecke, 2008). OHRQoL is a multidimensional construct that encompasses a subjective evaluation of one's oral health, functional and emotional well-being, expectations and satisfaction with dental care, and sense of self(Sischo & Broder, 2011). The concept of OHRQoL is significant for three key areas of dentistry: clinical practice, research, and education. In particular, the notion of OHRQoL is tremendously important across all levels of dental research, as successful research can make meaningful contributions to patients' quality of life. At the community research level, the OHRQoL framework is especially vital for promoting oral health care access and utilization(Shamrany, 2006).

3.4 Study variables and their operational definitions

3.4.1 Dependent variables

Oral health-related quality of life (OHRQoL) is the main outcome of this study, and it is the dependant variable, we will measure it by a short version of the instrument Oral Health Impact

Profile (OHIP-14). Rates of responses for this instrument on the Likert scale are as follows 0 = never, 1 = hardly ever, 2 = occasionally, 3 = often, 4 = very often/every day. The OHIP-14 scores can range from 0 to 56 and are calculated by summing the ordinal values for the 14 items. The domain scores can range from 0 to 8. Higher OHIP-14 scores indicate worse OHRQoL and lower scores indicate better OHRQoL (Mary et al., 2017). A validated Arabic version of this instrument was used in this study from the previous studies among Sudanese (Khalifa et al., 2013; Osta et al., 2012). Domains and questions of the OHIP-14 instrument are shown in Table 3.4.1.1.

Table 3.4.1.3.1 OHIP-14 Domains and Items

Domain	Item
Domain 1: Functional limitation	1. Had trouble pronouncing any words 2. Felt sense of taste has worsened
Domain 2: Physical pain	3. Had painful aching 4. Found it uncomfortable to eat any food
Domain 3: Psychological discomfort	5. Been self-conscious 6. Felt tense
Domain 4: Physical disability	7. Felt diet has been unsatisfactory 8. Had to interrupt meals
Domain 5: Psychological disability	9. Found it difficult to relax 10. Been a bit embarrassed
Domain 6: Social disability	11. Been a bit irritable 12. Had difficulty doing usual jobs
Domain 7: Handicap	13. Felt life less satisfying 14. Been totally unable to function

Knowledge about oral health is the dependent variable which could be affected by the other independent factors as the conceptual model shows. And it is also consider This variable will be assessed by the questions in (Table 3.4.1.2), adapted from (Abu-Gharbieh et al., 2019; Ismaeil & Ali, 2013; Jaber et al., 2017; Journal & Vol, 2015; Mian, Rashidi, Alshammary, Zubaidi, Shammary, & Siddiqui, 2020; Niguse et al., 2019; Shawahna et al., 2021; Wang et al., 2018, Alhajaji, 2022; Mahzari et al., 2022). Answers to these questions: “True” or “False”.

Table 3.4.1.3.2: Questions about Knowledge

1. People with diabetes are more susceptible to gum disease and dental-supporting tissues.
2. There is no relationship between gum disease and dental supporting tissues and increased blood sugar levels in the blood.
3. Diabetes does not cause bad breath.
4. People with diabetes are more likely to have dry mouth.
5. Diabetics usually do not suffer from oral thrush.
6. Diabetics have a higher incidence of tooth decay due to dry mouth
7. Diabetes is not a cause of tooth loss in patients
8. Regulating blood sugar levels may protect against oral and dental diseases in diabetics
9. Smoking is not a risk factor for increased oral and dental diseases in diabetics.
10. There is a relationship between chronic gum inflammation and cardiovascular disease in diabetics

Attitude will act as an independent variable and a dependent one influenced by knowledge and accessibility to healthcare services as the conceptual framework shows. Attitude will be assessed by these questions in (Table 3.4.1.3), adapted from (Abu-Gharbieh et al., 2019; Ismaeil & Ali, 2013; Jaber et al., 2017; Journal & Vol, 2015; Mian, Rashidi, Alshammary, Zubaidi, Shammary, & Siddiqui, 2020; Niguse et al., 2019; Shawahna et al., 2021; Wang et al., 2018 ,Alhajaji, 2022; Mahzari et al., 2022).

The response to these questions will be 5-point agreement scale, “Totally Disagree”, “Disagree”, “Uncertain”, “Agree”, and “Totally Agree”.

Table 3.4.1.3.3: Questions related to attitude toward oral health

1. Taking care of your mouth is as important as taking care of other parts of your body.
2. It is important to brush your teeth in the morning and before going to bed.
3. I think it is necessary to maintain a visit to the dentist at least once a year for a regular check-up of the mouth and teeth.
4. If you have a problem with your mouth or teeth, you should consult a dentist.
5. It is important for the medical team supervising diabetic patients to provide information about the complications of diabetes on oral and dental health during a routine visit to the diabetes clinic.
6. It is important for your doctor to treat your diabetes by referring you to a dentist for a regular oral and dental check-up.

Oral hygiene self-care practice is a dependent variable for the other independent variables and an independent variable for OHRQoL. We can measure the practice by this group of questions shown in (Table 3.4.1.4), adapted from (Abu-Gharbieh et al., 2019; Ismaeil & Ali, 2013; Jaber et al., 2017; Journal & Vol, 2015; Mian, Rashidi, Alshammary, Zubaidi, Shammery, & Siddiqui, 2020; Niguse et al., 2019; Shawahna et al., 2021; Wang et al., 2018, Alhajaji, 2022; Mahzari et al., 2022).

Table 3.4.1.3.4: Questions and answers about oral hygiene selfcare practices

1. Do you brush your teeth?	At least once a day/ Sometimes /Rarely/ Never
2. Do you floss?	At least once a day/ Sometimes /Rarely/ Never
3. Do you use fluoridated toothpaste to clean your teeth?	Yes / Sometimes / No/ I don't know
4. Do you use mouthwash?	Yes / Sometimes / No/ I don't know
5. How do you hold your toothbrush when brushing your teeth, can you show me? (The correct way is at a 45-degree angle so that the bristles of the brush touch the tip of the gums and teeth)	Yes (Correctly)/ No (Incorrectly)
6. How long time do you brush your teeth?	Less than a minute/ Two minutes/ More than two minutes / I don't know, or I don't brush my teeth

3.4.2 Independent variables

According to the conceptual framework, these variables will be studied based on literature and models of KAP and they are categorized as follows:

Socio-demographic characteristics

- Gender categorized as:
 - Male
 - Female
- Age in years expressed in number.
- Marital status categories:
 - Married
 - Divorced
 - Widowed
 - Single

- Family members (including participants themselves) expressed in number.
- Place of residence categorized as:
 - Village
 - City
 - Camp
 - Other
- Educational level categorized as:
 - Uneducated
 - Elementary (1-6)
 - Secondary (7-10)
 - High School (11-12)
 - 2-years College
 - 4-years University and above
- Employment categorized as:
 - Full-time employee
 - Part-time employee
 - No employment
 - Retired
 - Housewife (Stay at home mother)
- Average monthly household income (in Shekel) is categorized as:
 - Less than 1000
 - 1000-1999
 - 2000-2999
 - 3000-3999
 - More than 4000

Behavioural factors:

Smoking

- Smoking is classified into:
 - Currently smoker
 - Former smoker

- Never smoker
- Type of smoking:
 - Cigarettes
 - Cigars
 - Pipe
 - Hookah
 - Electronic cigarette
 - More than one type
 - All options Other
- Duration of smoking
 - 1-5 years
 - 6-10 years
 - 11-15 years
 - More than 15 years
- Thoughts about quitting smoking
 - No
 - Yes
- For former smokers, the duration of quitting smoking
 - 1-5 years
 - 6-10 years
 - 11-15 years
 - More than 15 years
- For former smokers, the reason for quitting
 - Health reason (disease)
 - Relatives' advice
 - Family reason
 - Economic reason
 - Other

Diet

- Vegetables and fruits are not part of your diet
 - Always
 - Often
 - Sometimes
 - Rarely
 - Never
- Do you eat a lot of sweets and sugar?
 - Always
 - Often
 - Sometimes
 - Rarely
 - Never
- Do you eat a lot of fats or oils (vegetable oils, butter, ghee, etc.)?
 - Always
 - Often
 - Sometimes
 - Rarely
 - Never

Other health issues and chronic diseases (Table 3.4.2.5)

- Do you suffer from any of the following diseases?

Table 3.4.2.3.5: General Health issues categories

	Yes	No
Cardiovascular diseases		
High blood pressure		
Respiratory diseases (such as asthma, etc.)		
Arthritis (Rheumatism)		
Previous Strokes		
Cholesterol		
Eye diseases and problems		
Other Endocrine diseases		

Diabetes history

- Family history of diabetes
 - None
 - First-degree relatives
 - Second-degree relatives
 - I don't know
- Cumulative sugar rate (HbA1c) is expressed as a number.
- When was the last sugar test Cumulative
 - 1-3 months
 - More than 3 months
- Diabetes status (based on HbA1c)
 - Controlled (HbA1c less than 7)
 - Uncontrolled (HbA1c more than 7)
- Duration of diabetes in years
 - 1-5 years
 - 6-10 years
 - 11-15 years
 - More than 15 years
- Are you taking medication for diabetes?
 - No
 - Yes
- Type of treatment
 - Diet prescribed by the doctor
 - Oral diabetes tablets prescribed by the doctor
 - Insulin
 - All treatments together
 - No treatment
- Type of diabetes tablets and duration, it is an open question.
- Type of insulin and duration, it is an open question.
- Have you noticed any of the changes mentioned in your mouth recently (Table 3.4.2.6)

Table 3.4.2.3.6: Oral issues and problems categories

	Yes	No	Not sure
Tooth decay			
Tooth loss			
Dry mouth			
Bleeding gums			
Ulcers, abscesses, tooth sensitivity			
Bad breath (Halitosis)			
Fungal infection(thrush)			
Stomatitis (infection or inflammation)			
Burning sensation in the mouth (Burning mouth syndrome)			
Change in taste of food			

Healthcare Access

- Participation in diabetes education program
 - No
 - Yes
- Talking to a doctor or physician about diabetes and oral health
 - No
 - Yes
- Have you ever talked to your dentist about your diabetes
 - No
 - Yes
- When was your last visit to the dentist?
 - Less than 6 months
 - 6-12 months
 - More than 1 year
 - I do not visit the dentist
- Reason for visiting the dentist

- Routine check-up
- Cosmetic treatments
- Therapeutic (fillings)
- Pain
- I do not visit the dentist
- Other

Health services

- Main source of health services?

Ministry of Health (clinics and centers)

- UNRWA
- Private sector
- Don't know
- Other
- Do you have health insurance?
- No
- Yes
- I don't know
- Type of insurance
- Public (governmental)
- Private
- Don't know
- Other
- General satisfaction with the health services provided by PHC of MoH
- Not satisfied
- Satisfied
- I don't want to answer

Answer the following with Yes if you are satisfied or No if you are not satisfied (Table 3.4.2.7)

Table 3.4.2.3.7: Satisfaction with healthcare services

	Yes	No
Location of the centre		
Doctor's treatment		
Health staff treatment		
Availability of medicines		
Doctor's presence during working hours		
Efficiency of health staff		
Availability of major specialties		
Availability of support services (laboratory, x-rays, etc.)		
Waiting period		
Cost		

4 Chapter Four: Methodology

4.1 Study design

A Cross-sectional study.

4.2 Choice of study design

In this study, we describe the effect of diabetes and its oral complications on the quality of life and declare that the knowledge, attitude, and practice of the patient in addition to other factors are key factors for a better life. In the literature review, most of the reviewed studies employed a cross-sectional study design, some used a convenience sampling method. For the OHRQoL, the approved tool was the OHIP-14 instrument, which is one of the tools that we used in this study.

4.3 Setting

The Palestinian health system has five main health service providers: the Ministry of Health (MoH), Palestinian Military Medical Services (PMMS), United Nations Relief and Works Agency for Palestine Refugees (UNRWA), the Palestinian nongovernmental nonprofit organizations (NGOs), and the private for-profit sector which provides secondary and tertiary services (Giacaman et al., 2009).

The Palestinian (MoH) is the main governmental healthcare provider in Palestine and provides three levels of healthcare, primary, secondary, and tertiary. According to the report of the MoH in 2022, MoH had the highest number of primary healthcare centres (PHC) in Palestine which was 493 (64.3%), UNRWA had 65(8.5%), NGOs had 192(25%) and PMMS had 17(2.2%)(Palestinian Ministry of Health, 2022).

In the West Bank, the number of patients who visited the MoH primary health care centres in 2022 was 1,455,857 visitors to physicians either for general or specialized clinics(Palestinian Ministry of Health, 2022).

There are PHC centres (all levels) in 11 governorates and the Gaza strip, the study was conducted in the West Bank, and we divided the eleven governorates according to the geographical area to North, Centre, and South. We will choose Jenin, Nablus, and Tulkarm for the North, Jerusalem, Ramallah, and AL-Bireh for the Centre, Bethlehem and Hebron for the South. This selection of governorates was done depending on the distribution(the highest number of PHC centers in each governorate) of (PHC) centers per governorate(Figure 4.3.1) (Palestinian Ministry of Health, 2022).

The study was conducted in the main centers of (PHC) centres of MoH in the selected governorates for the North, centre, and the South of the West Bank where they had a diabetic clinic in these centres.

4.4 Sample frame

Confirmed and diagnosed diabetic patients with type 2 aged ≥ 40 years old who are attending clinics in PHC of MoH in (Nablus, Tulkarm, and Jenin) for the North, (Jerusalem, Ramallah & Al-Bireh) for the Centre, (Bethlehem and Hebron) for the South from July 2023 till July 2024.

4.5 Inclusion-Exclusion criteria

We included all diagnosed and confirmed T2DM patients ≥ 40 years old who are attending PHC clinics in the selected governorates.

We excluded T1DM patients, prediabetic, diabetic patients under the age of 40, and other undiagnosed patients.

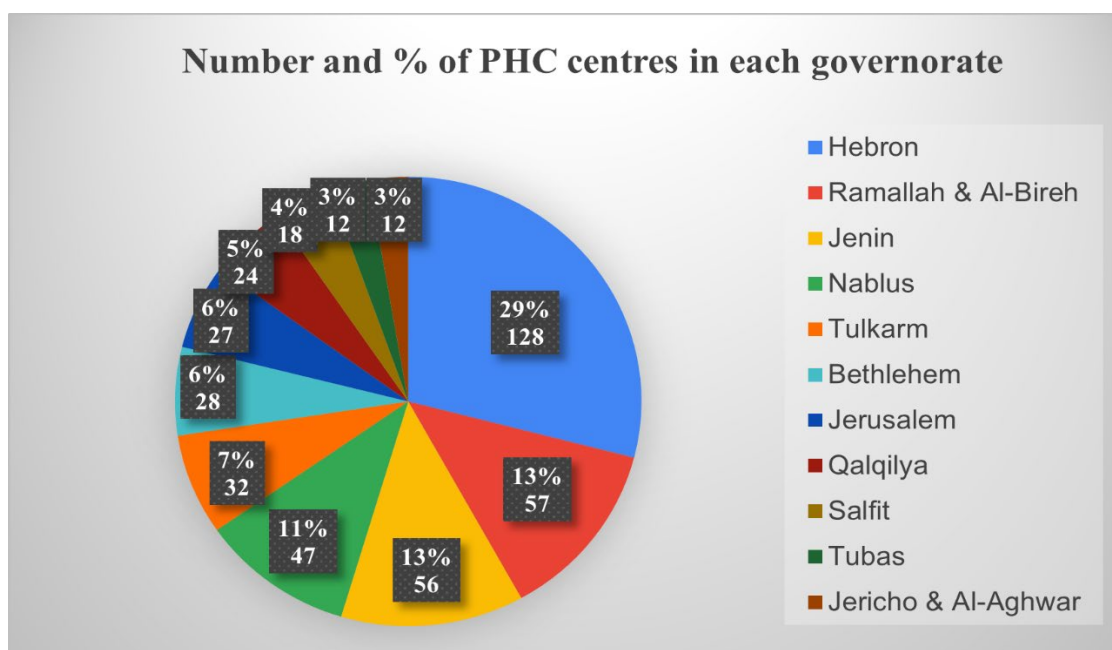


Figure 4.3.1: Number and percentage of PHC centres in each governorate

4.6 Sample method

A convenience sampling method was used in the main centres in each governorate following the inclusion-exclusion criteria. Main centres were chosen after using a cluster sampling technique dividing the West Bank geographically into three clusters (North, Centre, and South). Jenin, Nablus, and Tulkarm represented the North, Jerusalem, Ramallah, and AL- Bireh for the Centre, and Bethlehem, and Hebron for the South (Figure 4.6.2). This selection of governorates was done depending on the distribution of (PHC) centres per governorate (Palestinian Ministry of Health, 2022) (the highest number of PHC centres in each governorate).

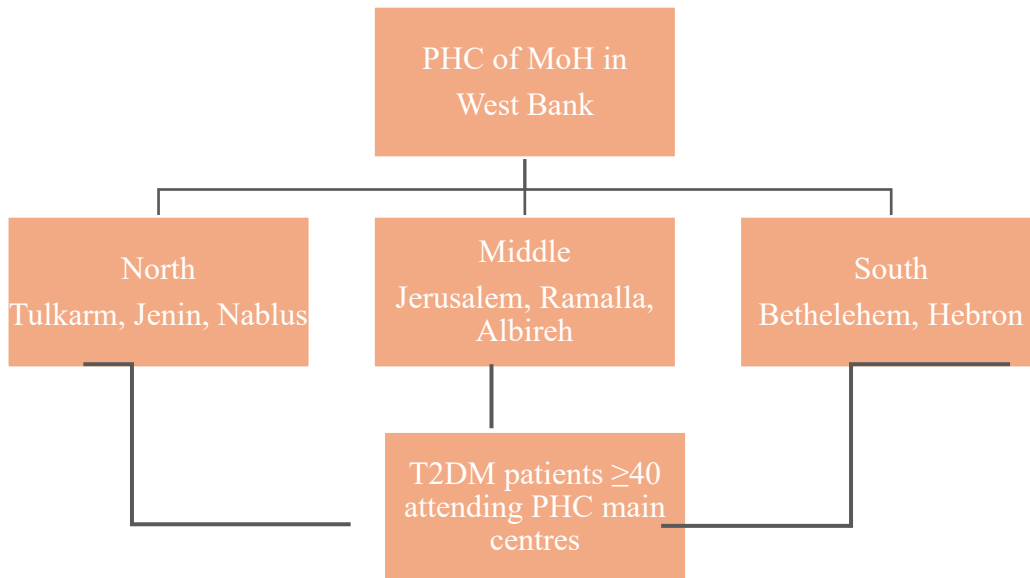


Figure 4.6.2: Flowchart of Sample technique

4.7 Sample size

According to a study that used the Markov model to estimate the prevalence of diabetes in the West Bank, the prevalence was assumed to be 20% (N. M. Abu-Rmeileh et al., 2012). For the population of the West Bank regarding PCBS in 2023, we have 3.25 million people (total in Palestine 5.48 million)(PCBS Palestine, 2023). The report of the Palestinian Ministry of Health in 2022 showed that half of the population of the West Bank attends the PHC centres of MoH as they are the main health providers.

Epitools website (Sergeant, 2018) was used to calculate the sample size (Figure 4.7.3) with a margin of error of 5%. The study sample size was around 457 (Figure 4.7.4), to avoid nonresponse or missing data, we expected a 10% nonresponse rate, after calculation – the minimum sample size was 508.

Sample size to estimate a simple proportion (apparent prevalence)

Analysed: Fri Dec 24, 2021 @ 12:09 UTC

Inputs

Estimated Proportion	0.2
Desired precision of estimate	0.05
Confidence level	0.95
Population size	3086816

Figure 4.7.3: Sample size calculation

Sample sizes for varying prevalence and precision values

	AP = 0.01	AP = 0.02	AP = 0.05	AP = 0.1	AP = 0.2	AP = 0.5
Precision = 0.01	381	753	1825	3458	6147	9604
Precision = 0.02	96	189	457	865	1537	2401
Precision = 0.05	16	31	73	139	246	385
Precision = 0.1	4	8	19	35	62	97
Precision = 0.2	1	2	5	9	16	25

Figure 4.7.4: Sample size for this study

4.8 Study tool

Five sections of an in-person structured interview Arabic questionnaire using Google form were conducted in this study, all elements, aims, benefits, and the use of this study were introduced to the participants then verbal consent was achieved for participation, and each participant was defined by the governorate where the PHC centres are in.

