

cdr

Potential for behaviour change among Kenyan type 2 diabetes service users and to understand behaviour change from healthcare professionals' perspectives

Item Type	Thesis or dissertation
Authors	Waithaka, Eve N.
Citation	Waithaka, E. N. (2024). Potential for behaviour change among Kenyan type 2 diabetes service users and to understand behaviour change from healthcare professionals' perspectives [Unpublished doctoral thesis]. University of Chester.
Publisher	University of Chester
Rights	Attribution-NonCommercial-NoDerivatives 4.0 International
Download date	2026-05-15 04:17:54
Item License	http://creativecommons.org/licenses/by-nc-nd/4.0/
Link to Item	http://hdl.handle.net/10034/629386



University of
Chester

**Potential for behaviour change among
Kenyan type 2 diabetes service users and to
understand behaviour change from
healthcare professionals' perspectives**

**Thesis submitted in accordance with the requirements of
University of Chester for the degree of Doctor of Philosophy**

By

Eva Njambi Waithaka

Department of Clinical Sciences and Nutrition

University of Chester

2024

DECLARATION

This thesis reports research conducted at the University of Chester between 2020 and 2024 under the supervision of Professor Stephen Fallows. I Eva Waithaka confirm that the work submitted in this report is my own and information derived from other sources has been clearly stated

Signature:

A handwritten signature in black ink, appearing to be 'E. Waithaka', written on a light grey rectangular background.

Date: ...13.03.2024.....

Word Count (84, 338)

ACKNOWLEDGEMENT

I am most grateful to God for seeing me through this journey to its completion.

I am grateful to my supervisor Professor Stephen Fallows for his support, guidance and expert supervision throughout my study. Thank you for keeping me on my toes, your prompt and excellent feedback encouraged me a lot.

My sincere gratitude to my family. My dad who would have been so proud, my dear mum for belief in me and unwavering all round support, my elder sister, Elizabeth Waithaka and younger brother, John Waithaka for cheering me on, my beautiful daughter Ella and fiancé, Edward Chege, Thank you!

I also want to appreciate my friends and PhD student colleagues, Dr. Ifeanyi Nwaugochi and Dr. Ebbie Kpokiri, thank you for being part of my think tank and encouraging me through out.

ABSTRACT

Introduction: The rising type two diabetes mellitus (T2DM) prevalence is largely due to unhealthy dietary practices, lack of physical activity, economic development, urbanisation, and an ageing population. Management of T2DM involves pharmacological treatment and or lifestyle behaviour changes focusing on diet and physical activity behaviour modifications. Diet and physical activity behaviour modifications are crucial in T2DM management. However, behaviour change is complex and challenging and more so in diet and physical activity behaviours as these are influenced by a myriad of behavioural, social, emotional and environmental, neuroendocrine and genetic factors. Behaviour change thus remains one of the most significant public health concerns. Underpinning this research study is the continued challenge with behaviour change among T2DM service users that leads to development of T2DM related complications and even death. The purpose of this study was therefore to examine the likelihood to change behaviour so as to avoid T2DM related complications and to explore whether being in receipt of the recommended care services had any influence on likelihood to change behaviour. This is particularly important because numerous interventions have been carried out but while change may be initially noted, the positive behaviour is in many cases not sustained over time. The main impact of this study to provide an understanding on the influences of behaviour change as influenced by the health belief model and to explore hinderances to access to the diabetes recommended care services.

Methods: The study utilised a mixed-method approach to gain an in-depth comprehension of the topic. The target population for the study comprised of T2DM service users at the Thika Level 5 Hospital diabetes comprehensive clinic and healthcare professionals directly involved in T2DM management. Through power calculations, a sample size of 346 service users was determined. Forty three healthcare professionals were also included in the study as key informants. The inclusion criterion for the diabetes clinic service users was persons diagnosed with type two diabetes and aged 20-70. The inclusion criterion for the healthcare professionals was those who directly worked with service users with regards to behaviour change. Purposive sampling was used in selecting the participants for the study. The exclusion criterion for the service users was those who had type one diabetes or were aged below 20 or above 70 years. For the healthcare professionals, those not directly involved with type two diabetes service users behaviour change (diet and physical activity) were not included in the study. Questionnaires were used to collect quantitative data from the service users. Semi-structured individual interviews were used to collect data from the healthcare professionals. Quantitative data was coded and entered into the Statistical Package for Social Sciences, Version 28.0, for analysis. Qualitative data was entered into Nvivo 13 for thematic analysis.