4.8.1 The questionnaire design, validation, and pilot testing

Questions of the study tool were extracted from the literature based on the conceptual framework of the study's variables. Worldwide and Arabic articles have been reviewed. Forward-backward translation technique was used by specialists in English-Arabic languages to check the suitability of questions culturally and Grammarly. The questionnaire was reviewed by researchers who had experience in different fields, two were dentists, one nurse and researcher in the health field, and another researcher in public health- a specialist in non-

communicable research, especially diabetes. Questions are modified by deleting or adding based on the recommendations of the review committee. The first pilot test was done on 20 patients to assess if the questions were readable and understandable, based on statistical analysis the questions were modified, and another pilot test was done on 25 patients, validity and internal consistency were good for all sections of this questionnaire.

Recruitment for the field researchers was done based on previous experience in data collection, commitment, and nearby place of residence to the targeted governorate. Zoom meetings were used for the calibration. WhatsApp and telephones were used for the follow-up process.

The first section consisted of two parts of questions, part one was sociodemographic data (gender, age, marital status, family members, education, monthly income, residence, and employment), and part two was about general and oral health status (Diabetes history, chronic diseases and oral problems related diabetes), and behavioural factors (smoking and diet), access to general and dental healthcare services.

The second section was an oral health knowledge survey consisting of 10 questions answered correctly, or incorrectly. The questions were as follows 1) People with diabetes are more susceptible to diseases of the gums and tissues supporting the teeth 2) There is no relationship between gum disease and the tissues supporting the teeth and increased blood sugar levels 3) Diabetes does not lead to bad breath 4) People with diabetes are more susceptible to dry mouth 5) Diabetics do not usually suffer from oral thrush 6) The incidence of tooth decay increases in diabetics due to dry mouth 7) Diabetes is not considered a cause of tooth loss in patients 8) Regulating blood sugar levels may prevent oral and dental diseases in diabetics 9) Smoking is not considered a risk factor for increasing the incidence of oral and dental diseases in patients with diabetes 10) There is a relationship between chronic gum infections and cardiovascular diseases in diabetics.

In the third section, attitudes towards oral health were ascertained through six questions, and a 5-point Likert scale was used, responses were totally agreed, agree, neither agree nor disagree, disagree, and totally disagree. The questions were as follows 1) Taking care of your mouth is as important as taking care of other parts of the body 2) It is important to brush your teeth in the morning and before going to sleep 3) I think it is necessary to visit the dentist at least once a year to conduct a periodic examination of the mouth and teeth 4) If you suffer from a problem in the mouth or teeth, you should consult a dentist 5) It is important for the medical team supervising diabetic patients to provide information about the complications of diabetes on oral

and dental health during a routine visit to the diabetes clinic 6) It is important that your diabetes doctor refer you to a dentist for a regular examination of your mouth and teeth.

In the fourth section, oral health practices were examined through 6 questions 1) Frequency of toothbrushing 2) Use of dental floss (for these questions answers were never, often, seldom, and at least once daily) 3) Fluoride use 4) Mouthwash use (for these questions answers were yes, no, sometimes or I don't know) 5) Way of toothbrushing (yes= the right way, no= the wrong way) 6) Time of toothbrushing (less than one minute, two minutes, more than 2 minutes or not brushing).

The final section of this questionnaire was the Sudanese-Arabic pre-validated OHIP-14 instrument, translated and validated, and used in previous research (Khalifa et al., 2013; Osman et al., 2018).

4.8.2 Oral health impact profile-14 (OHIP-14)

The impact of OHRQoL was measured using the Arabic version of (OHIP-14), validated by previous articles, with a Cronbach's alpha coefficient of 0.80 in the Sudanese version, and α values for the seven subscales ranged from 0.75 to 0.81 (Khalifa et al., 2013). The format of the question was as follows, how often during the last 12 months have you had (impact item) because of problems with your teeth, mouth, or dentures? Four common factors were extracted from the 14 entries: diminished independence, psychological discomfort, discomfort in physical functioning, and pain and discomfort of the mouth. The questionnaire included 14 questions related to the experience: articulation difficulties, degradation of taste, pain, discomfort during eating, self-consciousness, emotional tension, dissatisfaction with eating, interruption of eating, difficulty relaxing, embarrassment, irritability, inability to complete daily tasks, reduced satisfaction with life, and complete inability to work. The frequency of occurrence was assessed on a five-point Likert scale: 0 = never, 1 = seldom, 2 = sometimes, 3 = frequently, and 4 = very often. All values were summed to calculate a total OHIP-14 score, which can vary between 0 and 56, the higher the OHIP-14 score, the worse the OHRQoL. In the pilot study for this research, the Cronbach's α coefficient for the OHIP-14 was 0.87.

4.9 Data analysis

Descriptive statistics, including means, standard deviations, frequencies, and percentages, were used to summarize participants' sociodemographic information, diabetes history, general and oral health status, and access to healthcare services. The Kolmogorov-Smirnov and Shapiro-Wilk tests were performed to assess the normality of the dependent variables (Knowledge, Attitude, Practice, Oral Health-Related Quality of Life [OHRQoL]). A p-value of less than 0.05 indicated that the data were not normally distributed. Therefore, non-parametric tests were employed for bivariate analysis. To further explore the influence of predictor variables on the main dependent variables, a stepwise multiple linear regression was conducted. The data were analysed using IBM SPSS Statistics version 26.0.

For the knowledge questions, participants were awarded 1 point for each correct response and 0 points for incorrect answers. The scores were summed to generate a composite knowledge score ranging from 0 to 10, with higher scores indicating better knowledge.

For attitudes, the five-point Likert scale responses (totally agree, agree, neither agree nor disagree, disagree, and totally disagree) were recoded as follows: “totally agree” and “agree” were recoded to 1 (indicating a positive attitude), while the other responses were recoded to 0 (indicating a negative attitude). The attitude composite variable was the sum of these scores, ranging from 0 to 6, where higher scores reflected more positive attitudes.

For oral hygiene practices, favourable responses to questions about toothbrushing and dental flossing (i.e., brushing/flossing at least once a day) were categorized as good practices, while other responses were considered non-favourable. For mouthwash and fluoride use, "yes" and "sometimes" were considered good practices, and other responses were deemed poor practices. The brushing technique was assessed as "yes" (correct) for good practice and "no" (incorrect) for bad practice, while brushing duration was considered a good practice if the participant brushed for two minutes, and any other duration was classified as bad practice. The Oral Hygiene Practice composite variable was constructed by assigning 1 point for each good practice and 0 points for each bad practice, with total scores ranging from 0 to 6, where higher scores indicated more favourable practices.

The Oral Health Impact Profile (OHIP-14) was used to assess oral health-related quality of life (OHRQoL). Summation scores ranged from 0 to 56, with higher scores indicating poorer quality of life.

Additional composite variables were created to explore relationships among the study variables. For dietary habits frequency (reverse coding for vegetables and fruit responses, fatty food and sugars responses were all on a five-point Likert scale then recoded: "never" and "rarely" were assigned 2 points (very good), "sometimes" was assigned 1 point (good), and "often" and "always" were recoded as 0 points (bad).

For oral complications, 1 point was given for "yes" responses and 0 points for "no" or "not sure" responses. These scores were summed to create a composite variable reflecting the total burden of oral health issues, with higher scores indicating more oral complications. A similar approach was used to create a composite variable for general health complications, where "yes" was given 1 point and "no" was assigned 0 points. Higher scores indicated more health issues or complications.

In descriptive analysis and compare means between groups, age and family members continuous variables recoded to new variables with categories to describe the data easily. In correlation, the continuous variables were used.

To examine the relationship between the Knowledge, Attitude, and Practice (KAP) scores and other predictor variables, Mann-Whitney U and Kruskal-Wallis tests were used to compare mean differences. Spearman's correlation was applied to investigate the relationships between KAP variables and OHRQoL and the other associated variables based on the conceptual model of the study.

For multivariate analysis, all significant variables with OHIP-14 in Mann Whytney U, Kruskal Wallis and Spearman's correlation tests in addition to these variables based on conceptual model and literature (knowledge, practice, age, smoking, family history of diabetes, last dental visit, attended educational programs regarding diabetes), that might theoretically be good predictors for OHRQoL were entered into regression. Variables that are not continuous or binary were recoded to dummy variables. Each category has a new variable.

All significant variables identified through Spearman's correlation, along with additional factors based on the conceptual model and relevant literature, were entered into a multiple linear regression analysis. These factors included knowledge, practice, age, smoking status, family history of diabetes, attendance at educational programs on diabetes, and the timing of the last dental visit (categorized as an ordinal variable: less than 6 months, 6-12 months, more than 12 months, or never visited).

OHRQoL served as our main dependent variable in this study (continuous variable). Categorical predictor variables with more than two categories were dummy coded before being included in the regression model, resulting in 51 predictor variables. A stepwise method, confirmed by forward regression analysis, was applied to the multivariate analysis.

Collinearity diagnostics were conducted, with Variance Inflation Factor (VIF) values all below 1.21 and tolerance values above 0.82, indicating no multicollinearity among the variables. The goodness of fit for the regression model was assessed using the adjusted R^2 value, with a significance level set at $p < 0.05$. Two-tailed tests were used for all analyses, with statistical significance defined as $p < 0.05$.

4.10 Ethical considerations

Ethical approval was obtained from Al-Quds University School of Public Health Ethical Research Committee and AL- Quds University Graduate Studies Committee. Approval was obtained from the Ministry of Health to access the healthcare centres. For the potential participants, field researchers explained the aim of this study then verbal consent as well as answering the questionnaire meant acceptance for participation.

5 Chapter Five: Results

5.1 Introduction

In this chapter, we have the results of the study divided into three parts, descriptive analysis, bivariate, and multivariate analysis. Some of the variables have been recoded for some analysis, recoded variables, and their codes will be mentioned in the place we used.

5.2 Descriptive analysis

5.2.1 Socio-demographic characteristics of participants

A total of 510 participants completed the questionnaire. Response rate was 100%. Hebron had the highest percentage of participants (31.4%) because it is a large governorate divided into North, Middle, and South (Table 5.2.1.1). The mean age of the participants was 60.4 ± 9.3 with a minimum age of 40 and a maximum of 85 years. Females were 297 (58.2%) and males 213 (41.8%). Mean family members including the participants themselves was 4.89 ± 2.6 (range 1 - 15) with (65.3%) having 1-5 members. Level of education was (25.7%) high school and (20.8%) university. For marital status (75.5%) were married. Male full-time employee was 69(32.4) and female full-time employee was 29 (9.8). Quarter of the participants had an average household monthly income less than 1000 Shekel (25.5%), all results are shown in Table 5.2.1.2.

5.2.2 Behavioural factors

Current smoker (26.1%) and never smoked with (58.2%). Cigarettes were the main type they smoked (22.4%) with (17.6%) having more than 15 years duration of smoking. For former smokers, the main reason to quit was health issues, and for 1-5 years duration of quitting. Patients on a regular basis consumed vegetables and fruits were 208(40.8%), eating sugar and sweets 91(17.8%) and consumed fatty food and oil 142(27.8%). All the characteristics of the participants are shown in Table 5.2.2.3a,b.

Table 5.2.1.5.1 : Distribution of participants based on governorates

Governorate	Number of participants	Percentage %
Jerusalem	64	12.5
Ramallah & Al-Bireh	75	14.7
Bethlehem	61	12
Hebron	160	31.4
Nablus	51	10
Jenin	49	9.6
Tulkarm	50	9.8

N: Frequency, %: Percentage

Table 5..2.1.5.2: Sociodemographic characteristics of the participants

Sociodemographic characteristics	Categories	Number of participants (N)	Percentage (%)
Gender	Male	213	41.8
	Female	297	58.2
Age	40-60 years	267	52.4
	61-80 years	236	46.3
	81-100 years	7	1.4
Marital status	Married	385	75.5
	Divorced	18	3.5
	Widowed	86	16.9
	Single	21	4.1
Place of residence	Village	212	41.6
	City	269	52.7
	Camp	29	5.7
Educational level	Uneducated	37	7.3
	Elementary (1-6)	88	17.3
	Secondary (7-10)	100	19.6
	High School (11-12)	131	25.7
	2-years College	48	9.4
	4-years University and above	106	20.8
Monthly household Income (Shekel)	Less than 1000	130	25.5
	1000-1999	128	25.1
	2000-2999	126	24.7
	3000-3999	65	12.7
	More than 4000	61	12
Family members	1-5	333	65.3
	6-10	162	31.8
	11-15	15	2.9
Employment	Full time	98	19.2
	Part-time	36	7.1
	Unemployed	114	22.4
	Retired	75	14.7
	Housewife	187	36.7

N: Frequency, %: Percentage

Table 5.2.2.5.3a: Behavioural factors (smoking and diet)

Behavioural factors	Categories	Number of participants (N)	Percentage (%)
Smoking	Current smoker	133	26.1
	Former smoker	80	15.7
	Never smoked	297	58.2
Type of smoking	Pipe	3	0.6
	Cigarettes	114	22.4
	Hookah	37	7.3
	Electronic cigarettes	1	0.2
	More than one type	10	2
	Not applicable*	345	67.6
Duration of smoking	1-5 years	13	2.5
	6-10 years	27	5.3
	11-15 years	19	3.7
	More than 15 years	90	17.6
	Not applicable*	361	70.8
Thinking of Quitting smoking	Yes	61	12
	No	83	16.3
	Not applicable*	366	71.8
Duration of quitting for a former smoker	1-5 years	38	7.5
	6-10 years	20	3.9
	11-15 years	9	1.8
	More than 15 years	14	2.7
	Not applicable*	429	84.1
Reason for quitting for a former smoker	Health reason	52	10.2
	Relatives 'advice	4	0.8
	Family reason	12	2.4
	Economic reason	9	1.8
	Other (Will, Self-conviction)	2	0.4
	Not applicable*	431	84.5

N: Frequency, %: Percentage

*Not applicable for being never smoker or not a former smoker

Table 5.2.2.5.4b: Behavioural factors (smoking and diet)

Behavioural factors	Categories	N	%
Diet			
Eating vegetables and fruits	Very good	208	40.8
	Good	174	34.1
	Bad	128	25.1
Eating sugar and sweets	Very good	91	17.8
	Good	168	32.9
	Bad	251	49.2
Eating fatty food and oils	Very good	142	27.8
	Good	140	27.5
	Bad	228	44.7

N: Frequency, %: Percentage

5.2.3 Diabetes history

Most of the participants (70.2%) reported that they had first-degree relatives with diabetes. For the mean cumulative sugar level (HbA1C) was 8.22 ± 1.67 (range of 6.6 -15.7). 64.5% with uncontrolled diabetes based on HbA1C(Fig.1), most of the HbA1C tests were done in the last 1-3 months period (66.5%) of time of answering the questionnaire. Duration of diabetes of 1-5 years (31.4%) and 6-10 years (31%). For commitment to their medication (92.9%) they answered yes (Table 5.2.3.4). Tablet was the main treatment (60.8%). Sitagliptin, Glucophage (Metformin), and glimepiride (Amaryl) names of the tablets they used. Glargine, Aspart, Mixtard, and Apidra were the main names of insulin they used. Duration of use for tablets and insulin for the applicable answers ranged between one month to 15 years.

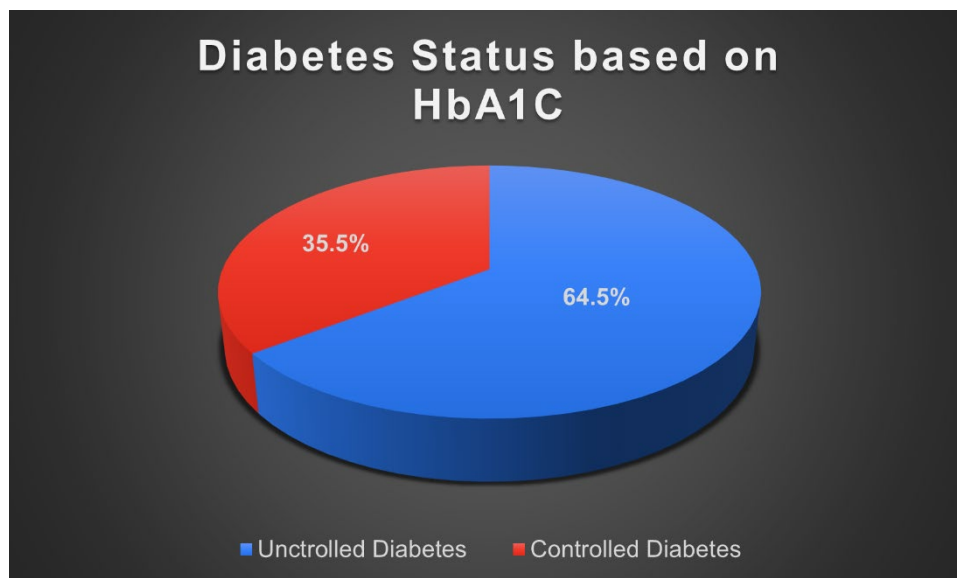


Figure 5.2.3.1: controlled and uncontrolled diabetic patients percentage based on HbA1c test

Table 5.2.3.4: Diabetes history

Variable	Categories	Participants (N)	Percentage (%)
Family history of diabetes	None	92	18
	First-degree relatives	358	70.2
	Second-degree relatives	29	5.7
	Don't know	31	6.1
Cumulative sugar rate (HbA1C)	Controlled (Less than 7)	181	35.5
	Not Controlled (More than 7)	329	64.5
Last HbA1C test	1-3 months	339	66.5
	More than 3 months	171	33.5
Duration of diabetes in years	1-5 years	160	31.4
	6-10 years	158	31
	11-15 years	96	18.8
	More than 15 years	96	18.8
Taking medication for diabetes?	Yes	474	92.9
	No	36	7.1
Type of treatment or medicine	Special diet	28	5.5
	Tablets	310	60.8
	Insulin	44	8.6
	All treatments together	120	23.5
	No treatment	8	1.6

N: Frequency, %: Percentage

5.2.4 Self-reported health and oral issues

For other chronic health issues, more than the half of the participants reported that they had high blood pressure 65.9%, followed by cholesterol and eye problems 47.6% and 44.5 %, respectively. All results of self-reported health issues are shown in (Table 5.2.4.5).

For the oral and dental issues, the most reported problem by the participants was dry mouth (Xerostomia) 62.2% followed by tooth lost 48.6%, and caries(decay) 46.1%. All results of the oral issues are shown in (Table 5.2.4.6).