Findings: Behaviour change among healthcare professionals and T2DM service users is based on four constructs of the health belief model: susceptibility to complications, intention to exercise, perceived benefits of exercise and health

eating and healthy eating intentions (likened to cues to action). Different factors that affect T2DM management are categorised into predisposing factors, reinforcing factors and enabling factors. Management processes of T2DM should include primary targets to prevent T2DM, primary targets towards promoting behaviour change, actions engaged in the management of T2DM, multi-sectorial approaches and actions by other sectors.

Conclusion: According to the study, behaviour change is perceived differently among healthcare professionals and service users. The study therefore recommends that tailored messages should be delivered to different categories of patients so as to enhance behaviour change. The health belief model should be adopted in crafting the messages so as to so as to effectively address complications (perceived susceptibility and severity) associated with T2DM, perceived barriers, perceived benefits, and self-efficacy for behaviour change to be effective. A “one size fits all” approach is not recommended when coming up with interventions towards behaviour change. Further, the study also concludes that policy makers in the Kenyan health system should consider predisposing factors, reinforcing factors and enabling factors towards T2DM management policy making. Since T2DM management involves different targets, the Kenyan health system should engage different stakeholders. A “one size fits all” approach is therefore not appropriate towards T2DM management.

TABLE OF CONTENTS

DECLARATION.....	ii
ACKNOWLEDGEMENT.....	iii
ABSTRACT.....	iv
TABLE OF CONTENTS.....	vi
LIST OF FIGURES.....	xii
LIST OF TABLES.....	xiii
LIST OF ABBREVIATIONS.....	xv
CHAPTER ONE: INTRODUCTION.....	1
1.1 Researcher’s Motivation.....	1
1.2 Background to the Study.....	1
1.3 Behaviour Change and Health.....	2
1.4 Health Behaviour Change in Developed and Developing Countries.....	3
1.4.1 Health Behaviour Change in Developed Countries.....	3
1.4.2 Health Behaviour Change in Developing Countries.....	5
1.5 Diabetes Introduction.....	9
1.5.1 Gestational Diabetes Mellitus.....	9
1.5.2 Type 1 Diabetes Mellitus.....	9
1.5.3 Type 2 Diabetes Mellitus.....	9
1.5.4 Symptoms.....	10
1.5.5 Risk Factors for T2DM.....	10
1.5.6 Screening.....	11
1.5.7 Diagnosis of T2DM.....	11
1.5.8 Pathophysiology of Diabetes Related Complications.....	12
1.5.9 Prevention of T2DM.....	13
1.5.10 The Burden of T2DM.....	15
1.6 Behaviour Change in Diabetes Management.....	17
1.7 Diabetes Care and Management in Kenya.....	18
1.7.1 The Health System in Kenya.....	18
1.7.2 Type Two Diabetes Management Policies in Kenya.....	20
1.8 Rationale for the Study.....	21
1.9 Purpose of the Study.....	21
1.10 Research Aim.....	22
1.10.1 Research Objectives.....	22
1.11 Thesis Structure.....	23
1.12 Types of Models/Theories of Behaviour Change in Health Psychology.....	24

1.12.1 Cognition Models	25
1.12.2 Protection Motivation Theory	27
1.12.2 Social Cognition Models.....	33
1.12.3 Stage Models.....	39
1.12.4 Integrated Theoretical Frameworks	46
1.13 Theory of Diabetes Care.....	50
1.13.1 Orem’s Theory of Self-Care.....	50
CHAPTER TWO: LITERATURE REVIEW	52
2.1 Introduction	52
2.2 Review Number 1: Systematic Review of Reviews of the Barriers and Facilitators of Behaviour Change in T2DM	52
2.2.1 Introduction	52
2.2.2 Review Aim.....	52
2.2.3 Objectives of the Review	53
2.2.4 Methods	53
2.2.5 Criteria for Considering Systematic Reviews for Inclusion	53
2.2.6 Search Strategy and Terms	53
2.2.7 Inclusion and Exclusion Criteria	54
2.2.8 Screening, Study Selection, Data Extraction and Quality Assessment	54
2.2.9 Selection of Review Studies	57
2.2.10 Results and Discussion	57
2.2.11 Strengths of the Review of Reviews	63
2.2.12 Limitations of the Review of Reviews	63
2.3 Review Number 2: Systematic Literature Review on Behaviour Change Predictors in Kenya Based on Theories of Behaviour Change	65
2.3.1 Introduction	65
2.3.2 Search Criteria.....	65
2.3.3 Objectives of the Systematic Literature Review	66
2.3.4 Data Analysis	70
2.3.5 Results	70
CHAPTER THREE: METHODOLOGY	77
3.1 Research Paradigms	77
3.1.1 Ontology.....	77
3.1.2 Epistemology.....	78
3.1.3 Methodology.....	80
3.1.4 Axiology.....	81
3.2 Paradigms.....	82