Table 5.2.4.5: Self-reported Health issues and chronic diseases

Self-reported Health issues or chronic disease	Yes N (%)	No N (%)
Cardiovascular disease	165(32.4)	345(67.6)
High blood pressure	336(65.9)	174(34.1)
Respiratory disease (Asthma, else)	74(14.5)	436(85.5)
Arthritis (Rheumatism)	176(34.5)	334(65.5)
Stroke	45(8.8)	465(91.2)
Cholesterol	243(47.6)	267(52.4)
Eyes problem-related diabetes	227(44.5)	283(55.5)
Other endocrine disease	56(11)	454(89)

N: Frequency, %: Percentage

Table 5.2.4.6: Self-reported oral and dental problems

Self-reported Oral and dental issues	Yes N (%)	No N (%)	Not sure N (%)
Caries (Tooth decay)	235(46.1)	247(48.4)	28(5.5)
Loss of teeth	248(48.6)	259(50.8)	3(0.6)
Dry mouth (Xerostomia)	317(62.2)	173(33.9)	20(3.9)
Gingival bleeding	156(30.6)	327(64.1)	27(5.3)
Ulcers, abscesses, and teeth sensitivity	73(14.3)	391(76.7)	46(9)
Bad breath (Halitosis)	178(34.9)	303(59.4)	29(5.7)
Candidiasis (Fungal infection)	90(17.6)	393(77.1)	27(5.3)
Stomatitis (infection or inflammation)	103(20.2)	375(73.5)	32(6.3)
Burning mouth syndrome	71(13.9)	405(79.4)	34(6.7)
Change in taste	149(29.2)	332(65.1)	29(5.7)

N: Frequency, %: Percentage

5.2.5 Healthcare Access

The main source of health services for the participants is the MoH with 94.7 %. Percentage of (95.9 %) they had insurance, mainly public(governmental) (86.3%). In general, 72.2% were satisfied with the PHC services. Availability of medicine, the waiting period in clinic and cost of services were the highest dissatisfaction percentages with (53.9%), (41.4%), (29.4%), respectively. (Table 5.2.5.7b)

The percentage of participants who reported that they attended diabetes educational programs was only (17.6%), and who talked to their physician about diabetes and oral health (32.2%), who talked about diabetes to their dentist (43.5%). The main reason for visiting the dentist was pain (27.3%) and (38.8%) reported that their last visit to a dentist was more than one year ago (Table 5.2.5.7a)

Table 5.2.5.7a: Healthcare access and services

Healthcare access variables	Categories	N	(%)
Health Insurance	Yes	489	95.9
	No	9	1.7
	Don't know	12	2.4
Type of Insurance	Public (Governmental)	440	86.3
	Private	38	7.5
	Don't know	26	5.1
	Other	6	1.2
Satisfaction with healthcare services in PHC	Satisfied	368	72.2
	Not satisfied	89	17.5
	Refused to answer	53	10.4
Attended educational programs regarding diabetes	Yes	90	17.6
	No	420	82.4
Talked to your physician about diabetes	Yes	164	32.2
	No	346	67.8
Talked to your dentist about diabetes	Yes	222	43.5
	No	288	56.5
Last dental visit	Less than 6 months	123	24.1
	6-12 months	92	18
	More than one year	198	38.8
	I don't visit the dentist	97	19
Reason for last dental visit	Regular checkup	55	10.8
	Cosmetic treatments	74	14.5
	Therapeutic visit	75	14.7
	Pain relief	139	27.3
	Other treatments	68	13.3
	I don't visit the dentist	99	19.4

N: Frequency, %: Percentage

Table 5.2.5.7b: Satisfaction with healthcare services

Total Satisfaction with health centre services	Satisfied N (%) 368 (72.2)	Not Satisfied N (%) 89 (17.5)	Refused to answer N (%) 53 (10.4)
			<i>Not applicable *</i> N (%)
Location of the centre	398(78%)	80(15.7%)	32(6.3)
The doctor's treatment	443(86.9%)	35(6.9%)	32(6.3%)
Health staff treatment	429(84.1%)	49(9.6%)	32(6.3%)
Availability of medicine	203(39.8%)	275(53.9%)	32(6.3%)
Doctors 'presence during working hours	424(83.1%)	53(10.4%)	33(6.5%)
Efficiency of health staff	431(84.5%)	43(8.4%)	36(7.1%)
Availability of major specialties	404(79.2%)	73(14.3%)	33(6.5%)
Availability of support services (laboratory, x-rays, etc)	420(82.4%)	59(11.6%)	31(6.1%)
Waiting period	267(52.4%)	211(41.4%)	32(6.3%)
Cost	328(64.3%)	150(29.4%)	32(6.3%)

N: Frequency, %: Percentage

*Not applicable, answered the main question about general satisfaction they do not want to answer or did not answer this question

5.2.6 Knowledge, Attitude, and Practice (KAP) related to Diabetes

Knowledge composite variable scores (ranged from 1-10) with a higher score means better knowledge. The mean score was 6.53 ± 2.07 , Median score was 6. According to the correct answers to the knowledge questions, participants had a good understanding of the bidirectional relationship between diabetes and oral health, they knew that dry mouth is a major oral problem, diabetic patients are more susceptible to gum disease and the importance of regulating blood sugar level to control oral complications of diabetes, and they knew that smoking is a risk factor

that can worsen the situation of the oral disease in diabetic patients. All answers are shown in Table 5.2.6.8

Question	Answer correctly N (%)	Answer incorrectly N (%)
People with diabetes are more susceptible to gum disease and dental-supporting tissues	372(72.9)	138(27.1)
There is no relationship between gum disease and dental supporting tissues and increased blood sugar levels in the blood	318(62.4)	192(37.6)
Diabetes does not cause bad breath	292(57.3)	218(42.7)
People with diabetes are more likely to have dry mouth	409(80.2)	101(19.8)
Diabetics usually do not suffer from oral thrush	293(57.5)	217(42.5)
Diabetics have a higher incidence of tooth decay due to dry mouth	323(63.3)	187(36.7)
Diabetes is not a cause of tooth loss in patients	318(62.4)	192(37.6)
Regulating blood sugar levels may protect against oral and dental diseases in diabetics	374(73.3)	136(26.7)
Smoking is not a risk factor for increased oral and dental diseases in diabetics	359(70.4)	151(29.6)
There is a relationship between chronic gum inflammation and cardiovascular disease in diabetics	272(53.3)	238(46.7)

Table 5.2.6.5.5: Answers to questions about knowledge

N: Frequency, %: Percentage

Attitude composite variable scores (ranged from 0-6) with a higher score means a more positive attitude. The mean score was 4.88 ± 1.65 , Median score was 6. We had a high score of positive attitudes toward oral health in diabetic patients. They had a positive attitude toward oral health hygiene behaviours and the importance of consultation and visits to the dentist. All answers to the attitude questions are shown in Table 5.2.6.9.

Table 5.2.6.5.6: Attitude statements and responses

Statement	Totally Agree N(%)	Agree N(%)	Neutral N(%)	Disagree N(%)	Totally disagree N(%)
Taking care of your mouth is as important as taking care of other parts of your body	305(59.8)	155(30.4)	31(6.1)	15(2.9)	4(0.8)
It is important to brush your teeth in the morning and before going to bed	257(50.4)	166(32.5)	58(11.4)	23(4.5)	6(1.2)
I think it is necessary to maintain a visit to the dentist at least once a year for a regular check-up of the mouth and teeth	224(43.9)	145(28.4)	84(16.5)	46(9)	11(2.2)
If you have a problem with your mouth or teeth, you should consult a dentist	255(50)	152(29.8)	66(12.9)	30(5.9)	7(1.4)
It is important for the medical team supervising diabetic patients to provide information about the complications of diabetes on oral and dental health during a routine visit to the diabetes clinic	275(53.9)	160(31.4)	62(12.2)	8(1.6)	5(1)
It is important that your doctor who treats your diabetes to refer you to a dentist for a regular oral and dental check-up	237(46.5)	158(31)	64(12.5)	26(5.1)	25(4.9)

N: Frequency, %: Percentage

Oral hygiene Practice composite variable scores (ranged from 0-6) with a higher score means better practice. The mean score was 1.99 ± 1.02 , Median score was 2. We had poor practice with these diabetic patients, although they had good knowledge and a positive attitude. Practice could be affected by other factors rather than just the knowledge and attitude. Only brushing teeth (76.9%) had better scores in comparison to other oral health self-practices. All results of practice scores are shown in Table 5.2.6.10.

Table 5.2.6.5.7: Answers to questions of practice

Practice	At least once a day	Sometimes	Rarely	Never
Do you brush your teeth?	275(53.9)	117(22.9)	60(11.8)	58(11.4)
Do you floss?	26(5.1)	54(10.6)	45(8.8)	385(75.5)
Practice	Yes	Sometimes	I don't know	No
Do you use fluoride toothpaste to clean your teeth?	94(18.4)	25(4.9)	282(55.3)	109(21.4)
Do you use mouthwash?	7(1.4)	78(15.3)	97(19)	328(64.3)
Practice	Two minutes	Less than 2 minutes	More than 2 minutes	I don't know/ I don't brush my teeth
How long do you spend brushing your teeth?	98(19.2)	220(43.1)	65(12.7)	127(24.9)
Practice	Correct		Incorrect	
How do you hold your toothbrush when brushing your teeth, can you show me? (The correct way is at a 45-degree angle so that the bristles of the brush touch the tip of the gums and teeth)	176(34.5)		334(65.5)	

N: Frequency, %: Percentage

5.2.7 Oral Health-Related Quality of Life (OHRQoL) and diabetes

OHIP-14 scores ranged from 0-50 , a higher score means poorer quality of life. The mean score of OHRQoL was 17.84± 11.65, Median score was 16. This means in general that the quality of life toward oral health of these diabetic patients is good. OHIP-14 scores with KAP scores among all the governorates are shown in Figure 5.2.7.1.

The number and percentage of negatively impacted participants in the seven domains of the OHIP-14 scale showed that the highly negatively impacted patients were in these three domains: psychological discomfort, handicap, and social disability (Table 5.2. 7.11).

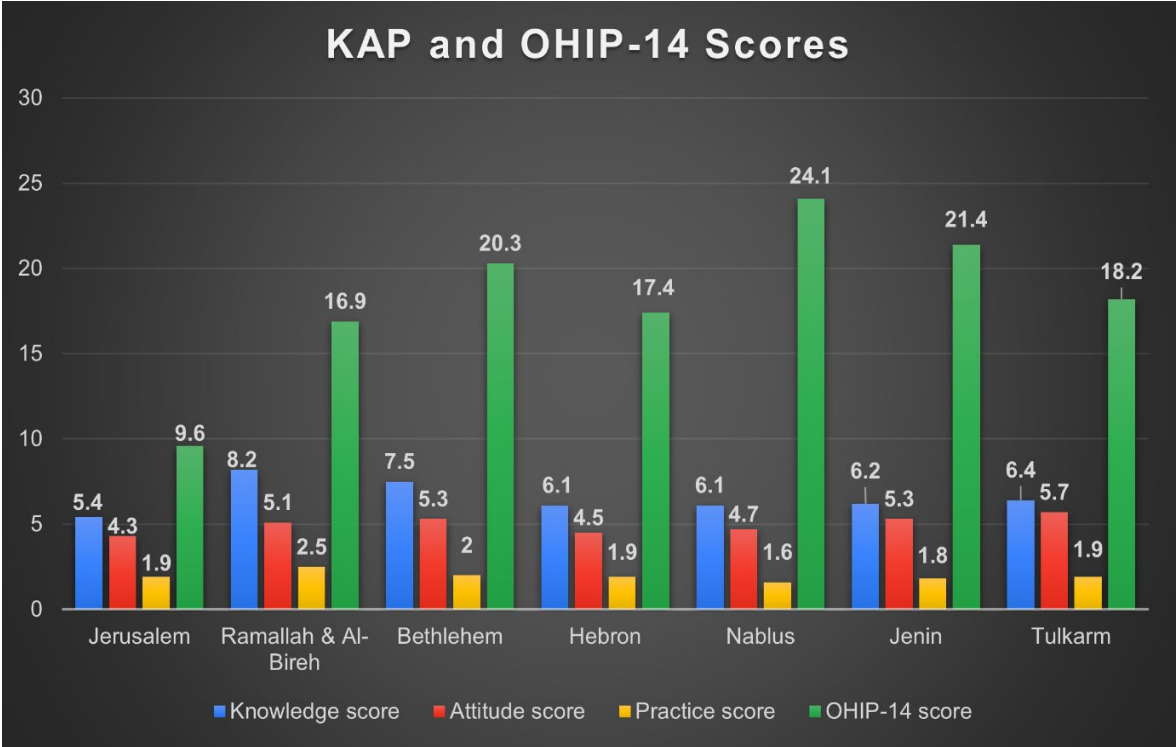


Figure 5.2.7.1: KAP and OHIP-14 scores distribution according to governorates

Table 5.2. 7.5.8 OHIP-14 scale entries that negatively impacted participants (N = 510)

Domain	Questions	N (%)
Functional limitation	Trouble pronouncing words	9(1.8)
	Worsened taste	16(3.1)
Physical pain	Pain in mouth	18(3.5)
	Discomfort eating foods	24(4.7)
Psychological discomfort	Feeling self-conscious	86(16.9)
	Feeling tense	72(14.1)
Physical disability	Interrupted meals	29(5.7)
	Poor diet	18(3.5)
Psychological disability	Difficulty relaxing	65(12.7)
	Embarrassment	53(10.4)
Social disability	Irritability	82(16.1)
	Difficulty in doing usual jobs	79(15.5)
Handicap	Life less satisfying	82(16.1)
	Inability to function	80(15.7)

N: Frequency, %: Percentage

5.3 Bivariate analysis

5.3.1 Spearman's correlation test for knowledge

Spearman's correlation test was conducted to examine the relationships between the three composite variables—knowledge, attitudes, and oral hygiene practices—and the study's predictor variables (either ordinal or continuous). A positive, statistically significant correlation was found between the KAP framework , practice and knowledge ($\rho = 0.160$, $P = 0.000$) and between practice and attitude ($\rho = 0.171$, $P = 0.000$). Knowledge and attitude also had a positive significant correlation ($\rho = 0.238$, $P = 0.000$)(Table 5.9).

Knowledge had a negative significant correlation with age ($\rho = -0.190$, $P = 0.000$), duration of diabetes in years ($\rho = -0.105$, $P = 0.018$)and last dental visit ($\rho = -0.328$, $P = 0.000$). And positive significant correlation between knowledge and family members($\rho = 0.102$, $P = 0.022$), educational level ($\rho = 0.263$, $P = 0.000$)and monthly household income ($\rho = 0.121$, $P = 0.006$).(Table5.10)

5.3.2 Spearman's correlation test for attitude

Negative spearman's correlation between attitude and age($\rho = -0.142$, $P = 0.001$), cumulative sugar rate ($\rho = -0.100$, $P = 0.024$), last test of HbA1C ($\rho = -0.175$, $P = 0.000$), duration of diabetes ($\rho = -0.138$, $P = 0.002$), last dental visit ($\rho = -0.290$, $P = 0.000$) and total general health status($\rho = -0.126$, $P = 0.004$). On the other hand, a positive significant correlation between attitude and knowledge ($\rho = 0.238$, $P = 0.000$), educational level($\rho = 0.189$, $P = 0.000$) and duration of smoking($\rho = 0.110$, $P = 0.013$). (Table5.10)

5.3.3 Spearman's correlation test for practice

For oral hygiene practices, a positive correlation was observed with educational level ($\rho = 0.188$, $P = 0.000$) and monthly income ($\rho = 0.282$, $P = 0.000$). There was also a negative correlation between practices and age ($\rho = -0.278$, $P = 0.000$), cumulative sugar rate ($\rho = -0.137$, $P = 0.002$), duration of diabetes ($\rho = -0.190$, $P = 0.000$), overall general health status ($\rho = -0.187$, $P = 0.000$), and last dental visit ($\rho = -0.181$, $P = 0.000$) (Table5.10).

5.3.4 Spearman's correlation test for OHRQoL

Negative significant spearman's correlation between attitude and OHIP-14 scores ($\rho = -0.174$, $P=0.000$)(Table 5.9). Negative spearman's correlation also was found between OHIP-14 scores and educational level ($\rho = -0.174$, $P=0.000$), and monthly income ($\rho = -0.227$, $P=0.000$). While a positive correlation between OHIP-14 scores and cumulative sugar rate ($\rho=0.174$, $P=0.000$), last test of HbA1C ($\rho=0.145$, $P=0.001$), total general health status ($\rho=0.252$, $P=0.000$) and total oral issues related to diabetes ($\rho=0.407$, $P=0.000$). (Table5.10)

Table 5.9: OHIP-14 and KAP correlation

Spearman correlation ρ	Knowledge Scores	P value	Attitude Scores	P value	Practice Scores	P value	OHIP-14 Scores	P value
Knowledge Scores	1	.	0.238**	0.000	0.160**	0.000	0.052	0.241
Attitude Scores	0.238**	0.000	1	.	0.171**	0.000	-0.174**	0.000
Practice Scores	0.160**	0.000	0.171**	0.000	1	.	-0.080	0.069
OHIP-14 Scores	0.052	0.241	-0.174**	0.000	-0.080	0.069	1	.

**p-value < 0.01, * p-value < 0.05

Table 5.10: OHRQOL, KAP, and associated factors correlation

Variable Spearman ρ	OHIP-14 Scores	Knowledge Scores	Attitude Scores	Practice Scores
Age	0.055	-0.190**	-0.142**	-0.278**
P value	0.215	0.000	0.001	0.000
Family members	-0.029	0.102*	0.050	0.035
P value	0.518	0.022	0.263	0.431
Educational level	-0.174**	0.263**	0.189**	0.188**
P value	0.000	0.000	0.000	0.000
Monthly household Income	-0.227**	0.121**	0.049	0.282**
P value	0.000	0.006	0.269	0.000
Cumulative sugar rate (HbA1c)	0.174**	-0.036	-0.100*	-0.137**
P value	0.000	0.414	0.024	0.002
Last test HbA1C	0.145**	-0.049	-0.175**	-0.015
P value	0.001	0.270	0.000	0.735
Duration of diabetes in years	0.051	-0.105*	-0.138**	-0.190**
P value	0.252	0.018	0.002	0.000
Last dental visit	-0.032	-0.328**	-0.290**	-0.181**
P value	0.478	0.000	0.000	0.000
Duration of Smoking	0.048	0.066	0.110*	0.014
P value	0.277	0.137	0.013	0.752
Total general health status	0.252**	0.026	-0.126**	-0.187**
P value	0.000	0.553	0.004	0.000
Total oral issues related to diabetes	0.407**	0.045	-0.087	-0.059
P value	0.000	0.311	0.050	0.183

**p-value < 0.01, * p-value < 0.05

5.3.5 Mann Whytney U and Kruskal Wallis H tests' results for KAP variables

Knowledge

Significant difference in knowledge scores and better scores in younger age group ($H(2) = 11.2$, $P = 0.004$), marital status also had a significant difference in knowledge scores ($H(3) = 10.1$, $P = 0.018$), divorced ($U = 97.6$, $P = 0.010$) and single ($U = -79.3$, $P = 0.025$) participants had higher score of knowledge. Who lived in a city had a higher knowledge score than who lived in a village ($H(2) = 11.4$, $P = 0.001$), higher educational level (university) ($H(5) = 43.7$, $P = .000$) and monthly income more than 4000 Shekel ($H(4) = 13.3$, $P = 0.010$) had better knowledge. Employment status had differences in knowledge scores about oral health and diabetes ($H(4) = 12.1$, $P = 0.016$), who work full-time had higher knowledge scores than who do not work ($U = 42.9$, $P = 0.032$) and more than housewife ($U = 52.11$, $P = 0.004$) (Table 5.3.5.11).

Eating good diet also was associated with better knowledge scores ($H(2) = 9.89$, $P = 0.007$), patients with less duration of diabetes (1-5 years) had better knowledge about their oral health ($H(3) = 14.05$, $P = 0.003$) (Table 5.3.5.12).

Who expressed their satisfaction or dissatisfaction with healthcare services were with better knowledge scores than who refused to answer ($H(2) = 13.02$, $P = 0.001$). Attending educational programs regarding diabetes ($U = 23034.5$, $P = 0.001$), talking to physician ($U = 33341.5$, $P = 0.001$) and dentist ($U = 39829$, $P = 0.000$) about diabetes and oral health, visiting dentist every six months ($H(3) = 56.2$, $P = 0.000$) and for routine check-up or cosmetic reason ($H(5) = 38.6$, $P = 0.000$), all these lead to better knowledge scores. (Table 5.3.5.13, Table 5.3.5.14)

Attitudes

Females had significantly higher attitude scores than males ($U = 35820.5$, $P = 0.005$). Younger age had also more positive attitude than older patients ($H(2) = 11.4$, $P = 0.003$). Those living in cities had more positive attitudes ($H(2) = 20.9$, $P = 0.000$). Higher educational level ($H(5) = 21.1$, $P = 0.001$) and higher monthly income ($H(4) = 23.7$, $P = 0.000$) had more positive attitude scores. For attitudes and employment ($H(4) = 12.4$, $P = 0.015$) who worked full-time was with higher scores than who did not work ($U = 40.8$, $P = 0.026$) (Table 5.3.5.11).

Participants with good diet had more positive attitudes ($H(2) = 28.3$, $P = 0.000$). Those who never smoked had better attitude scores compared to current and former smokers ($H(2) = 9.48$, $P = 0.009$). Additionally, individuals with a second-degree relative with diabetes had higher

attitude scores ($H(3) = 13.59, P = 0.004$). Patients with controlled diabetes had more positive attitudes ($U=25484.5, P=0.003$) and those who did their HbA1c test less than three months period since the time of participation were with higher scores of positive attitudes ($U=23373, P=0.000$) and patients with less duration of having diabetes were with more positive attitudes ($H(3) = 15.6, P=0.001$)(Table 5.3.5.12, Table 5.3.5.13).

There was a significant difference in attitude scores among patients who responded to the satisfaction question. Those satisfied with health services more positive attitudes ($H(2) = 7.06, P=0.029$). Attending an educational program ($U=22485.5, P = 0.002$), consulting a physician, ($U=31486.5, P = 0.027$), and talking to a dentist ($U= 38038, P = 0.000$) about diabetes were all associated with significantly more positive attitudes. The reason for visiting the dentist also had a significant difference, those who visited for regular check-ups or cosmetic reasons had more positive attitudes ($H(5) = 48.7, P = 0.000$). Participants who's last dental visit was less than one year had more positive attitude scores than others ($H(3) = 44.4, P=0.000$) (Table 5.3.5.14).

Oral hygiene Practice

Younger age had better practice scores than older groups($H(2)=32.7, P=0.000$). Higher educational level($H(5)=22.05, P=0.001$) and higher monthly income($H(4)=47.6, P=0.000$) had better practice scores . In addition to full-time employee had better practice scores than other groups ($H(4)=34.7, P=0.000$) (Table 5.3.5.11).

Controlled diabetic patients had better practice than uncontrolled patients($U=25922.5, P=0.011$). Less duration of diabetes had better practice scores($H(3)=25.6, P=0.000$). Interestingly who is not taking their medication had better practice($U=6460.5, P=0.011$). Who visited dentist frequently every six months had better practice scores than who did not visit the dentist or visited more than one year ($H(3)=22.6, P=0.000$) and who visited the dentist for regular check-up or therapeutic or pain relief reason ($H(5)=26.4, P=0.000$) had better practice than other reasons(Table 5.3.5.13, Table 5.3.5.14).

Table 5.3.5.11: Sociodemographic factors and KAP scores

Variables		N	Knowledge Score (0-10) M±SD	P value	Attitude Score (0-6) M±SD	P value	Practice Score (0-6) M±SD	P value
Gender	Male	213	6.63±2.06	0.528	4.58±1.83	0.005*	1.91±1.07	0.055
	Female	297	6.45±2.08		5.09±1.46		2.04±0.98	
Age	40-60 years	267	6.81±2.12	0.004*	5.08±1.48	0.003*	2.23±1.06	0.000*
	61-80 years	236	6.21±1.98		4.62±1.78		1.74±0.89	
	81-100 years	7	6.57±1.81		5.42±1.51		1.00±1.00	
Marital status	Married	385	6.56± 2.04	0.018*	4.94±1.53	0.885	2.05±1.05	0.106
	Divorced	18	7.50± 2.20		5.00±1.64		1.94±1.16	
	Widowed	86	6.03±2.12		4.55±2.07		1.74±0.87	
	Single	21	7.19±2.08		5.00±1.67		1.85±0.79	
Place of residence	Village	212	6.16±1.98	0.003*	4.53±1.82	0.000*	1.87±0.98	0.096
	City	269	6.84±2.06		5.17±1.45		2.04±1.03	
	Camp	29	6.53±2.07		4.72±1.55		2.34±1.20	
Educational level	Uneducated	37	5.72±2.05	0.000*	4.11±2.23	0.001*	1.64±0.82	0.001*
	Elementary	88	6.14±2.04		4.76±1.63		1.87±0.95	
	Secondary	100	6.10±1.87		4.58±1.84		1.82±1.05	
	High school	131	6.40±1.96		4.80±1.67		1.98±0.97	
	College	48	6.62±1.96		5.20±1.33		2.02±0.81	
	University	106	7.65±2.08		5.47±1.02		2.35±1.16	
Monthly household Income (Shekel)	Less than 1000	130	6.32±1.86	0.010*	5.06±1.43	0.000*	1.73±0.96	0.000*
	1000-1999	128	6.39±1.95		4.78±1.73		1.75±0.90	
	2000-2999	126	6.32±2.01		4.50±1.81		1.95±0.93	
	3000-3999	65	6.77±2.27		4.80±1.66		2.46±1.03	
	More than 4000	61	7.41±2.44		5.56±1.25		2.61±1.15	
Family members	1-5	333	6.43±2.13	0.068	4.74±1.80	0.574	2.03±1.00	0.314
	6-10	162	6.61±1.94		5.12±1.30		1.93±1.08	
	11-15	15	7.66±1.98		5.20±0.94		1.73±0.79	
Employment	Full-time	98	6.99±2.24	0.016*	5.08±1.57	0.015*	2.54±1.23	0.000*
	Part-time	36	6.69±2.02		4.13±2.00		1.94±1.11	
	Unemployed	114	6.37±1.83		4.69±1.68		1.66±0.86	
	Retired	75	6.94±2.01		4.89±1.52		1.77±0.84	
	Housewife	187	6.19±2.10		5.03±1.60		1.99±0.92	
Total		510	6.53±2.07		4.88±1.65		1.99±1.02	

N: Frequency M: Mean, SD: Standard Deviation. Two categories: Mann Whitney test, more than 2 categories: Kruskal Wallis, * significance p value <0.05

Table 5.3.5.12 Behavioural factors and KAP scores differences

Behavioural factors		N	Knowledge Score (0-10) M±SD	P value	Attitude Score (0-6) M±SD	P value	Practice Score (0-6) M±SD	P value
Diet	Bad	127	6.03±1.99	0.007*	4.44±1.91	0.000*	1.92±0.96	0.089
	Good	214	6.78±2.13		4.68±1.74		1.91±0.99	
	Very Good	169	6.57±2.01		5.45±1.04		2.13±1.08	
Smoking	Never smoker	297	6.54±2.03	0.076	5.12±1.39	0.009*	2.01±0.99	0.407
	Former smoker	80	6.90±2.27		4.77±1.70		1.87±1.07	
	Current smoker	133	6.27±2.03		4.39±1.99		2.01±1.06	
Total		510	6.53±2.07		4.88±1.65		1.99±1.02	

N: Frequency M: Mean, SD: Standard Deviation. Two categories: Mann Whitney test, more than 2 categories: Kruskal Wallis, * significance p value <0.05

Table 5.3.5.13: Diabetes history and KAP scores

Variables		N	Knowledge Score (0-10) M±SD	P value	Attitude Score (0-6) M±SD	P value	Practice Score (0-6) M±SD	P value
Family history of diabetes	None	92	6.57±2.09	0.147	4.94±1.34	0.004*	1.84±1.00	0.266
	First-degree relatives	358	6.54±2.05		4.94±1.62		2.00±1.01	
	Second-degree relatives	29	6.96±1.93		5.24±1.43		2.31±1.19	
	I don't know	31	5.80±2.32		3.64±2.36		1.96±0.94	
Cumulative sugar rate (HbA1c)	Less than 7(controlled)	181	6.66±2.03	0.374	5.20±1.37	0.003*	2.18±1.36	0.011*
	More than 7(not controlled)	329	6.46±2.10		4.70±1.75		1.88±0.94	
Last HbA1c test	1-3 months	339	6.58±2.07	0.270	5.06±1.54	0.000*	2.00±1.02	0.734
	More than 3 months	171	6.42±2.08		4.50±1.78		1.95±1.03	
Duration of diabetes in years	1-5 years	160	7.03±2.07	0.003*	5.31±1.20	0.001*	2.28±1.12	0.000*
	6-10 years	158	6.27±2.04		4.68±1.81		2.02±0.99	
	11-15 years	96	6.03±2.06		4.52±1.80		1.60±0.84	
	More than 15 years	96	6.60±1.99		4.84±1.71		1.82±0.91	
Taking medication	Yes	474	6.49±2.04	0.318	4.90±1.61	0.903	1.95±1.00	0.11*
	No	36	6.94±2.41		4.61±2.10		2.44±1.20	
Total		510	6.53±2.07		4.88±1.65		1.99±1.02	

N: Frequency M: Mean, SD: Standard Deviation. Two categories: Mann Whitney test, more than 2 categories: Kruskal Wallis, * significance p value <0.05

Table 5.3.5.14: Healthcare Access and KAP scores

Variables		N	Knowledge Score (0-10) M±SD	P value	Attitude Score (0-6) M±SD	P value	Practice Score (0-6) M±SD	P value
Health Insurance	Yes	489	6.56±2.07	0.102	4.91±1.62	0.230	1.99±1.01	0.778
	No	9	6.00±2.23		4.22±1.85		1.77±1.30	
	Don't know	12	5.41±1.62		4.16±2.32		2.08±1.24	
Satisfaction with PHC	Satisfied	368	6.64±2.05	0.001*	4.97±1.59	0.029*	2.05±1.05	0.128
	Not satisfied	89	6.64±2.02		4.89±1.43		1.85±0.92	
	No answer	53	5.56±2.08		4.16±2.14		1.79±0.94	
Educational programs regarding diabetes	Yes	90	7.20±2.01	0.001*	5.47±0.88	0.002*	2.12±1.14	0.315
	No	420	6.38±2.06		4.75±1.74		1.96±0.99	
Talking to physician about diabetes	Yes	164	6.96±1.88	0.001*	5.26±1.15	0.027*	2.04±1.04	0.404
	No	346	6.32±2.13		4.69±1.81		1.96±1.01	
Talking to dentist about diabetes	Yes	222	7.03±1.99	0.000*	5.35±1.05	0.000*	2.03±1.06	0.499
	No	288	6.14±2.05		4.52±1.91		1.96±0.99	
Last dental visit	Less than 6 months	123	7.49±1.98	0.000*	5.49±1.05	0.000*	2.09±0.96	0.000*
	6-12 months	92	7.06±2.09		5.19±1.36		2.33±1.08	
	More than one year	198	6.08±2.01		4.79±1.65		1.92±1.02	
	I don't visit the dentist	97	5.70±1.69		3.98±2.05		1.65±0.94	
Reason for last dental visit	Regular checkup	55	7.29±2.10	0.000*	5.49±1.03	0.000*	2.27±1.14	0.000*
	Cosmetic treatments	74	7.27±2.10		5.57±0.75		1.85±0.78	
	Therapeutic visit	75	6.86±1.93		5.22±1.26		2.37±1.18	
	Pain relief	139	6.49±2.26		4.54±1.83		2.07±0.99	
	Other treatments	68	6.01±1.67		5.17±1.35		1.79±0.97	
	I don't visit the dentist	99	5.69±1.72		4.03±2.06		1.66±0.93	
Total		510	6.53±2.07		4.88±1.65		1.99±1.02	

N: Frequency M: Mean, SD: Standard Deviation. Two categories: Mann Whitney test, more than 2 categories: Kruskal Wallis, * significance p value <0.05

5.3.6 Mann Whitney U and Kruskal Wallis tests' results for OHRQoL

Females had significantly higher OHIP-14 scores than males ($U=36287.5$, $P= 0.005$). Unemployed participants also had significantly higher OHIP-14 scores compared to full-time employees ($H(4) =25.35$, $P = 0.000$). There was a significant mean difference among diet categories, with participants who followed a very good diet having lower OHIP-14 scores ($H(2) =10.32$, $P = 0.006$) (Table 5.3.6.15a, b and Table 5.3.6.16).

Controlled diabetic patients had significantly lower OHIP-14 scores ($U=34421.5$, $P= 0.004$). Additionally, there was a significant difference in mean OHIP-14 scores between those who took their medication and those who did not, with lower scores observed in participants who did not take medication ($U=11228.5$, $P= 0.002$). Participants who consulted their physician ($U=32919 = 0.003$) or dentist ($U=36925$, $P= 0.003$) regarding diabetes had higher OHIP-14 scores. Lastly, participants who visited the dentist for pain relief had higher OHIP-14 scores than those who visited for other reasons ($H(5) =25.65$, $P = 0.000$) (Table 5.3.6.17- Table 5.3.6.19).

Table 5.3.6.15a: OHIP-14 scores and socio-demographic factors⁸

Socio-demographic characteristics		N	OHIP-14 scores (0-56) M±SD	P value
Gender	Male	213	16.10±11.18	0.005*
	Female	297	19.09±11.83	
Age	40-60 years	267	17.55±10.98	0.977
	61-80 years	236	18.22±12.51	
	81-100 years	7	16.14±4.33	
Marital status	Married	385	17.61±11.60	0.197
	Divorced	18	17.94±12.97	
	Widowed	86	17.44±11.38	
	Single	21	23.61±11.86	
Place of residence	Village	212	18.21±13.06	0.994
	City	269	17.55±10.43	
	Camp	29	17.79±11.70	

Table 5.3.6.5.16b: OHIP-14 scores and socio-demographic factors

Socio-demographic characteristics		N	OHIP-14 scores (0-56) M±SD	P value
Educational level	Uneducated	37	18.35±14.01	0.000*
	Elementary	88	23.05±11.73	
	Secondary	100	17.90±12.01	
	High school	131	17.17±10.96	
	College	48	15.95±11.02	
	University	106	14.97±10.19	
Monthly household Income (Shekel)	Less than 1000	130	20.09±12.93	0.000*
	1000-2999	128	20.92±11.58	
	2000-2999	126	17.46±10.70	
	3000-3999	65	12.04±8.80	
	More than 4000	61	13.55±9.91	
Family members	1-5	333	17.63±11.41	0.903
	6-10	162	18.24±12.02	
	11-15	15	18.13±13.36	
Employment	Full-time	98	12.82±10.32	0.000*
	Part-time	36	17.22±12.66	
	Unemployed	114	20.09±13.10	
	Retired	75	18.72±11.12	
	Housewife	187	18.87±10.69	

N: Frequency M: Mean, SD: Standard Deviation. Two categories: Mann Whitney test, more than 2 categories: Kruskal Wallis, * significance p value <0.05

Table 5.3.6.5.17: Behavioral factors and OHIP-14 scores

Behavioural factors		N	OHIP-14 (M±SD)	P value
Total Diet	Bad	127	19.28±9.98	0.006*
	Good	214	18.45±11.61	
	Very Good	169	15.98±12.64	
Smoking	Never smoker	297	18.76±11.56	0.093
	Former smoker	80	16.36±11.29	
	Current smoker	133	16.69±11.94	
Total		510	17.84±11.65	

Table 5.3.6. 5.18: OHIP-14 scores and diabetes history

Diabetes history		N	OHIP-14(M±SD)	P value
Family history of diabetes	None	92	19.69±12.16	0.178
	First-degree relatives	358	17.81±11.74	
	Second-degree relatives	29	14.89±10.80	
	I don't know	31	15.41±8.86	
HbA1c test	Controlled	181	15.92±11.74	0.004*
	Uncontrolled	329	18.90±11.48	
Last test of HbA1c	1-3 months	339	16.58±11.03	0.001*
	More than 3 months	171	20.35±12.45	
Duration of diabetes in years	1-5 years	160	16.66±11.60	0.105
	6-10 years	158	19.10±11.90	
	11-15 years	96	16.63±11.61	
	More than 15 years	96	18.93±11.18	
Taking medication for diabetes	Yes	474	18.28±11.56	0.002*
	No	36	12.05±11.35	

Table 5.3.6.19: OHIP-14 scores and healthcare access

Healthcare access		N	OHIP-14(M±SD)	P value
Health Insurance	Yes	489	17.64±11.63	0.062
	No	9	18.66±10.09	
	Don't know	12	25.58±11.49	
Satisfaction with healthcare services	Satisfied	368	17.40±11.66	0.054
	Not satisfied	89	20.43±11.89	
	I don't want to answer	53	16.52±10.66	
Attended educational programs	Yes	90	18.86±11.47	0.266
	No	420	17.62±11.69	
Talked to your physician	Yes	164	20.33±13.09	0.003*
	No	346	16.66±10.72	
Talked to your dentist	Yes	222	19.77±12.39	0.003*
	No	288	16.36±10.83	
Last dental visit	Less than 6 months	123	18.08±10.64	0.796
	6-12 months	92	17.53±11.70	
	More than one year	198	18.10±11.59	
	I don't visit the dentist	97	17.30±13.02	
Reason for last dental visit	Regular checkup	55	17.65±13.78	0.000*
	Cosmetic treatments	74	17.05±9.91	
	Therapeutic visit	75	15.68±11.04	
	Pain Relief	139	21.04±10.88	
	Other treatments	68	13.32±9.17	
	I don't visit the dentist	99	18.79±13.30	

5.4 Multivariate analysis

A total of 51 variables were entered into multiple linear regression with stepwise method and confirmed with forward method. Eleven models were produced, and model number 11 with eleven variables was selected with R^2 was 0.306 and adjusted R^2 was 0.290, p value < 0.000 and F change was 19.95. Predicted variables for poor or good oral health related quality of life.

OHIP-14 scores will be increased (poorer OHRQoL) influencing by these factors: total oral issues ($\beta=0.299$, $P=0.000$), total general health issues ($\beta=0.104$, $P=0.011$), talked to dentist ($\beta=0.200$, $P=0.000$), elementary education ($\beta=0.124$, $P=0.002$), pain relief visit ($\beta=0.139$, $P=0.000$), no history of DM in family ($\beta=0.126$, $P=0.001$) and if last test of HbA1C was more than three months period ($\beta=0.098$, $P=0.012$).

On the other hand, OHIP-14 scores will be decreased (better OHRQoL) influencing by these factors: full time employee ($\beta=- 0.125$, $P=0.002$), attitude ($\beta= - 0.103$, $P=0.009$), 2000 - 3000 Shekel ($\beta= - 0.079$, $P=0.048$) and 3000 -4000 Shekel ($\beta= - 0.128$, $P=0.001$).

Table 5.4.5.20: Multiple linear regression was used for OHRQoL (OHIP-14 scores) influence factor analysis (N =510)

	Standardized β	T	P-value	95% confidence interval for β	
				Upper	lower
Constant		5.802	0.000	7.468	15.115
Total Oral issues	0.299	7.453	0.000	1.114	1.911
Full-time employee	- 0.125	-3.169	0.002	-6.000	-1.407
Talked to dentist	0.200	5.049	0.000	2.864	6.514
Elementary education	0.124	3.179	0.002	1.456	6.166
Pain relief visit	0.139	3.517	0.000	1.604	5.664
No DM in family	0.126	3.291	0.001	1.533	6.077
Total Attitude score	- 0.103	-2.615	0.009	-1.279	- 0.182
3000-4000 Shekel per month	- 0.128	-3.269	0.001	-7.170	-1.787
HbA1C test > 3months	0.098	2.534	0.012	0.542	4.282
Total health issues	0.104	2.567	0.011	0.175	1.320
2000-3000 Shekel per month	- 0.079	-1.978	0.048	-4.246	- 0.014

OHRQoL: Oral health-related quality of life(dependent variable)

Stepwise regression model fit Adjusted R Squared was 0.294, $p < 0.000$

6 Chapter Six: Discussion, Strengths and Limitations, Conclusion and Recommendations

6.1 Introduction

This study is a cross-sectional study done in centres of PHC of MoH in the West Bank. The main objective of this study was to assess the effect of knowledge, attitudes, and practices (KAP) related to oral health among T2DM patients on their oral health-related quality of life. The secondary objectives were to: 1) evaluate the oral health knowledge of T2DM patients, 2) assess their attitudes toward oral health, 3) examine their oral health self-care practices, and 4) investigate the influence of demographic, socioeconomic, and access to dental care factors on patient KAP and OHRQoL. This chapter consists of two parts. Part I is about discussion of the results of this study and compared to the literature review and the conceptual model. Part II includes strengths, limitations, conclusion, and recommendations.

Part I: Results Discussion

6.2 KAP variables

Moderate knowledge and a positive attitude did not translate into good practice, as the KAP theory would suggest. Although Spearman's correlation showed a positive relationship between knowledge, attitude, and practice, the actual practice of oral health care remained poor in this study. This finding aligns with existing literature, where low practice scores were observed despite good knowledge and attitudes (Saengtibovorn & Taneepanichskul, 2014, Wang et al.,

2018, Kakooei et al., 2020, Arefin et al., 2021, Alhuwais et al., 2021, Mahzari et al., 2022, Shaikh & Badar, 2023, Sohal et al., 2024).

The study was conducted in a conflict zone, which highlights several key barriers to effectively applying the KAP framework for oral health management among diabetic patients. Although correlated with the attitude and knowledge, the oral hygiene practices in this sample were poor. This could be influenced by systemic barriers, including limited access to dental care, financial instability, and safety concerns in conflict areas. These challenges prevent patients from acting on their knowledge and attitudes, pointing to the need for interventions that address these broader socio-economic and logistical issues to improve oral health practices.

Interventions in conflict zones must address systemic barriers like limited access to care and financial instability, while also providing psychological support and empowering local communities to improve oral health practices. Policy changes and community-based approaches are essential for ensuring diabetic patients receive the necessary care and support.

6.3 KAP model with general and oral health

Dry mouth emerged as the most frequently reported oral complication among diabetic patients in this study, followed by tooth loss, decay, bad breath, and gingival bleeding. This aligns with existing literature, which highlights dry mouth as a primary oral health issue significantly impacting the quality of life of diabetic patients (Poudel et al., 2021; Tonetti, M. S., Van Dyke, T. E., 2013). Despite its prevalence and negative impact, diabetic patients' knowledge about their condition did not correlate with self-reported oral or general health issues, suggesting that knowledge alone may not suffice to improve health outcomes. In contrast, negative attitudes and poor health practices were associated with worse general health issues, particularly among patients managing multiple chronic conditions.