3.2.1 Positivism	82
3.2.2 Interpretivism.....	83
3.2.4 Critical Paradigm	84
3.2.5 Pragmatism	85
3.3 Quantitative, Qualitative and Mixed Methods Research Designs	86
3.3.1 Quantitative Research Design	86
3.3.2 Qualitative Research Design	87
3.3.3 Mixed Methods Research Design	88
3.4 Strategies of Inquiry	90
3.4.1 Quantitative Strategies	90
3.4.2 Qualitative Strategies.....	91
3.4.3 Mixed Methods Strategies	94
CHAPTER FOUR: RESEARCH METHODS.....	100
4.1 Introduction	100
4.2 Study Design-Mixed Methods.....	100
4.3 Study Location.....	101
4.4 Target Population.....	101
4.5 Sample Size and Sampling Techniques	102
4.5.1 Sample Size.....	102
4.5.2 Sampling Technique	103
4.6 Participant Inclusion and Exclusion Criteria.....	103
4.6.1 Inclusion Criteria	103
4.6.2 Exclusion Criteria.....	103
4.7 Research Tools	104
4.7.1 Questionnaires	104
4.7.2 Interview Guide.....	104
4.8 Pilot Study	105
4.9 Data Collection Procedures.....	106
4.10 Recruitment of Participants into Main Study	107
4.11 Methods of Data Analysis	108
4.11.1 Qualitative Data Analysis	108
4.11.2 Quantitative Data Analysis.....	110
4.12 Ethical Considerations.....	112
4.12.1 Research Approvals and Permits	113
4.12.2 Informed Consent	113
4.12.3 Care and Protection of Research Participants and Confidentiality	113

CHAPTER FIVE: QUALITATIVE ANALYSIS RESULTS.....	115
5.1 Introduction	115
5.2 Demographic Information of the Participants.....	115
5.3 Background on Behaviour Change.....	116
5.4 Strategic Relevance in Behaviour Change.....	120
5.5 Challenges Encountered in Behaviour Change	123
5.5.1 Resource Related Challenges	124
5.5.2 Information/Knowledge Related Challenges	126
5.5.3 Personal Characteristics Challenges	127
5.5.4 Norms/Beliefs/Culture	129
5.5.5 Facility Related Challenges.....	130
5.5.6 Social Support Related Challenges.....	131
5.5.7 Ignorance.....	132
5.5.8 Psychological Related Challenges	132
5.5.9 Medication Adherence Challenges	133
5.6 Factors Hindering Behaviour Change.....	134
5.6.1 Resource Factors.....	134
5.6.2 Facility Factors.....	135
5.6.3 Knowledge-Information Factors	137
5.6.4 Support Systems.....	137
5.6.5 Demographic Factors	138
5.6.6 Work-Related Factors	139
5.6.7 Ignorance.....	140
5.6.8 Norms, Culture and Beliefs	140
5.6.9 Inaccessibility to Behaviour Change Facilitation Items.....	141
5.6.10 Psychological Factors	141
5.7 Solutions for Prevention of T2DM	141
5.7.1 Primary Targets to Prevent T2DM	142
5.8 Primary Targets to Promote Behaviour Change among T2DM Service Users...	146
5.8.1 Information Dispensation, Education and Awareness.....	147
5.8.2 Support Groups	149
5.8.3 Emphasis on Routine Behaviour and Diet Changes	150
5.8.4 Financial and other Forms of Support	151
5.8.5 Monitoring, Screening and Follow-Ups	152
5.8.6 Grassroot Level Services	152
5.8.7 Training of Healthcare Workers.....	153