These findings highlight the need for integrated care strategies that address both oral and general health complications in diabetic patients. Interventions should prioritize the management of oral complications through tailored care plans, including regular dental check-ups and strategies to mitigate symptoms. Additionally, improving attitudes and promoting healthy practices through behavioural counselling and support programs is essential to enhance self-care and overall quality of life. Addressing these factors holistically can better support diabetic patients, particularly those facing the challenges of multimorbidity.

6.4 KAP model and Socio-demographic characteristics

Older age was correlated with lower levels of knowledge, attitude, and practice (KAP) related to oral health among diabetic patients in this study, while higher educational levels and monthly income were associated with better knowledge, more positive attitudes, and improved practices. These findings align with previous research demonstrating the influence of socio-demographic variables on oral health related KAP (Abbasi et al., 2018; Alhajaji, 2022; Baniyasi et al., 2021; Kakooei et al., 2020; Mian, Rashidi, Alshammary, Zubaidi, Shammery, Siddiqui, et al., 2020; Niroomand et al., 2016; Poudel et al., 2018, 2022; Saengtipbovorn & Taneepanichskul, 2014, Sohal et al., 2024; Verhulst et al., 2019; Zhu et al., 2023). Neglect of oral health among older adults may be attributed to challenges such as denture use or impaired motor skills, which hinder their ability to maintain oral hygiene (Dibello et al., 2021; Schierz et al., 2021). Additionally, females demonstrated more positive attitudes toward oral health than males. Older adults should be supported to address physical limitations and consider facilitations like mobile dental clinics. Policymakers should address socioeconomic disparities by integrating oral health education into diabetes care programs and supporting vulnerable groups by focusing on the primary prevention for oral health with lower cost to avoid the highly cost of other treatments.

6.5 KAP model and Diabetes History

Controlled diabetic patients (HbA1C <7%) showed more positive attitudes and better oral health practices than those with uncontrolled diabetes, consistent with prior studies (Kakooei et al., 2020; Mahzari et al., 2022). The bidirectional relationship between diabetes and oral health highlights the need to integrate oral health care into diabetes management to improve outcomes in both areas.

6.6 KAP model and Healthcare Access

This study found that better knowledge and more positive attitude with better practice had been noticed among diabetic patients who participated in educational programs and discussed their diabetes and oral health with healthcare providers (physicians and dentist). Patients who visited the dentist more than twice yearly and for routine check-ups or cosmetic and therapeutic treatments had significantly higher knowledge scores, while those who visited once or twice annually for cosmetic or therapeutic reasons demonstrated better oral health practices.

Educational programs and the important role of the healthcare providers in educating and promoting healthier behaviours in diabetic patients had been discussed in literature (Alhuwais et al., 2021; Poudel et al., 2018). Incorporating oral health education into routine diabetes care is vital, with a focus on early detection and ongoing patient engagement. Healthcare providers should emphasize the connection between diabetes and oral health, highlighting the importance of regular dental visits for prevention and treatment. Additionally, healthcare systems need to improve access to routine dental care and encourage participation in educational programs to enhance oral health behaviours. Addressing these factors can close knowledge gaps, foster positive attitudes, and promote better practices, ultimately improving both oral and overall health outcomes for diabetic patients.

6.7 KAP model and Behavioural factors

Smoker diabetic patients exhibited less positive attitudes toward oral health, whereas those following a healthy diet showed more positive attitudes compared to those with less healthy dietary habits. This highlights the importance of integrating smoking cessation programs and nutritional counselling into diabetes care. As discussed in the literature (Banyai et al., 2022; Saengtibovorn & Taneepanichskul, 2015), these interventions can play a crucial role in improving the knowledge, attitudes, and practices (KAP) of diabetic patients, ultimately enhancing their overall health outcomes.

6.8 OHRQoL and KAP model

A few studies combined between KAP theory and OHRQoL concept (Zheng et al., 2021; Zhu et al., 2023). In this study, KAP model used to assess its impact on OHRQoL, as a result, only attitude was significantly correlated with OHRQoL. Patients with a positive attitude toward oral health had lower scores on the OHIP-14, indicating better quality of life. Several factors influence the attitude of diabetic patients toward oral health, including their knowledge and awareness of the diabetes-oral health connection, socio-demographic factors such as age, education, and income, and previous dental experiences. Cultural beliefs, perceived severity of oral health issues, and psychological factors like stress can also impact attitudes (Y. Wang et al., 2023). Additionally, support from healthcare providers, access to care, and self-efficacy play crucial roles in shaping patients' attitudes (Y. Wang et al., 2023). Peer influence and social

networks further contribute to how patients approach oral health care. Addressing these factors can help improve oral health attitudes and outcomes for diabetic patients.

6.9 OHRQoL and Socio-demographic

In this study, females had higher OHIP-14 scores, indicating lower Oral Health-Related Quality of Life (OHRQoL). Other factors contributing to lower OHRQoL included a lower educational level (elementary), while higher monthly income and full-time employment were associated with improved OHRQoL. The impact of socio-economic status had been widely discussed in literature (Baniyadi et al., 2021; Khalifa et al., 2020; Sadeghi, M., 2017). Healthcare providers should focus on providing additional support and resources for lower-income patients and those with less education to enhance their oral health outcomes.

6.10 OHRQoL and Diabetes history

Uncontrolled diabetic patients and those without a family history of diabetes exhibited poorer Oral Health-Related Quality of Life (OHRQoL). Many studies highlighted the impact of diabetes on the OHRQoL (Azogui-Lévy et al., 2018; Nikbin et al., 2014; Sadeghi et al., 2014). This suggests that lack of effective diabetes management and absence of familial knowledge or experience with diabetes may contribute to poorer oral health outcomes. These findings imply that interventions for diabetic patients should emphasize the importance of blood sugar control and educate patients without a family history of diabetes about the potential oral health risks associated with the condition. Tailored care plans that address these factors could help improve OHRQoL among these groups.

6.11 OHRQoL and Behavioural factors

Diabetic patients with a healthy diet exhibited better Oral Health-Related Quality of Life (OHRQoL), likely due to the positive impact of diet on reducing oral complications. A balanced diet can help manage blood sugar levels and prevent oral health issues such as gum disease and tooth loss (Hemmingsen et al., 2017; Khalifa et al., 2020; Poudel et al., 2021). Based on these results, healthcare providers should emphasize the importance of a healthy diet as part of diabetes management, not only for controlling blood sugar but also for improving oral health

outcomes. Integrating dietary counselling into diabetes care can help prevent oral complications and enhance patients' overall quality of life.

6.12 OHRQoL and Healthcare access

Diabetic patients who frequently discuss their oral health with their physician and dentist, or those who visit a dentist infrequently and primarily for pain-related reasons, tend to experience poorer Oral Health-Related Quality of Life (OHRQoL). Visiting a dentist only when pain occurs reflects poor access to regular dental services, which limits opportunities for preventive care and allows oral health issues to progress unchecked. This deterioration not only exacerbates oral health problems but also contributes to a lower quality of life. Additionally, the lack of regular interprofessional collaboration between healthcare providers may hinder comprehensive care. Dentists should actively discuss medical conditions such as diabetes with their patients, while physicians should address the oral health complications associated with systemic conditions like diabetes to ensure a holistic approach to care.

As this is a cross-sectional study, one limitation is the inability to establish causality in this bidirectional relationship. It remains unclear whether a poorer quality of life drives patients to seek dental care or discuss oral health with their providers, or whether such discussions, often prompted by worsening oral health, contribute to the perception of a lower quality of life. Delayed, pain-driven visits heighten concerns about dental health and further deteriorate oral health outcomes.

The importance of healthcare access and interprofessional collaboration in mitigating these issues is well-documented in the literature (Poudel et al., 2022; Rockville (MD): Agency for Healthcare Research and Quality (US), 2021). By fostering regular communication and collaboration between dentists and physicians, healthcare providers can create a supportive environment that prioritizes preventive care and early intervention. This approach can alleviate patient anxiety, improve oral and systemic health outcomes, and ultimately enhance OHRQoL for diabetic patients.

6.13 OHRQoL and Self-reported oral and general health issues

Diabetic patients with additional health issues and multiple oral problems experienced a poorer quality of life. However, the overall OHIP-14 score indicated that oral health had a minimal negative impact on their overall quality of life, with the most significant impacts

observed in the domains of psychological discomfort, handicap, and social disability. These findings suggest that while oral health affects specific aspects of life, the broader quality of life may be influenced more by other factors. Conflict zone setting, which may affect participants' psychological well-being and financial stability. Political issues is considered one of the social determinant of health(Watts and Karen, 2008). This leads us to the idea that improving oral health is crucial, in addition to socio-economic factors such as financial status and psychological well-being should also be addressed in diabetes care. Further research is needed to explore the complex relationship between political, economic, and overall/oral health-related quality of life in diabetic patients, which can help inform more comprehensive interventions that consider both health and socio-economic factors.**Part II strengths, limitations, conclusion and recommendations**

6.14 Strengths and limitations

This study is the first to assess oral health-related quality of life (OHRQoL) among diabetic patients in the West Bank and examine its relationship with their knowledge, attitudes, oral hygiene practices, and various sociodemographic and health-related characteristics. The study employed robust methodology, including the adaptation of a validated tool from literature, content and face validation processes, and standardized training for data collectors. A representative national sample was recruited from the West Bank region of the Palestinian territories, ensuring the findings are relevant and generalizable.

This study shares the inherent limitations of a cross-sectional design, offering a snapshot of associations between variables at a single point in time, which highlights potential bidirectional relationships but does not establish causality. The reliance on self-reported data introduces measurement bias, as participants may be influenced by recall inaccuracies or social desirability.

6.15 Conclusion

This study identified a positive attitude as a key predictor of better OHRQoL among diabetic patients, emphasizing the need for targeted interventions to foster positive attitudes and improve diabetes management. Conversely, poorer OHRQoL was linked to limited healthcare utilization, such as dental visits focused primarily on pain relief. In addition, socio-economic disparities significantly impacted OHRQoL outcomes, underscoring the importance of

addressing these inequalities to enhance healthcare access and outcomes. These findings underscore the need to enhance access to comprehensive dental care and integrate oral health management into diabetes care programs to address the disparities and improve outcomes for diabetic patients.

6.16 Recommendations:

For the diabetic patients:

Good oral health practice, the importance of regular visits to a dentist, and control of blood sugar levels will lead to improved oral health status and in turn improved quality of life. In addition to modify lifestyle, including healthy diet and smoking cessation, to reduce the risk of oral complications in diabetic patients.

For PHC centers of MoH and policy makers:

The need to increase the workshops or educational programs for diabetic patients especially for a specific sociodemographic group, particularly older adults, individuals with lower income, and those with lower education to emphasize the connection between diabetes and oral health complications, highlighting the importance of preventive care. Involving family members and caregivers in the education process is crucial, especially for older adults or those with physical limitations, to ensure consistent oral hygiene practices.

To address access barriers, affordable and accessible dental services, such as mobile dental clinics and tele-dentistry, should be promoted.

Psychosocial support programs targeting older adults and low-income individuals can help address stress and emotional challenges that negatively impact OHRQoL.

For the research field:

Future research should focus on specific oral health conditions linked to diabetes, such as periodontitis, dry mouth, candidiasis, and tooth decay, to better understand their prevalence, severity, and impact on oral health-related quality of life (OHRQoL). Addressing barriers that prevent the translation of knowledge and attitudes into effective oral health practices is crucial,

as identifying these gaps could inform the development of tailored educational and behavioural interventions. Additionally, integrating self-reported data with objective clinical assessments, such as periodontal examinations or biomarkers of glycemic control, would offer a more comprehensive understanding of oral health challenges faced by diabetic populations.

New models could be used to further investigate the OHRQoL of diabetic patients such as, the Biopsychosocial and Ecological Models that both can offer valuable perspectives for understanding the quality of life in diabetic patients. The Biopsychosocial Model emphasizes the interplay of biological, psychological, and social factors, highlighting the need for holistic care that addresses not just the physical aspects of diabetes but also the psychological and social challenges. The Ecological Model, with its focus on multiple levels of influence—individual, interpersonal, and societal—adds a broader context to the factors affecting OHRQoL. By combining these models, we can create more comprehensive strategies for improving oral health outcomes in diabetic patients. This integrated approach will help identify barriers and guide interventions that improve both oral health behaviors and overall well-being.

References

- Abbasi, Y. F., See, O. G., Ping, N. Y., Balasubramanian, G. P., Hoon, Y. C., & Paruchuri, S. (2018). Diabetes knowledge, attitude, and practice among type 2 diabetes mellitus patients in Kuala Muda District, Malaysia – A cross-sectional study. *Diabetes and Metabolic Syndrome: Clinical Research and Reviews*, 12(6), 1057–1063. <https://doi.org/10.1016/j.dsx.2018.06.025>
- Abdulaziz Alrashed, F., Ahmad, T., Almurdi, M. M., Alqahtani, A. S., Alamam, D. M., & Alsubiheen, A. M. (2023). Investigating the relationship between lifestyle factors, family history, and diabetes mellitus in non-diabetic visitors to primary care centers. *Saudi Journal of Biological Sciences*, 30(9), 103777. <https://doi.org/10.1016/j.sjbs.2023.103777>
- Abu-Gharbieh, E., Saddik, B., El-Faramawi, M., Hamidi, S., & Basheti, M. (2019). Oral health knowledge and behavior among adults in the United Arab Emirates. *BioMed Research International*, 2019. <https://doi.org/10.1155/2019/7568679>
- Abu-Rmeileh, N. M. E., Husseini, A., Capewell, S., & O’Flaherty, M. (2013). Preventing type 2 diabetes among Palestinians: Comparing five future policy scenarios. *BMJ Open*, 3(12), 1–6. <https://doi.org/10.1136/bmjopen-2013-003558>
- Abu-Rmeileh, N. M., Husseini, A., O’Flaherty, M., Shoaibi, A., & Capewell, S. (2012). Forecasting prevalence of type 2 diabetes mellitus in Palestinians to 2030: validation of a predictive model. *The Lancet*, 380, S21. [https://doi.org/10.1016/s0140-6736\(13\)60202-0](https://doi.org/10.1016/s0140-6736(13)60202-0)
- Abu Al-Halaweh, A., Davidovitch, N., Almdal, T. P., Cowan, A., Khatib, S., Nasser-Eddin, L., & Baradia, Z. (2017). Prevalence of type 2 diabetes mellitus complications among palestinians with T2DM. *Diabetes and Metabolic Syndrome: Clinical Research and Reviews*, 11(February), S783–S787. <https://doi.org/10.1016/j.dsx.2017.05.017>
- Abuawad, M. S. S. (2013). Assessing quality of life of Palestinian diabetic patients ; refugees and non-refugees. *ASLO and Akershus University College of Applied Sciences*, 1–68.
- ADA. (2024). *HbA1c*. American Diabetes Association. <https://diabetes.org/about-diabetes/a1c>, Accessed December 13,2024
- Al-Matrouk, J., & Al-Sharbati, M. (2022). Quality of Life of Adult Patients with Type 2 Diabetes Mellitus in Kuwait: A Cross-Sectional Study. *Medical Principles and Practice*,

31(3), 238–245. <https://doi.org/10.1159/000521686>

- Alhajaji, R. (2022). Oral Health Knowledge, Attitude and Practice among adults living with diabetes in Makkah City. *Journal of Research in Medical and Dental Science*, 10(1), 495-+.
- Alhuwais, M., Alkanderi, A., & Jospheh, B. (2021). Attitudes and Awareness of Diabetic Patients in Kuwait Towards Their Oral Health. *International Journal of Oral and Dental Health*, 7(3). <https://doi.org/10.23937/2469-5734/1510133>
- Allen, E. M., Ziada, H. M., O'Halloran, D., Clerehugh, V., & Allen, P. F. (2008). Attitudes, awareness and oral health-related quality of life in patients with diabetes. *Journal of Oral Rehabilitation*, 35(3), 218–223. <https://doi.org/10.1111/j.1365-2842.2007.01760.x>
- Alqedra, E., & Aljeesh, Y. (2022). Oral health problems among patients with type 2 diabetes attending UNRWA health centres in Gaza governorates: a cross-sectional study. *The Lancet*, 399, S20. [https://doi.org/10.1016/s0140-6736\(22\)01155-2](https://doi.org/10.1016/s0140-6736(22)01155-2)
- Alqedra, E., & Aljeesh, Y. I. (2020a). *DMFT Index of Type 2 Diabetic Patients Attending UNRWA Health Centers in Gaza Governorates* -. 4(February), 15–22.
- Alqedra, E., & Aljeesh, Y. I. (2020b). *Periodontal Status of Type 2 Diabetic Patients Attending UNRWA Health Centers in Gaza Governorates* -. 4(February), 15–22.
- Andrade, C., Menon, V., Ameen, S., & Kumar Praharaj, S. (2020). Designing and Conducting Knowledge, Attitude, and Practice Surveys in Psychiatry: Practical Guidance. *Indian Journal of Psychological Medicine*, 42(5), 478–481. <https://doi.org/10.1177/0253717620946111>
- Arefin, M. H., Sultana, H., Hossain, A., Fahmida, S. F., & Khatun, M. (2021). Knowledge and Practice on Oral Health among Diabetic Patients. *North American Academic Research*, 4(3), 268–280.
- Ashour, Y., Jlambo, A., & Abuzerr, S. (2024). Patients in Gaza with chronic conditions need urgent interventions. *The Lancet*, 403(10439), 1847–1848. [https://doi.org/10.1016/S0140-6736\(24\)00705-0](https://doi.org/10.1016/S0140-6736(24)00705-0)
- Asmar, Imad, et al. (2021). "Health-related quality of life among Palestinians with diabetes. *Ournal of Diabetes Nursing*.