5.9 Actions that Healthcare Professionals are engaged in T2DM Management.....	153
5.9.1 Education, Awareness and Information Sharing	153
5.9.2 Extreme Cases Management	154
5.9.3 General Routine Management	156
5.9.4 Medication and General Consultancy on T2DM.....	157
5.9.5 Counselling.....	157
5.9.6 Nutrition Management	158
5.9.7 Screening and Monitoring.....	158
5.10 Actions that Could Contribute to a Multi-Sectorial Collaboration	158
5.10.1 Integrated Information and Support Management Systems for Holistic Care	159
5.10.2 Mass Education and Information Sharing.....	160
5.10.3 Medical Camps, Screening and Monitoring.....	161
5.10.4 Establishment of Extra Devolved Care Units	162
5.10.5 Community and Social Work.....	162
5.10.6 Policy Making	163
5.10.7 Training of Lower Cadre Health Professionals.....	163
5.10.8 Research and Specialised Centres.....	163
5.11 Actions by other Sectors/Departments/Organisations/Associations and People that Encourage and Support Behaviour Change among T2DM Service Users	164
5.11.1 Multi-Disciplinary Engagement.....	164
5.11.2 Support through Subsidies and Finances.....	166
5.11.3 Education, Awareness and Advocacy	167
5.11.4 Facilities and Specialised Employees	167
5.11.5 Wellness Clinics.....	168
5.11.6 Counselling.....	168
5.12 Barriers to Behaviour Change in T2DM	168
5.12.1 Facility-Related Barriers	169
5.12.2 Socio-Economic Barriers/Financial Barriers.....	171
5.12.3 Policy Barriers.....	172
5.12.4 Information, Knowledge and Awareness.....	174
5.12.5 Personal Barriers	175
5.12.6 Healthcare Provider Barriers.....	175
5.12.7 Psychological Barriers	175
5.12.8 Funding and Support.....	176
5.12.9 Non-Adherence to Medication	176
5.13 Conclusion of the Qualitative Findings	176

CHAPTER SIX: QUANTITATIVE ANALYSIS RESULTS	178
6.1 Introduction	178
6.2 General Information.....	178
6.3 Knowledge Assessment on T2DM.....	179
6.4 Relationship between Socio-Demographic Characteristics and Knowledge Level	182
6.5 Perceived Risk of Heart Attack/Stroke.....	182
6.6 Exploratory Factor Analysis.....	184
6.6.1 Exploratory Factor Analysis Explained	184
6.6.2 Exploratory Factor Analysis in this Study.....	185
CHAPTER SEVEN: DISCUSSION AND CONCLUSION	193
7.1 General Discussion	193
7.2 Conclusion	202
7.3 Recommendations	205
7.4 Anticipated Study Contribution	207
7.4.1 Contribution to Policy	207
7.4.2 Contribution to Knowledge.....	207
7.5 Limitations of the Study	208
LIST OF REFERENCES	209
Appendix 1: Questionnaire	241
Appendix 2: Interview Guide	247
APPENDIX 3a: Informed Consent Form- Service Users.....	249
APPENDIX 3b: Informed Consent Form- Healthcare professionals.....	253
Appendix 4: Consent Form.....	257
Appendix 5: Risk assessment	258
Appendix 6: Workplan.....	259
Appendix 7: Budget.....	260
Appendix 8: Participant Information Sheet (Service User)	261
Appendix 9: Participant Information Sheet (Healthcare Professionals).....	264
Appendix 10: Ethic Approval from Kenyatta University	268
Appendix 11: National Commission for Science, Technology and Innovation Research Permit	269
Appendix 12: Kiambu County Research Approval	270
Appendix 13: Thika Level 5 Hospital Research Approval	271
Appendix 14: Research Dissemination.....	272
Appendix 15: Summary of Review of Reviews.....	274
Appendix 16: Summary Table for Systematic Literature Review	280

LIST OF FIGURES

Figure 1.2: Structure of the Thesis	23
Figure 1.3: Behaviour Change according to the HBM.....	27
Figure 1.4: Schematic Representation of Protection Motivation Theory.....	31
Figure 1.5: Theory of Reasoned Action	33
Figure 1.6: Constructs of the Theory of Planned Behaviour.....	37
Figure 1.7: Transtheoretical Model of Behaviour Change; stages in bold and processes in boxes	45
Figure 2.1: PRISMA Flow Chart-Review of Reviews of Barriers and Facilitators of Behaviour Change in T2DM	56
Figure 2.2: PRISMA Flow Chart-Application of Behaviour Change Theories	69
Figure 3.1: Convergent Parallel Design	97
Figure 3.2: Procedure of Convergent Parallel Design	99