- Asmar, I., Almahmoud, O., Qoud, B., Assaf, M., Saleh, A. D., Alyan, A., & Dahabrah, N. (2024). Diabetes knowledge, attitudes and practices among university students in a developing country. *Journal of Diabetes Nursing*, 28(3), 1–7.
- Association., A. D. (2020). Oral health and diabetes: A vital connection. *Diabetes Care*, 43(1), 20-. <https://doi.org/10.2337/dci19-0075>
- Azogui-Levy et al. (2018). *Factors associated with oral health-related quality of life in patients with diabetes*. 163–169. <https://doi.org/10.1111/adj.12577>
- Badran, A., Bahar, A., Tammam, M., Bahar, S., Khalil, A., Koni, A. A., & Zyoud, S. H. (2023). The relationship between diabetes-related knowledge and kidney disease knowledge, attitudes, and practices: a cross-sectional study. *BMC Public Health*, 23(1), 1–15. <https://doi.org/10.1186/s12889-023-15390-8>
- Baniasadi, K., Armoon, B., Higgs, P., Bayat, A. H., Mohammadi Gharehghani, M. A., Hemmat, M., Fakhri, Y., Mohammadi, R., Fattah Moghaddam, L., & Schroth, R. J. (2021). The Association of Oral Health Status and socio-economic determinants with Oral Health-Related Quality of Life among the elderly: A systematic review and meta-analysis. In *International Journal of Dental Hygiene* (Vol. 19, Issue 2). <https://doi.org/10.1111/idh.12489>
- Banyai, D., Vegh, A., Biczo, Z., Barone, M. T. U., Hegedus, T., & Vegh, D. (2022). Oral Health Knowledge and Habits of People With Type 1 and Type 2 Diabetes. *International Dental Journal*, 72(3), 407–413. <https://doi.org/10.1016/j.identj.2021.07.003>
- Benzian, H., Daar, A., & Naidoo, S. (2023). Redefining the non-communicable disease framework to a 6 × 6 approach: incorporating oral diseases and sugars. *The Lancet Public Health*, 8(11), e899–e904. [https://doi.org/10.1016/S2468-2667\(23\)00205-0](https://doi.org/10.1016/S2468-2667(23)00205-0)
- Borgnakke, W. S. (2019). IDF Diabetes Atlas: Diabetes and oral health – A two-way relationship of clinical importance. *Diabetes Research and Clinical Practice*, 157, 107839. <https://doi.org/10.1016/j.diabres.2019.107839>
- Burns, C., & Francis, N. (2023). Type 2 Diabetes: Etiology, Epidemiology, Pathogenesis, and Treatment. *Metabolic Syndrome*, 509–528. https://doi.org/10.1007/978-3-031-40116-9_34
- Care, D., & Suppl, S. S. (2020). Classification and diagnosis of diabetes: Standards of Medical

- Care in Diabetes-2020. *Diabetes Care*, 43(January), S14–S31. <https://doi.org/10.2337/dc20-S002>
- CDC. (2024). *Division for Heart Disease and Stroke Prevention*. https://www.cdc.gov/dhdsp/health_equity/socioeconomic.htm, Accessed October 22, 2024
- Cervino, G., Terranova, A., Briguglio, F., Stefano, R. De, Famà, F., Amico, C. D., Amoroso, G., Marino, S., Gorassini, F., Mastroieni, R., Scoglio, C., Catalano, F., Lauritano, F., Matarese, M., Giudice, R. Lo, Siniscalchi, E. N., & Fiorillo, L. (2019). *Diabetes : Oral Health Related Quality of Life and Oral Alterations*. 2019.
- Desai, R., Khobaragade, B., McCracken, G., Wassall, R., Taylor, J. J., Bissett, S. M., Pumerantz, A. S., & Preshaw, P. M. (2021). Impact of diabetes and periodontal status on life quality. *BDJ Open*, 7(1), 1–7. <https://doi.org/10.1038/s41405-021-00061-w>
- Diabetes, NCD*. (2024). <https://www.emro.who.int/noncommunicable-diseases/diabetes/index.html>, Accessed June 4, 2024
- Dibello, V., Zupo, R., Sardone, R., Lozupone, M., Castellana, F., Dibello, A., Daniele, A., De Pergola, G., Bortone, I., Lampignano, L., Giannelli, G., & Panza, F. (2021). Oral frailty and its determinants in older age: a systematic review. *The Lancet Healthy Longevity*, 2(8), e507–e520. [https://doi.org/10.1016/S2666-7568\(21\)00143-4](https://doi.org/10.1016/S2666-7568(21)00143-4)
- Dweib, M., & El Sharif, N. (2023). Diabetes-Related Microvascular Complications in Primary Health Care Settings in the West Bank, Palestine. *Journal of Clinical Medicine*, 12(21). <https://doi.org/10.3390/jcm12216719>
- Elheeny, A. A. H. (2020). Oral health status and impact on the oral health-related quality of life of Egyptian children and early adolescents with type-1 diabetes: a case-control study. *Clinical Oral Investigations*, 24(11), 4033–4042. <https://doi.org/10.1007/s00784-020-03273-w>
- Eljedi, A., Mikolajczyk, R. T., Kraemer, A., & Laaser, U. (2006). Health-related quality of life in diabetic patients and controls without diabetes in refugee camps in the Gaza strip: A cross-sectional study. *BMC Public Health*, 6, 1–7. <https://doi.org/10.1186/1471-2458-6-268>
- Eyth E, Naik R. Hemoglobin A1C. [Updated 2023 Mar 13]. In: StatPearls [Internet]. Treasure

Island (FL): StatPearls Publishing; 2025 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK549816/>, Accessed December 24, 2024

- Sanz, M., Marco Del Castillo, A., Jepsen, S., Gonzalez-Juanatey, J. R., D'Aiuto, F., Bouchard, P., Chapple, I., Dietrich, T., Gotsman, I., Graziani, F., Herrera, D., Loos, B., Madianos, P., Michel, J. B., Perel, P., Pieske, B., Shapira, L., Shechter, M., Tonetti, M., Vlachopoulos, C., ... Wimmer, G. (2020). Periodontitis and cardiovascular diseases: Consensus report. *Journal of clinical periodontology*, 47(3), 268–288. <https://doi.org/10.1111/jcpe.13189>
- Ghandour, R., Mikki, N., Abu Rmeileh, N. M. E., Jerdén, L., Norberg, M., Eriksson, J. W., & Husseini, A. (2018). Complications of type 2 diabetes mellitus in Ramallah and al-Bireh: The Palestinian Diabetes Complications and Control Study (PDCCS). *Primary Care Diabetes*, 12(6), 547–557. <https://doi.org/10.1016/j.pcd.2018.07.002>
- Giacaman, R., Khatib, R., Shabaneh, L., Ramlawi, A., Sabri, B., Sabatinelli, G., Khawaja, M., & Laurance, T. (2009). Health status and health services in the occupied Palestinian territory. *The Lancet*, 373(9666), 837–849. [https://doi.org/10.1016/S0140-6736\(09\)60107-0](https://doi.org/10.1016/S0140-6736(09)60107-0)
- Glurich, I., Schwei, K. M., Lindberg, S., Shimpi, N., & Acharya, A. (2018). Integrating Medical-Dental Care for Diabetic Patients: Qualitative Assessment of Provider Perspectives. *Health Promotion Practice*, 19(4), 531–541. <https://doi.org/10.1177/1524839917737752>
- Habashneh, R. Al, Khader, Y. S., & Salameh, S. (2012). *Use of the Arabic version of Oral Health Impact Profile-14 to evaluate the impact of periodontal disease on oral health-related quality of life among Jordanian adults*. 54(1), 113–120.
- Harahsheh, A. H. M. (2022). Oral Hygiene; knowledge, attitude, and practices among diabetic patients in Hebron-Palestine. *Diss. Al-Quds University*.
- Hemmingsen, B., Mauricio, D., M, R. F., Mi, M., Richter, B., Hemmingsen, B., Mauricio, D., M, R. F., Mi, M., & Richter, B. (2017). *Diet, physical activity or both for prevention or delay of type 2 diabetes mellitus and its associated complications in people at increased risk of developing type 2 diabetes mellitus (Review)*. <https://doi.org/10.1002/14651858.CD003054.pub4>. www.cochranelibrary.com
- Husseini, A., Abdul-Rahim, H., Awartani, F., Giacaman, R., Jervell, J., & Bjertness, E. (2000). Type 2 diabetes mellitus, impaired glucose tolerance and associated factors in a rural

- palestinian village. *Diabetic Medicine*, 17(10), 746–748. <https://doi.org/10.1046/j.1464-5491.2000.00355.x>
- Imam, A., Abdo, N., & Sharif, E. (2019). *Current Status of Diabetes in Palestine : Epidemiology , Management , and Healthcare System* (Issue September). <https://doi.org/10.1007/978-3-319-74365-3>
- Imam, A., Abdo, N., & Sharif, E. (2020a). Handbook of Healthcare in the Arab World. In *Handbook of Healthcare in the Arab World* (Issue September). <https://doi.org/10.1007/978-3-319-74365-3>
- Imam, A., Abdo, N., & Sharif, E. (2020b). Handbook of Healthcare in the Arab World. In *Handbook of Healthcare in the Arab World* (Issue September). <https://doi.org/10.1007/978-3-319-74365-3>
- Institute of Medicine (US) Committee on Health and Behavior. (2001). Health and Behavior. In *The Interplay of Biological, Behavioral, and Societal Influences*. <https://www.ncbi.nlm.nih.gov/books/NBK43744/>
- International Diabetes Federation. (2024). *Diabetes Facts and Figures*. <https://idf.org/about-diabetes/diabetes-facts-figures/>, Accessed July 8,2024
- Irani, F. C., Wassall, R. R., & Preshaw, P. M. (2015). Impact of periodontal status on oral health-related quality of life in patients with and without type 2 diabetes. *Journal of Dentistry*, 43(5), 506–511. <https://doi.org/10.1016/j.jdent.2015.03.001>
- Ismaeil, F. M., & Ali, N. (2013). Diabetic Patients Knowledge, Attitude and Practice toward Oral Health. *Journal of Education and Practice*, 4(20), 19–25. <http://www.iiste.org/Journals/index.php/JEP/article/viewFile/7895/7969>
- Jaber, M. F., Khan, A., Elmosaad, Y., Mustafa, M. M., Suliman, N., & Jamaan, A. (2017). Oral health knowledge, attitude and practices among male Qassim university students. *International Journal Of Community Medicine And Public Health*, 4(8), 2729. <https://doi.org/10.18203/2394-6040.ijcmph20173316>
- Jebril, M., Liu, X., Shi, Z., Mazidi, M., Altaher, A., & Wang, Y. (2020). Prevalence of type 2 diabetes and its association with added sugar intake in citizens and refugees aged 40 or older in the gaza strip, palestine. *International Journal of Environmental Research and Public Health*, 17(22), 1–15. <https://doi.org/10.3390/ijerph17228594>

- Journal, E., & Vol, M. S. (2015). *European Journal of Research in Medical Sciences Vol. 3 No. 1, 2015 ISSN 2056-600X*. 3(1), 40–53.
- Kakooei, S., Afzali, S., Parirokh, M., Kakooei, S., Mostafavi, M., & Nekouei, A. (2020). The Knowledge and Attitude of Diabetic Patients Regarding Oral and Dental Disorders in Kerman Diabetes Clinics. *Journal of Dentistry (Shiraz, Iran)*, 21(3), 195–201. <https://doi.org/10.30476/DENTJODS.2020.77878.0>
- Kandelman, D., Petersen, P. E., & Ueda, H. (2008). *Oral health , general health , and quality of life in older people*. 8, 224–236. <https://doi.org/10.1111/j.1754-4505.2008.00045.x>
- Kanjirath, P. P., Kim, S. E., & Rohr Inglehart, M. (2011). Diabetes and oral health: the importance of oral health-related behavior. *Journal of Dental Hygiene : JDH / American Dental Hygienists' Association*, 85(4), 264–272.
- Karunanathan, S., Jn, L., Linklater, S., Bj, M., Moher, D., Mortazhejri, S., Nazarali, S., Ramsay, T., Pm, R., Sargious, P., Kg, S., Se, S., Tonelli, M., Tricco, A., Vachon, B., Chy, Y., Zahradnik, M., Ta, T., Jm, G., & Ivers, N. (2023). *outcomes for adults living with diabetes (Review)*. <https://doi.org/10.1002/14651858.CD014513>. www.cochranelibrary.com
- Khalifa, N., Rahman, B., Gaintantzopoulou, M. D., Al-Amad, S., & Awad, M. M. (2020). Oral health status and oral health-related quality of life among patients with type 2 diabetes mellitus in the United Arab Emirates: a matched case-control study. *Health and quality of life outcomes*, 18(1), 182. <https://doi.org/10.1186/s12955-020-01418-9>
- Khalifa, N., Allen, P. F., Abu-bakr, N. H., & Abdel-Rahman, M. E. (2013). Psychometric properties and performance of the Oral Health Impact Profile (OHIP-14s-ar) among Sudanese adults. *Journal of oral science*, 55(2), 123–132. <https://doi.org/10.2334/josnusd.55.123>
- Khalifa, N., Rahman, B., Gaintantzopoulou, M. D., Al-Amad, S., & Awad, M. M. (2020). Oral health status and oral health-related quality of life among patients with type 2 diabetes mellitus in the United Arab Emirates: A matched case-control study. *Health and Quality of Life Outcomes*, 18(1), 1–8. <https://doi.org/10.1186/s12955-020-01418-9>
- Khatib, S. T., Hemadne, M. K., Hasan, S. A., Khazneh, E., & Zyoud, S. H. (2018). Quality of life in hemodialysis diabetic patients: A multicenter cross-sectional study from Palestine. *BMC Nephrology*, 19(1), 1–9. <https://doi.org/10.1186/s12882-018-0849-x>

- Kim, Tae Ryong, et al. (1964). KOREA: Trends in Four National KAP Surveys. *JSTOR, Studies in Family Planning*, 67. <https://doi.org/10.2307/1965090>. Accessed 8 Oct. 2024.
- Kudiyirickal, M. G., & Pappachan, J. M. (2014). Diabetes mellitus and oral health. *Endocrine*, 49(1), 27–34. <https://doi.org/10.1007/s12020-014-0496-3>
- Lalla, E., & Papapanou, P. N. (2011). Diabetes mellitus and periodontitis: a tale of two common interrelated diseases. *Nature reviews. Endocrinology*, 7(12), 738–748. <https://doi.org/10.1038/nrendo.2011.106>
- Lipman, R. D., O'Brien, K. K., Bardsley, J. K., & Magee, M. F. (2023). A Scoping Review of the Relation Between Toothbrushing and Diabetes Knowledge, Glycemic Control, and Oral Health Outcomes in People With Type 2 Diabetes. *Diabetes Spectrum*, 36(4), 364–372. <https://doi.org/10.2337/ds22-0089>
- Mahzari, M. A., Oraibi, O. H., Shami, A. M., Shami, M. O., Thobab, T. Y., Awlaqi, A. A., Abu Allah, R. A., Azyabi, F. Y., Otaif, F., Majrashi, K., Alwan, A. K., & Hazazi, M. H. (2022). Knowledge, Attitude, and Practice Regarding Diabetes Mellitus Among Type 2 Diabetic Patients Attending Primary Health Care Centers in the Jazan Region of Saudi Arabia. *Cureus*, 14(9). <https://doi.org/10.7759/cureus.28704>
- Mark, A. M. (2018). Can diabetes affect my oral health? *Journal of the American Dental Association*, 149(4), 328. <https://doi.org/10.1016/j.adaj.2018.01.032>
- Mary, A. V., Mahendra, J., John, J., Moses, J., Ebenezar, A. V. R., & Kesavan, R. (2017). *Assessing Quality of Life using the Oral Health Impact Profile (OHIP-14) in Subjects with and without Orthodontic Treatment need in Chennai , Tamil Nadu , India*. 11(8), 78–81. <https://doi.org/10.7860/JCDR/2017/27309.10442>
- Mian, R. I., Rashidi, F. F. H., Alshammary, T. M., Zubaidi, S. Al, Shammery, F. Al, & Siddiqui, A. A. (2020). *Oral Health-related Knowledge and Assessment of Oral Health Status of Diabetic Patients Attending Dental Clinics at College of Dentistry , Hail , Saudi Arabia*. January. <https://doi.org/10.5005/jp-journals-10024-2729>
- Mian, R. I., Rashidi, F. F. H., Alshammary, T. M., Zubaidi, S. Al, Shammery, F. Al, Siddiqui, A. A., Amin, J., & Khan, R. S. (2020). Oral health-related knowledge and assessment of oral health status of diabetic patients attending dental clinics at college of dentistry, Hail, Saudi Arabia. *Journal of Contemporary Dental Practice*, 21(1), 78–82. <https://doi.org/10.5005/jp-journals-10024-2729>

- Mikki, N., & Mactaggart, I. (2022). The prevalence of diabetic retinopathy in the occupied Palestinian territories: a national cross-sectional study. *The Lancet*, 399, S19. [https://doi.org/10.1016/s0140-6736\(22\)01154-0](https://doi.org/10.1016/s0140-6736(22)01154-0)
- Miller, A., & Ouanounou, A. (2020). Diagnosis, Management, and Dental Considerations for the Diabetic Patient. *Journal (Canadian Dental Association)*, 86, k8.
- Mohsin, S., Fawwad, A., Mustafa, N., Shoaib, A., & Basit, A. (2017). Impact of Type 2 Diabetes Mellitus on Oral Health Related Quality of Life among Adults in Karachi, Pakistan - A Cross-Sectional Study. *British Journal of Medicine and Medical Research*, 20(1), 1–7. <https://doi.org/10.9734/bjmmr/2017/31676>
- Moore, Paul A., et al. (2000). Diabetes and oral health promotion: a survey of disease prevention behaviors. *The Journal of the American Dental Association*, 131(9), 1333–1341.
- Mosleh, R. S. A., Jarrar, Y. B., Zyoud, S., & Morisky, D. E. (2017). Factors related to diabetes self-care management behaviors among patients with type II diabetes in Palestine. *Journal of Applied Pharmaceutical Science*, 7(12), 102–109. <https://doi.org/10.7324/JAPS.2017.71214>
- Niguse, H., Belay, G., Fisseha, G., Desale, T., & Gebremedhn, G. (2019). Self-care related knowledge, attitude, practice and associated factors among patients with diabetes in Ayder Comprehensive Specialized Hospital, North Ethiopia. *BMC Research Notes*, 12(1), 1–7. <https://doi.org/10.1186/s13104-019-4072-z>
- Nikbin, A., Bayani, M., Jenabian, N., khafri, S., & Motalebnejad, M. (2014). Oral health-related quality of life in diabetic patients: Comparison of the Persian version of Geriatric Oral Health Assessment Index and Oral Health Impact Profile: A descriptive-analytic study. *Journal of Diabetes and Metabolic Disorders*, 13(1), 1–10. <https://doi.org/10.1186/2251-6581-13-32>
- Niroomand, M., Ghasemi, S. N., Karimi-Sari, H., Kazempour-Ardebili, S., Amiri, P., & Khosravi, M. H. (2016). Diabetes knowledge, attitude and practice (KAP) study among Iranian in-patients with type-2 diabetes: A cross-sectional study. *Diabetes and Metabolic Syndrome: Clinical Research and Reviews*, 10(1), S114–S119. <https://doi.org/10.1016/j.dsx.2015.10.006>
- Norris S. L. (2005). Health-related quality of life among adults with diabetes. *Current diabetes*

- reports, 5(2), 124–130. <https://doi.org/10.1007/s11892-005-0039-7>
- Ong, K. L., Stafford, L. K., McLaughlin, S. A., Boyko, E. J., Vollset, S. E., Smith, A. E., Dalton, B. E., Duprey, J., Cruz, J. A., Hagins, H., Lindstedt, P. A., Aali, A., Abate, Y. H., Abate, M. D., Abbasian, M., Abbasi-Kangevari, Z., Abbasi-Kangevari, M., ElHafeez, S. A., Abd-Rabu, R., ... Vos, T. (2023). Global, regional, and national burden of diabetes from 1990 to 2021, with projections of prevalence to 2050: a systematic analysis for the Global Burden of Disease Study 2021. *The Lancet*, 402(10397), 203–234. [https://doi.org/10.1016/S0140-6736\(23\)01301-6](https://doi.org/10.1016/S0140-6736(23)01301-6)
- Osman, S. M., Khalifa, N., & Alhajj, M. N. (2018). Validation and comparison of the Arabic versions of GOHAI and OHIP-14 in patients with and without denture experience. *BMC oral health*, 18(1), 157. <https://doi.org/10.1186/s12903-018-0620-5>
- El Osta, N., Tubert-Jeannin, S., Hennequin, M., Bou Abboud Naaman, N., El Osta, L., & Geahchan, N. (2012). Comparison of the OHIP-14 and GOHAI as measures of oral health among elderly in Lebanon. *Health and quality of life outcomes*, 10, 131. <https://doi.org/10.1186/1477-7525-10-131>
- Pérez-Losada, F. L., Estrugo-Devesa, A., Castellanos-Cosano, L., Segura-Egea, J. J., López-López, J., & Velasco-Ortega, E. (2020). Apical Periodontitis and Diabetes Mellitus Type 2: A Systematic Review and Meta-Analysis. *Journal of clinical medicine*, 9(2), 540. <https://doi.org/10.3390/jcm9020540>
- Palestinian Ministry of Health. (2022). *Health Annual Report* (Vol. 11, Issue 1). <http://link.springer.com/10.1007/978-3-319-59379-1%0Ahttp://dx.doi.org/10.1016/B978-0-12-420070-8.00002-7%0Ahttp://dx.doi.org/10.1016/j.ab.2015.03.024%0Ahttps://doi.org/10.1080/07352689.2018.1441103%0Ahttp://www.chile.bmw-motorrad.cl/sync/showroom/lam/es/>
- Parakh, M. K., Kasi, A., Ayyappan, V., & Subramani, P. (2020). Knowledge and Awareness of Oral Manifestations of Diabetes Mellitus and Oral Health Assessment among Diabetes Mellitus Patients- A Cross Sectional Study. *Current diabetes reviews*, 16(2), 156–164. <https://doi.org/10.2174/1573399815666190502112603>
- PCBS Palestine. (2023). *Annual report 2023*. https://www.pcbs.gov.ps/portals/_pcbs/PressRelease/Press_En_GDPNAQ022023E.pdf, Accessed June 8, 2024

- Pitiphat, W., Garcia, R. I., Douglass, C. W., & Joshipura, K. J. (2002). Validation of self-reported oral health measures. *Journal of Public Health Dentistry*, 62(2), 122–128. <https://doi.org/10.1111/j.1752-7325.2002.tb03432.x>
- Poudel, P., Griffiths, R., Arora, A., Wong, V. W., Flack, J. R., Barker, G., & George, A. (2021). Oral health status, knowledge and behaviours of people with diabetes in Sydney, Australia. *International Journal of Environmental Research and Public Health*, 18(7), 1–15. <https://doi.org/10.3390/ijerph18073464>
- Poudel, P., Griffiths, R., Wong, V. W., Arora, A., Flack, J. R., Khoo, C. L., & George, A. (2018). Oral health knowledge, attitudes and care practices of people with diabetes: A systematic review. *BMC Public Health*, 18(1), 1–12. <https://doi.org/10.1186/s12889-018-5485-7>
- Poudel, P., Griffiths, R., Wong, V. W., Arora, A., & George, A. (2017). Knowledge and practices of diabetes care providers in oral health care and their potential role in oral health promotion: A scoping review. *Diabetes Research and Clinical Practice*, 130, 266–277. <https://doi.org/10.1016/j.diabres.2017.06.004>
- Poudel, P., Rawal, L. B., Kong, A., Yadav, U. N., Sousa, M. S., Karmacharya, B., Pradhan, S., & George, A. (2022). Oral Health Knowledge, Attitudes and Practices of People Living with Diabetes in South Asia: A Scoping Review. *International Journal of Environmental Research and Public Health*, 19(21), 1–21. <https://doi.org/10.3390/ijerph192113851>
- Preshaw, P. M., Alba, A. L., Herrera, D., Jepsen, S., Konstantinidis, A., Makrilakis, K., & Taylor, R. (2012). Periodontitis and diabetes: A two-way relationship. *Diabetologia*, 55(1), 21–31. <https://doi.org/10.1007/s00125-011-2342-y>
- Preshaw, Philip M., & Bissett, S. M. (2019). Periodontitis and diabetes. *British Dental Journal*, 227(7), 577–584. <https://doi.org/10.1038/s41415-019-0794-5>
- Ramadan., D. A., Almadani., A., Aljohani., O., & Amara., K. (2017). Diabetic Patients Knowledge, Attitude and Practice Toward Periodontal Health. *International Journal of Advanced Research*, 5(1), 2749–2753. <https://doi.org/10.21474/ijar01/3068>
- Rav-Marathe, K. S. R. on the K.-O. F. for D. E. and R., Wan, T. T. H., & Marathe, S. (2016). a Systematic Review on the Kap-O Framework for Diabetes Education and Research. *Medical Research Archives*, 4(1), 1–21., <https://esmed.org/MRA/images/sidebar/pdf/483-1710-1-PB.pdf>

- Riaz, F., Ehsan, A., Raza, A., Abdullah, U., Mehdi, M. M., & Sahu, E. H. (2022). Impact of Demographic Factors on Oral Health Knowledge and Attitude of patients with Type II Diabetemellitus Visiting A THQ Hospital in Punjab, Pakistan. *Pakistan Journal of Medical & Health Sciences*, 16(10), 247–250. <https://doi.org/10.53350/pjmhs221610247>
- Rockville (MD): Agency for Healthcare Research and Quality (US). (2021). *2021 National Healthcare Quality and Disparities Report*. ACCESS TO HEALTHCARE AND DISPARITIES IN ACCESS. <https://www.ncbi.nlm.nih.gov/books/NBK578537/>
- Sadeghi, D., Motlagh, M. K., Darvish, A., Daryaafzoon, M., Mohamadnejad, E., Molaei, A., Montazerlotf, P., & Hosseini, R. S. S. (2024). Comparative effect of physical health training and psychological training of the theory of reasoned action (TRA) model on the life quality of patients with diabetes in Tehran, Iran: utilization of message texting. *BMC Endocrine Disorders*, 24(1), 1–12. <https://doi.org/10.1186/s12902-024-01598-1>
- Sadeghi, R., Taleghani, F., & Farhadi, S. (2014). Oral health related quality of life in diabetic patients. *Journal of Dental Research, Dental Clinics, Dental Prospects*, 8(4), 230–234. <https://doi.org/10.5681/joddd.2014.41>
- Saengtibovorn, S., & Taneepanichskul, S. (2014). Knowledge , Attitude , and Practice (Kap) Toward Oral Health and Diabetes Mellitus Among the Elderly With Type 2 Diabetes ., *Journal of Health Research*, 28(6), 433–441. <http://www.jhealthres.org>
- Saengtibovorn, S., & Taneepanichskul, S. (2015). Lifestyle Change Plus Dental Care (LCDC) program improves knowledge, attitude, and practice (KAP) toward oral health and diabetes mellitus among the elderly with type 2 diabetes. *Journal of the Medical Association of Thailand = Chotmai het thangphaet*, 98(3), 279–290.
- Salameh, B. S., Abdallah, J., & Naerat, E. O. (2020). Case-Control Study of Risk Factors and Self-Care Behaviors of Foot Ulceration in Diabetic Patients Attending Primary Healthcare Services in Palestine. *Journal of Diabetes Research*, 2020. <https://doi.org/10.1155/2020/7624267>
- Shanbhag, S., Dahiya, M., & Croucher, R. (2012). The impact of periodontal therapy on oral health-related quality of life in adults: a systematic review. *Journal of clinical periodontology*, 39(8), 725–735. <https://doi.org/10.1111/j.1600-051X.2012.01910.x>
- González-Moles, M. Á., & Ramos-García, P. (2021). State of Evidence on Oral Health Problems in Diabetic Patients: A Critical Review of the Literature. *Journal of clinical*

- medicine, 10(22), 5383. <https://doi.org/10.3390/jcm10225383>
- Schierz, O., Baba, K., & Fueki, K. (2021). Functional oral health-related quality of life impact: A systematic review in populations with tooth loss. *Journal of Oral Rehabilitation*, 48(3), 256–270. <https://doi.org/10.1111/joor.12984>
- Sergeant, E. (2018). *Epitools, Sample size*. <http://epitools.ausvet.com.au>, Accessed September 22, 2022
- Shaikh, H., & Badar, A. (2023). Poor Oral Health Care Practices by Diabetic Patients. *Pakistan Journal of Medicine and Dentistry*, 12(4), 37–44. <https://doi.org/10.36283/pjmd12-4/008>
- Al Shamrany M. (2006). Oral health-related quality of life: a broader perspective. *Eastern Mediterranean health journal = La revue de sante de la Mediterranee orientale = al-Majallah al-sihhiyah li-sharq al-mutawassit*, 12(6), 894–901.
- Shawahna, R., Samaro, S., & Ahmad, Z. (2021). Knowledge, attitude, and practice of patients with type 2 diabetes mellitus with regard to their disease: a cross-sectional study among Palestinians of the West Bank. *BMC Public Health*, 21(1), 1–13. <https://doi.org/10.1186/s12889-021-10524-2>
- Ship, J. A. (2003). Diabetes and oral health: an overview. *Journal of the American Dental Association (1939)*, 134 Spec N, 4S-10S. <https://doi.org/10.14219/jada.archive.2003.0367>
- Siddiqi, A., Zafar, S., Sharma, A., & Quaranta, A. (2022). Diabetes mellitus and periodontal disease: The call for interprofessional education and interprofessional collaborative care - A systematic review of the literature. *Journal of Interprofessional Care*, 36(1), 93–101. <https://doi.org/10.1080/13561820.2020.1825354>
- Sischo, L., & Broder, H. L. (2011). Oral health-related quality of life: What, why, how, and future implications. *Journal of Dental Research*, 90(11), 1264–1270. <https://doi.org/10.1177/0022034511399918>
- Sitlinger, A., & Zafar, S. Y. (2018). Health-Related Quality of Life: The Impact on Morbidity and Mortality. *Surgical Oncology Clinics of North America*, 27(4), 675–684. <https://doi.org/10.1016/j.soc.2018.05.008>
- Sohal, K. S., Kambole, R., & Owibingire, S. S. (2024). Oral Health-Related Knowledge, Attitudes, and Practices of Diabetic Patients in Tanzania. *International Dental Journal*, 0, 1–7. <https://doi.org/10.1016/j.identj.2024.06.006>

- Statistics Canada. (2024). *Health problems, self-reported of person*. <https://www23.statcan.gc.ca/imdb/p3Var.pl?Function=DEC&Id=82429>, Accessed October 22, 2024
- Sun, J., Tong, D., Sun, C., Wang, X., Zuo, Z., Liu, Y., Qi, L., Kong, L., Luan, X., & Meng, J. (2023). Knowledge, attitude, and practice toward self-control of dental plaque among patients with periodontal diseases: a cross-sectional study. *BMC Oral Health*, *23*(1), 1–10. <https://doi.org/10.1186/s12903-023-03352-w>
- Surlari, Z.; Ciurcanu, O.E.; Budala, D.G.; Butnaru, O.; Luchian, I. (2023). An Update on the Interdisciplinary Dental Care Approach for Geriatric Diabetic Patients. *Geriatrics*, *8*, 114. <https://doi.org/10.3390/geriatrics8060114>
- Taylor, G. W., & Borgnakke, W. S. (2008). Periodontal disease: associations with diabetes, glycemic control and complications. *Oral Diseases*, *14*(3), 191. <https://doi.org/10.1111/j.1601-0825.2008.01442.x>
- Tibeica, S. C., Virvescu, D. I., Lupu, I. C., Budala, D. G., Luchian, I., Tibeica, A., Surlari, Z., & Carausu, E. M. (2024). Patients' Satisfaction Regarding Oral Healthcare Services in the North-East Region of Romania: A Preliminary Questionnaire Survey. *Healthcare (Switzerland)*, *12*(12). <https://doi.org/10.3390/healthcare12121195>
- Tietjen, A. K., Ghandour, R., Mikki, N., Jerdén, L., Eriksson, J. W., Norberg, M., & Husseini, A. (2021). Quality of life of type 2 diabetes mellitus patients in Ramallah and al-Bireh Governorate–Palestine: a part of the Palestinian diabetes complications and control study (PDCCS). *Quality of Life Research*, *30*(5), 1407–1416. <https://doi.org/10.1007/s11136-020-02733-w>
- Tonetti, M. S., Van Dyke, T. E., & working group 1 of the joint E. workshop. (2013). Periodontitis and atherosclerotic cardiovascular disease: consensus report of the Joint EFP/AAP Workshop on Periodontitis and Systemic Diseases. *Journal of Periodontology*, *84*(4 Suppl). <https://doi.org/10.1902/jop.2013.1340019>
- Torrijos-gómez, G., & González-serrano, J. (2016). *Quality of life and oral health in elderly*. November. <https://doi.org/10.4317/jced.53317>
- Usmani, W., de Courten, M., & Hanna, F. (2024). Can oral health care be a gateway to improve cardiovascular disease? A scoping review. *Frontiers in Oral Health*, *5*(May). <https://doi.org/10.3389/froh.2024.1364765>

- Vaddi, J. K., Jesija, J. S., Prasad, J. D., Kattula, D., Paul, G. J. S., & Prasad, J. H. (2024). Assessment of Oral Health Status and Factors Associated with Oral Health-related Quality of Life among Geriatric Population in Rural South India – A Community-based Cross-sectional Study. *Journal of the Indian Academy of Geriatrics*, 20(1), 3–11. https://doi.org/10.4103/jiag.jiag_7_24
- Verhulst, M. J. L., Teeuw, W. J., Gerdes, V. E. A., & Loos, B. G. (2019). Self-reported oral health and quality of life in patients with type 2 diabetes mellitus in primary care: A multi-center cross-sectional study. *Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy*, 12, 883–899. <https://doi.org/10.2147/DMSO.S207087>
- Wang, C. X., Ma, L. L., Yang, Y., Xu, M. R., Wang, X., Feng, X. P., Tai, B. J., Hu, D. Y., Lin, H. C., Wang, B., Zheng, S. G., Liu, X. N., Rong, W. S., Wang, W. J., Si, A., & Li, Z. X. (2018). Oral Health Knowledge, Attitudes, Behaviour and Oral Health Status of Chinese Diabetic Patients Aged 55 to 74 Years. *The Chinese Journal of Dental Research : The Official Journal of the Scientific Section of the Chinese Stomatological Association (CSA)*, 21(4), 267–273. <https://doi.org/10.3290/j.cjdr.a41085>
- Wang, Y., Zhu, J., Xu, Z., Dai, X., Chen, K., & Wang, Y. (2023). Social support, oral health knowledge, attitudes, practice, self-efficacy and oral health-related quality of life in Chinese college students. *Scientific Reports*, 13(1), 1–10. <https://doi.org/10.1038/s41598-023-39658-6>
- WHO A. (2023). *Noncommunicable diseases*. <http://www.emro.who.int/noncommunicable-diseases/diabetes/index.html>, Accessed December 24, 2024
- WHO B. (2023). *Oral Health Programme*. <https://www.who.int/teams/noncommunicable-diseases/ncds-management/oral-health-programme>, Accessed December 24, 2024
- Wolf, T. G., Cagetti, M. G., Fisher, J. M., Seeberger, G. K., & Campus, G. (2021). Non-communicable Diseases and Oral Health: An Overview. *Frontiers in Oral Health*, 2(September), 1–6. <https://doi.org/10.3389/froh.2021.725460>
- World Diabetes Foundation. (2024). *Palestine national diabetes programme, Palestine*. <https://www.worlddiabetesfoundation.org/what-we-do/projects/wdf15-1304/>, Accessed November 11, 2024
- World Health Organization. (2003). The World Oral Health Report 2003. *Community Dentistry and Oral Epidemiology*, 31 Suppl 1, 3–23. <https://www.who.int/publications/i/item/WHO->

- World Health Organization. (2022). *Global oral health status report: towards universal health coverage for oral health by 2030*. <https://www.who.int/publications/i/item/9789240061484>, Accessed December 21,2024
- Wu, C. Z., Yuan, Y. H., Liu, H. H., Li, S. S., Zhang, B. W., Chen, W., An, Z. J., Chen, S. Y., Wu, Y. Z., Han, B., Li, C. J., & Li, L. J. (2020). Epidemiologic relationship between periodontitis and type 2 diabetes mellitus. *BMC oral health*, 20(1), 204. <https://doi.org/10.1186/s12903-020-01180-w>
- Zakaria, O., Yasser, M., Daoud, I., & Zakaria, O. M. (2021). *Dental and Oral Problems among Diabetic Patients: A Developing Country -Local Perceptual Study*. May. <https://doi.org/10.21276/apjhs.2021.8.2.14>
- Zeng, Y., Hu, X., Li, Y., Zhen, X., Gu, Y., Sun, X., & Dong, H. (2019). The quality of caregivers for the elderly in long-term care institutions in Zhejiang province, China. *International Journal of Environmental Research and Public Health*, 16(12). <https://doi.org/10.3390/ijerph16122164>
- Zheng, S., Zhao, L., Ju, N., Hua, T., Zhang, S., & Liao, S. (2021). Relationship between oral health-related knowledge, attitudes, practice, self-rated oral health and oral health-related quality of life among Chinese college students: a structural equation modeling approach. *BMC Oral Health*, 21(1), 1–11. <https://doi.org/10.1186/s12903-021-01419-0>
- Zyoud, S. H., Al-Jabi, S. W., Sweileh, W. M., Arandi, D. A., Dabeek, S. A., Esawi, H. H., Atyeh, R. H., Abu-Ali, H. A., Sleet, Y. I., Abd-Alfatah, B. M., & Awang, R. (2015). Relationship of treatment satisfaction to health-related quality of life among Palestinian patients with type 2 diabetes mellitus: Findings from a cross-sectional study. *Journal of Clinical and Translational Endocrinology*, 2(2), 66–71. <https://doi.org/10.1016/j.jcte.2015.03.002>

Appendices

Appendix 1: Consent form of participants

Appendix 2: Questionnaire of the study

Appendix 3: Approval from Al Quds University Research Ethical Committee

Appendix 4: Approval from the MoH

Appendix 5: Approval from the MoH for the data collection team

Appendix 1: Consent form of participants

استبانة لمرضى السكري النوع الثاني لأعمار ≤ 40 سنة

عنوان البحث: معرفة مرضى السكري، ومواقفهم وممارساتهم تجاه صحة الفم وتأثيرها على جودة الحياة في الفم في الضفة الغربية

نموذج الموافقة

عزيزي/تي المشارك/ة:

من ضمن متطلبات رسالة الماجستير في الصحة العامة - جامعة القدس للطالبة د. ايمان وهبه/ طبيبة اسنان، نود دعوتك للمشاركة في هذا البحث والذي يهدف إلى دراسة جودة الحياة المتعلقة بصحة الفم وعلاقتها بمعرفة مريض السكري عن مرضه ومواقفه وممارساته للعناية بصحة الفم والاسنان بالإضافة الى العوامل الأخرى التي قد يكون لها تأثير وذلك في عيادات الصحة الأولية في وزاره الصحة في عام 2023 \ 2024. سوف يتم مقابلة كل مشترك/ة وسؤاله/ها مجموعة من الأسئلة لتعبئة الاستبانة. كما سيتم الحصول على معلومات من ملفك الشخصي في العيادة.

ستستخدم نتائج هذه الدراسة بهدف البحث العلمي والتي ستساعد في التخطيط للتوعية وزيادة المعرفة لدى مرضى السكري عن علاقة مرضهم بصحة الفم والاسنان. نرجو من حضرتك الموافقة على فتح ملفك الشخصي واستخدام البيانات المسجلة بداخله، وايضا الموافقة على المشاركة وذلك بإتمام المقابلة والتي تتضمن إجابتك الدقيقة والموضوعية على الاسئلة المطروحة من قبل الباحثة أو أحد مساعديها. نضمن لحضرتك السرية التامة في المعلومات التي ستقدمها/ ستقدمينها للبحث ولك الحرية التامة في عدم ذكر اسمك أو عدم الإجابة عن أي سؤال يطرح عليك ولك كامل الحرية في الانسحاب متى شئت من الدراسة وإنهاء المقابلة والمغادرة في أي وقت، دون أي التزام. وبناء عليه أوافق على المشاركة في هذه الدراسة.

عيادة الصحة الأولية في محافظة:

القدس

رام الله والبيرة

بيت لحم

الخليل

نابلس

جنين

طولكرم

القسم الاول: يحتوي هذا القسم على جزئين لمعلومات تعتبر مرجعية عامة
(أ) البيانات الاجتماعية والديموغرافية

(1) الجنس (الجندر)

ذكر

انثى

(2) العمر بالسنوات: -----

(3) الحالة الاجتماعية

متزوج/ة

مطلق/ة

أرمل/ة

أعزب/ أعزباء

(4) ما هو عدد أفراد الأسرة المقيمة في منزلك الحالي (بمن فيهم انت): -----

(5) مكان الإقامة

قرية

مدينة

مخيم

غير ذلك، -----

(6) المستوى التعليمي

غير متعلم/ة

ابتدائي (6-1)

اعدادي (7-10)

ثانوي (11-12)

كلية

جامعة

(7) العمل الحالي

اعمل بدوام كامل

اعمل بدوام جزئي

لا اعمل حالياً

متقاعد

ربة منزل

(8) ما هو معدل الدخل الشهري للأسرة (بالشيكل)؟

1000 أقل من

1000-1999

2000-2999

3000-3999

4000 أكثر من

ب) البيانات المتعلقة بالتاريخ المرضي والحالة الصحية

*** التدخين**

1 هل انت مدخن/ة

نعم، مدخن/ة حاليا

لا، مدخن/ة سابقا

لا ابدأ

في حالة الإجابة كانت مدخن سابقا، انتقل الى أسئلة التدخين السابق، اما في حالة الإجابة كانت لا ابدأ، انتقل الى أسئلة التغذية.

2 ما هو نوع التدخين؟

السجائر

السيجار

الغليون

النرجيلة

السيجارة الالكترونية

أكثر من نوع

جميع الخيارات

غير ذلك، -----

3 كم من الوقت مضى عليك وأنت تدخن؟

سنوات 1-5

سنوات 6-10

سنة 11-15

أكثر من 15 سنة

4 هل فكرت يوما في الاقلاع عن التدخين؟

لا

نعم

5 في حالة التدخين السابق، ما هي مدة الاقلاع عن التدخين؟

سنوات 1-5

سنوات 6-10

سنة 11-15

أكثر من 15 سنة

(6) في حالة التدخين السابق، ما هو سبب توقفك عن التدخين؟

سبب صحي (مرضي)

نصيحة أقارب

سبب عائلي

سبب اقتصادي

غير ذلك

* التغذية

(1) لا تعد الخضار والفواكه جزءا من نظامك الغذائي

دائما

غالبا

أحيانا

نادرا

ابدا

(2) هل تكثر من تناول الحلويات والسكريات؟

دائما

غالبا

أحيانا

نادرا

ابدا

(3) هل تكثر من تناول الدهون أو الزيوت (زيوت نباتية، زبدة، سمنة وغيرها)؟

دائما

غالبا

أحيانا

نادرا

ابدا

الامراض المزمنة

1 هل تعاني من أي من الامراض التالية

لا	نعم	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	امراض القلب والشرابيين
<input type="checkbox"/>	<input type="checkbox"/>	ارتفاع ضغط الدم
<input type="checkbox"/>	<input type="checkbox"/>	امراض الجهاز التنفسي (مثل الربو وغيرها)
<input type="checkbox"/>	<input type="checkbox"/>	التهاب المفاصل (الروماتيزم)
<input type="checkbox"/>	<input type="checkbox"/>	جلطات دماغية
<input type="checkbox"/>	<input type="checkbox"/>	الكوليسترول
<input type="checkbox"/>	<input type="checkbox"/>	امراض ومشاكل بالعيون
<input type="checkbox"/>	<input type="checkbox"/>	امراض الغدد

السكري

1 التاريخ العائلي للإصابة بمرض السكري

لا يوجد

أقارب من الدرجة الأولى

أقارب من الدرجة الثانية

لا أعرف

2 معدل السكر التراكمي: -----

3 متى كان آخر اختبار لمعدل السكر التراكمي

1-3 أشهر

أكثر من 3 أشهر

4) حالة مرض السكري (اعتماداً على معدل السكري التراكمي)

مضبوط (معدل السكر التراكمي أقل من 7)

غير متحكم فيه (معدل السكر التراكمي أكثر من 7)

5) مدة مرض السكري بالسنوات

سنوات 1-5

سنوات 6-10

سنة 11-15

أكثر من 15 سنة

6) هل تأخذ علاج لمرض السكري؟

لا

نعم

7) نوع العلاج

حمية غذائية موصوفة من الطبيب

أقراص لعلاج السكري موصوفة من الطبيب عن طريق الفم

الأنسولين

جميع العلاجات معاً

لا اخذ العلاج

8) نوع اقراص علاج السكري والمدة: -----

9) نوع الانسولين والمدة: -----

10) هل لاحظت أيًا من التغيرات المذكورة في فمك مؤخرًا

لست متأكدًا	لا	نعم	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	تسوس الاسنان
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	فقدان الاسنان
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	جفاف الفم
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	نزيف اللثة
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	تقرحات، خراج، حساسية الاسنان

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	رائحة فم كريهة
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	فطريات
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	التهاب بالفم
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	شعور بالحرقنة بالفم (متلازمة الفم الحارق)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	تغير في مذاق الطعام

*** إمكانية الوصول إلى الخدمات الصحية**

1 هل شاركت في برامج تعليمية لمرضى السكري من قبل؟

لا

نعم

2 هل سبق لك أن تحدثت مع طبيبك عن مرض السكري وصحة الفم

لا

نعم

3 هل سبق لك أن تحدثت إلى طبيب أسنانك عن مرض السكري لديك

لا

نعم

4 متى كانت آخر زيارة لطبيب الأسنان؟

أقل من 6 أشهر

شهرا 6-12

اكثر من سنة واحدة

لا أזור طبيب الاسنان

5 سبب زيارة طبيب الأسنان

فحص روتيني

علاجات تجميلية

علاج (حشوات)

ألم

لا أزور طبيب الاسنان

غير ذلك، -----

*الخدمات الصحية

1) ما هو المصدر الرئيسي لحصولك على الخدمات الصحية؟

وزارة الصحة (العيادات والمراكز)

وكالة الغوث الدولية(الأونروا)

القطاع الخاص

لا اعرف

غير ذلك

2) هل لديك تأمين صحي؟

لا

نعم

لا اعرف

3) نوع التأمين

عام(حكومي)

خاص

لا اعرف

غير ذلك

4) بصفة عامة هل أنت راض عن الخدمات الصحية المقدمة من هذا المصدر؟

لا

نعم

لا اريد الإجابة

(5) اجب عما يلي ب نعم إذا كنت راضي او لا إذا كنت غير راضي؟

لا	نعم	
<input type="checkbox"/>	<input type="checkbox"/>	موقع المركز
<input type="checkbox"/>	<input type="checkbox"/>	معاملة الطبيب
<input type="checkbox"/>	<input type="checkbox"/>	معاملة الكوادر الصحية
<input type="checkbox"/>	<input type="checkbox"/>	توافر الادوية
<input type="checkbox"/>	<input type="checkbox"/>	تواجد الطبيب خلال ساعات الدوام
<input type="checkbox"/>	<input type="checkbox"/>	كفاءة الكوادر الصحية
<input type="checkbox"/>	<input type="checkbox"/>	توفر التخصصات الرئيسية
<input type="checkbox"/>	<input type="checkbox"/>	توفر الخدمات المساندة (مختبر، اشعة، الخ)
<input type="checkbox"/>	<input type="checkbox"/>	فترة الانتظار
<input type="checkbox"/>	<input type="checkbox"/>	التكلفة

القسم الثاني: مستوى المعرفة بصحة الفم والاسنان

من فضلك اجب عن الاسئلة التالية اعتمادا على معرفتك بالعناية بصحة الفم والاسنان، ولا داعي للقلق إذا كنت لا تعرف الإجابة

خطأ	صح	
<input type="checkbox"/>	<input type="checkbox"/>	1. الاشخاص المصابون بداء السكري أكثر عرضة للإصابة بأمراض اللثة والأنسجة الداعمة للأسنان
<input type="checkbox"/>	<input type="checkbox"/>	2. لا توجد علاقة بين الإصابة بأمراض اللثة والأنسجة الداعمة للأسنان وزيادة مستوى السكر في الدم
<input type="checkbox"/>	<input type="checkbox"/>	3. لا يؤدي مرض السكري الى رائحة فم كريهة
<input type="checkbox"/>	<input type="checkbox"/>	4. الاشخاص المصابون بداء السكري أكثر عرضه للإصابة بجفاف الفم
<input type="checkbox"/>	<input type="checkbox"/>	5. لا يعاني عادة مرضى السكري من فطريات الفم
<input type="checkbox"/>	<input type="checkbox"/>	6. ترتفع نسبة الإصابة بتسوس الاسنان لدى مرضى السكري بسبب جفاف الفم
<input type="checkbox"/>	<input type="checkbox"/>	7. مرض السكري لا يعتبر سبب من أسباب فقدان الاسنان عند المرضى
<input type="checkbox"/>	<input type="checkbox"/>	8. تنظيم مستوى السكر في الدم قد يقي من الإصابة بأمراض الفم والاسنان لدى مرضى السكري
<input type="checkbox"/>	<input type="checkbox"/>	9. التدخين لا يعتبر عامل خطر لزيادة الإصابة بأمراض الفم والاسنان عند المرضى المصابين بداء السكري

<input type="checkbox"/>	<input type="checkbox"/>	10. هناك علاقة بين التهابات اللثة المزمنة وأمراض القلب والأوعية الدموية عند مرضى السكري
--------------------------	--------------------------	---

القسم الثالث: المواقف تجاه صحة الفم والأسنان

من فضلك الاجابة عن الاسئلة اعتمادا على موقفك بالنسبة للعناية بصحة الفم والأسنان ولا داعي للقلق إذا لم يكن لديك موقف بالنسبة لبعض الأمور

أوافق بشدة	أوافق	محايد	لا أوافق بشدة	لا أوافق بشدة
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

القسم الرابع: الممارسة حول نظافة الفم والأسنان

من فضلك أجب عن الأسئلة التالية اعتمادا على الممارسات التي تقوم بها بالنسبة للعناية بصحة الفم والأسنان

الممارسة حول نظافة الفم والأسنان

مرة واحدة يوميا على الأقل	نادرا	أحيانا	أبدا
---------------------------	-------	--------	------

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1. هل تقوم بتنظيف أسنانك باستخدام فرشاة الاسنان؟
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2. هل تستعمل خيط الاسنان؟

أحيانا	لا اعرف	لا	نعم	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3. هل تستخدم معجون الأسنان الذي يحتوي على مادة الفلورايد لتنظيف اسنانك؟
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	4. هل تستعمل غسول الفم(المضمضة)؟
		<input type="checkbox"/>	<input type="checkbox"/>	5. كيف تمسك فرشاة الاسنان عند تنظيف اسنانك، هل يمكنك ان تريني؟ (الطريقة الصحيحة بزاوية 45 درجة بحيث تلامس شعيرات الفرشاة طرف اللثة والاسنان)

6. كم من الوقت تستغرق في تفريش اسنانك؟

أقل من دقيقة

دقيقتين

أكثر من دقيقتين

لا اعرف/ لا أنظف اسناني

القسم الخامس: جودة الحياة المتعلقة بصحة الفم والاسنان

من فضلك أجب عن الأسئلة التالية اعتمادا على تأثير صحة الفم والاسنان على جودة الحياة المتعلقة بصحة الفم والاسنان (في السنة الماضية هل كان لديك مشاكل في أسنانك أو لثتك أو الطقم؟)

دائما	معظم الوقت	احيانا	نادرا	ابدا	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1. هل لديك مشكلة في النطق

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2. هل تشعر بسوء المذاق
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3. هل لديك ألم بالفم
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	4. تشعر بعدم الارتياح (صعوبة) عند الأكل
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5. شعور ذاتي ووعي بالمشكلة
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6. هل يوجد شعور بالقلق والتوتر
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7. هل أصبحت وجباتك متقطعة
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	8. هل تتناول غذاء غير مغذي
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	9. صعوبة الاسترخاء
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10. الشعور بالحرج والارتباك
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	11. حدة الطبع
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	12. هل تجد صعوبة في أداء الأعمال المعتادة
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	13. حياة غير مرضية
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	14. عدم قدرة على أداء الوظائف المطلوبة منك

Appendix 3: Approval from Al Quds University Research Ethical Committee

Al-Quds University
Jerusalem
School of Public Health

جامعة القدس
القدس
كلية الصحة العامة

التاريخ: 2022/1/24

عزيرتي الطالبة ايمان وهبة المحترمة
برنامج: الصحة العامة/مسار علم الاوبئة

الموضوع: موافقة لجنة اخلاقيات البحث العلمي

قامت اللجنة الفرعية لأخلاقيات البحث التابعة لكلية الصحة العامة بمراجعة مشروع الرسالة

بعنوان:

" Diabetic patients' knowledge, attitude and practices (KAP) about oral health and its effect on oral Quality of Life (QoL) in the West Bank: A cross-sectional study"

المقدم من (مشرف الرسالة/ د.الهام الخطيب).

يعتبر مشروعك مستوفياً لمتطلبات أخلاقيات البحث في جامعة القدس.

نتمنى لكم كل التوفيق في تسيير المشروع.

رئيسة لجنة اخلاقيات البحث
د. نهى الشريف

Faculty of Public Health

نسخة/ أعضاء لجنة البحث
نسخة/ الملف

Jerusalem Branch/Telefax 02-2799234

Appendix 4: Approval from the MoH

State of Palestine
Ministry of Health
Education in Health and Scientific
Research Unit



دولة فلسطين
وزارة الصحة
وحدة التعليم الصحي
والبحث العلمي

Ref.:
Date:.....

الرقم: ١٦٤/١٧٧/٢٠٢٢
التاريخ: ٢٠٢٢/١٠/٢٠

عظوفة الوكيل المساعد لشؤون الصحة العامة وصحة الاسرة المحترم،،،
تحية واحترام،،،

الموضوع: تسهيل مهمة بحث

مرفق طلب تسهيل مهمة الطالبة: ايمان ايمن وهبة- ماجستير صحة عامة/ جامعة القدس،
ويشرف د. الهام الخطيب، في عمل بحث علمي بعنوان:
'معرفة مرضى السكري، ومواقفهم وممارساتهم تجاه صحة الفم وتأثيرها على جودة الحياة في الفم
في الضفة الغربية'
من خلال السماح للطالبة بجمع معلومات من خلال تعبئة استبانة من المرضى عينة الدراسة
(بعد اخذ موافقتهم)، وذلك في:

- عيادات الرعاية في مديريات صحة: نابلس- جنين- طولكرم - القدس- رام الله والبيرة
- بيت لحم - الخليل - شمال الخليل - جنوب الخليل

على ان يتم الالتزام بالسياسات واخلاقيات البحث العلمي.
على ان يتم تزويد الوزارة بنسخة PDF من نتائج البحث، والتعهد بعدم النشر لحين الحصول على موافقة
الوزارة على نتائج البحث.

مع الاحترام،،،

د. عبد الله القواسمي
رئيس وحدة التعليم الصحي والبحث العلمي



نسخة: عميد كلية الصحة العامة المحترم/ جامعة القدس

Telfax.:09-2333901

scientificresearch.dep@gmail.com

تلفاكس: 09-2333901

Appendix 5: Approval from the MoH for the data collection team

State of Palestine
Ministry of Health
Education in Health and Scientific
Research Unit



دولة فلسطين
وزارة الصحة
وحدة التعليم الصحي
والبحث العلمي

Ref.:
Date:.....

الرقم: ٢٠٢٤ / ٢٩١ / ١٦٤
التاريخ: ٢٠٢٤ / ٤ / ٢٨

عطوفة الوكيل المساعد لشؤون الصحة العامة وصحة الاسرة المحترم،،،
تعبية واحترام،،،

الموضوع: تسهيل مهمة بحث

يرجى تسهيل مهمة الطالبة: ايمان ايمن وهبة- ماجستير صحة عامة/ جامعة القدس، وفريقها
البحثي: رند الزغير، ايهاب حميد، ميرنا مصطفى، زينة عيسى، عمر دويكات، عائشة نعييرات،
وبإشراف د. الهام الخطيب، في عمل بحث علمي بعنوان:
" معرفة مرضى السكري، ومواقفهم وممارساتهم تجاه صحة الفم وتأثيرها على جودة الحياة في الفم
في الضفة الغربية "
من خلال السماح للطالبة بجمع معلومات من خلال تعبئة استبانة من المرضى عينة الدراسة
والحصول على بعض نتائج الفحوصات من ملفاتهم(بعد اخذ موافقتهم)، وذلك في:
- عيادات الرعاية في مديريات صحة: نابلس- جنين- طولكرم - القدس- رام الله والبييرة
- بيت لحم - الخليل - شمال الخليل - جنوب الخليل
على ان يتم الالتزام باساليب واخلاقيات البحث العلمي.
على ان يتم تزويد الوزارة بنسخة PDF من نتائج البحث، والتعهد بعدم النشر لحين الحصول على موافقة
الوزارة على نتائج البحث.

مع الاحترام،،،



نسخة: عميد كلية الصحة العامة المحترم/ جامعة القدس

الملخص بالعربي

معرفة صحة الفم والمواقف والممارسات بين مرضى السكري وتأثيرها على جودة الحياة المرتبطة بصحة الفم: دراسة مقطعية

اعداد: ايمان ايمن رجائي وهبة

اشراف: د. الهام خطيب

ملخص الدراسة

الخلفية: مرض السكري، وهو حالة متعددة العوامل تتميز بارتفاع مستويات السكر في الدم، قد يؤدي إلى مضاعفات صحية خطيرة إذا لم يتم التحكم فيه. ومن تأثيراته الرئيسية، يساهم السكري في تدهور صحة الفم من خلال زيادة خطر الإصابة بأمراض اللثة، فقدان الأسنان، جفاف الفم، وتسوس الأسنان. تهدف هذه الدراسة إلى تقييم معرفة ومواقف وممارسات (KAP) مرضى السكري حول صحة الفم، وتحليل تأثير هذه العوامل على جودة حياتهم المرتبطة بصحة الفم (OHRQoL)، واستكشاف الروابط مع العوامل الاجتماعية والديموغرافية والسلوكية، وإدارة السكري، والوصول إلى الرعاية الصحية، والحالة الصحية العامة وصحة الفم.

المنهجية: اعتمدت الدراسة تصميمًا مقطعيًا باستخدام نهج أخذ عينات مختلطة، تجمع بين التجميع الجغرافي وأخذ العينات الملائمة. شملت الدراسة 510 مشاركًا، أعمارهم 40 سنة فأكثر، مصابين بداء السكري من النوع 2 ومرتابدين لمراكز الرعاية الصحية الأولية التابعة لوزارة الصحة. حصل المشاركون على موافقة شفوية وأكملوا استبيانًا منظمًا. تم تحليل البيانات باستخدام برنامج SPSS الإصدار 26، مع اعتبار الدلالة الإحصائية عند $P < 0.05$. شملت التحليلات وصفية، ثنائية، ومتعددة المتغيرات. تم استخدام اختباري Mann-Whitney U وKruskal-Wallis لتحليل الفروقات في KAP وOHRQoL بين المتغيرات، بينما تم استخدام معامل سبيرمان (Spearman's rho) لتحديد العلاقات بين KAP، OHRQoL، والعوامل المرتبطة. تم تحديد المؤثرات الرئيسية لجودة الحياة المتعلقة بصحة الفم (OHRQoL) عبر تحليل انحدار خطي متعدد تدرجي، مدعوم بالطريقة الأمامية، مع عرض النتائج كـ R^2 معدلة وفواصل ثقة 95% (CIs). أكدت التحليلات عدم وجود أي تعدد خطي.

النتائج: كان متوسط درجة OHIP-14 (OHRQoL) بين المشاركين 11.65 ± 17.84 (النطاق: 0-50)، مما يعكس جودة حياة متعلقة بصحة الفم معتدلة. كانت أكثر مشكلات صحة الفم التي تم الإبلاغ عنها شيوعاً هي جفاف الفم (62.2%) وفقدان الأسنان (48.6%) وتسوس الأسنان (46.1%). أظهر المشاركون مستويات معرفة معتدلة، بمتوسط درجة 2.07 ± 6.53 (المدى: 1-10)، ومواقف إيجابية، بمتوسط درجة 1.65 ± 4.88 (المدى: 0-6). ومع ذلك، كانت ممارسات نظافة الفم لديهم غير مفضلة بشكل عام، بمتوسط درجة 1.02 ± 1.99 (المدى: 0-6). لوحظت ارتباطات إيجابية كبيرة بين الممارسة والمعرفة ($P = 0.000$, $\rho = 0.160$)، والممارسة والموقف ($P = 0.000$, $\rho = 0.171$)، والمعرفة والموقف ($P = 0.000$, $\rho = 0.238$). كشف تحليل الانحدار عن العديد من العوامل التي تؤثر على جودة حياة صحة الفم والأسنان. ارتبط العمل بدوام كامل ($\beta = -0.125$, $P = 0.002$)، والدخل الأعلى ($\beta = -0.128$, $P = 0.001$)، والموقف الإيجابي ($\beta = -0.103$, $P = 0.009$) بتحسين جودة حياة الصحة الفموية. وعلى النقيض من ذلك، ارتبطت جودة حياة الصحة الفموية الأقل جودة بزيارات طبيب الأسنان في المقام الأول لتسكين الآلام ($\beta = 0.139$, $P = 0.000$)، والمناقشات مع أطباء الأسنان حول مرض السكري ومضاعفاته الفموية ($\beta = 0.200$, $P = 0.000$)، وسوء الحالة الصحية العامة ($\beta = 0.104$, $P = 0.011$)، وسوء حالة صحة الفم ($\beta = 0.299$, $P = 0.000$). وشملت المؤشرات الإضافية لتدهور جودة حياة الصحة والرفاهية في OHRQoL المستويات التعليمية المنخفضة ($\beta = 0.124$, $P = 0.002$)، وعدم وجود تاريخ عائلي للإصابة بمرض السكري ($\beta = 0.126$)، والفترات الطويلة (أكثر من ثلاثة أشهر) منذ اختبار الهيموجلوبين السكري ($\beta = 0.098$, $P = 0.001$)، والفترات الطويلة (أكثر من ثلاثة أشهر) منذ اختبار الهيموجلوبين السكري ($\beta = 0.098$, $P = 0.001$).

الخلاصة: وجدت هذه الدراسة أن الموقف الإيجابي هو أحد المؤشرات الرئيسية لجودة حياة الصحة العقلية لدى مرضى السكري، مما يسلب الضوء على أهمية السيطرة على مرض السكري وتحسين الوصول إلى الرعاية الصحية. كما تم تحديد التفاوتات الاجتماعية والاقتصادية التي تؤثر على نتائج جودة حياة الصحة العقلية. قد لا يكون نموذج KAP قابلاً للتطبيق بشكل كامل في مناطق الصراع، مما يشير إلى الحاجة إلى نماذج بديلة وطرق مختلطة في الأبحاث المستقبلية.

الكلمات المفتاحية: مرض السكري، جودة الحياة المتعلقة بصحة الفم، المعرفة، الموقف، الممارسة.