LIST OF TABLES

Table 1.1: Risk Factors for T2DM	11
Table 1.2: Regional % T2DM 2017, 2021 Prevalences and 2045 Projections.....	16
Table 1.3: Theories of Behaviour Change	24
Table 1.4: Constructs of the Health Belief Model.....	25
Table 1.5: Constructs of the Precaution Adoption Process Stage of Change Model.	40
Table 1.6: Stage Transitions Allowable in Precaution Adoption Process Model	40
Table 1.7: Factors that Influence Transitions in the Precaution Adoption Process Model	41
Table 1.8: Trans-Theoretical Model Stages of Change Applied to Physical Activity..	43
Table 1.9: Processes of Behaviour Change Applied to Physical Activity.....	44
Table 2.1: Framework of Systematic Review of Reviews of Barriers and Facilitators of Behaviour Change in T2DM Management	53
Table 2.2: Search Terms for Review of Reviews	54
Table 2.3: Search Terms with Synonyms	67
Table 5.1: Respondents' Understanding of Behaviour Change	116
Table 5.2: Strategic Relevance in Behaviour Change Sub-Themes.....	121
Table 5.3: Challenges Sub-Themes	124
Table 5.4: Sub-Themes on Factors Hindering Behaviour Change.....	134
Table 5.5: Solutions for T2DM Prevention and Management	142
Table 5.6: Primary Targets to Promote Behaviour Change	147
Table 5.7: Primary Targets to Promote Behaviour Change	153
Table 5.8: Actions that could Contribute to a Multi-Sectorial Collaboration	159
Table 5.9: Actions by others that Encourage and Support Behaviour Change among T2DM Service Users	164
Table 5.10: Barriers to Behaviour Change in T2DM.....	169
Table 6.1: Socio-Demographic Characteristics	179
Table 6.2: Knowledge Assessment Scores	181
Table 6.3: Overall Knowledge Score	181
Table 6.4: Breakdown of Individual Knowledge Scores	182
Table 6.5: Likert Scale Responses on Perceived Risks.....	183
Table 6.6: Bartlett's Sphericity Test and KMO Sampling Adequacy Measure for Perceived Risk of Heart Attack or Stroke	185

Table 6.7: Total Variance of Perceived Risk Explained by the Two Underlying Sub-Dimensions.....	186
Table 6.8: Items for Susceptibility to Heart Attack or Stroke	186
Table 6.9: Cronbach Alpha for Susceptibility to Heart Attack or Stroke	187
Table 6.10: Items for Threat of Heart Attack or Stroke	187
Table 6.11: Cronbach Alpha for Threat of Heart Attack or Stroke	187
Table 6.12: Bartlett’s Test of Sphericity and KMO Sampling Adequacy Measure for Perceived Benefits and Intentions to Change.....	188
Table 6.13: Total Variance of Perceived Benefits Explained by the Two Factors	188
Table 6.14: Item Loadings for Intention to Exercise	189
Table 6.15: Cronbach Alpha for Intention to Exercise	189
Table 6.16: Items for Perceived Benefits of Exercise and Healthy Eating	189
Table 6.17: Cronbach Alpha for Perceived Benefits of Exercise and Healthy Eating	190
Table 6.18: Barlett’s Test of Sphericity for Healthy Eating Intentions.....	190
Table 6.19: Total Variance of Healthy Eating Intentions Explained by the Factor ..	190
Table 6.20: Items Loading on Cues to Action.....	191
Table 6.21: Cronbach Alpha Reliability for Cues to Action	191

LIST OF ABBREVIATIONS

Abbreviation	Meaning
AMSTAR	Assessing the Methodological Quality of Systematic Reviews
BCC	Behaviour Change Communication
CBC	Competency Based Curriculum
COM-B	Capability, Opportunity, Motivation and behaviour
Covid-19	CoronaVirus Disease of 2019
DARE	Drug Abuse Resistance Education
DCC	Diabetes Comprehensive Centre/Clinic
DM	Diabetes Mellitus
EBF	Exclusive Breastfeeding
EFA	Exploratory Factor Analysis
FPG	Fasting Plasma Glucose
GDM	Gestational Diabetes Mellitus
HB	Haemoglobin
HBM	Health Belief Model
HDL	High Density Lipoprotein
HIV	Human Immuno-deficiency Virus
IDF	International Diabetes Federation
KMO	Kaiser-Meyer-Olkin
KNDS	Kenya National Diabetes Strategy
MDGs	Millennium Development Goals
MoH	Ministry of Health
NACOSTI	National Commission for Science, Technology and Innovation
NCDs	Non-Communicable Diseases
NHIF	National Hospital Insurance Fund
OGTT	Oral Glucose Tolerance Test
PAPM	Precaution Adoption Process Model
PHC	Primary Health Care
PICOS	Population, Intervention, Comparator, Outcome and Study design (PICOS)
PMT	Protection Motivation Theory
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-

	Analyses
PUFA	Polyunsaturated Fatty Acids
RCT	Randomised Control Trial
T1DM	Type 1 Diabetes Mellitus
T2DM	Type 2 Diabetes Mellitus
TDF	Theoretical Domain Framework
TL5H	Thika Level 5 Hospital
TPB	Theory Of Planned Behaviour
TRA	Theory of Reasoned Action
TTM	Trans-Theoretical Model
UK	United Kingdom
UN	United Nations
UoC	University of Chester
USA	United States of America
WHO	World Health Organization

CHAPTER ONE: INTRODUCTION

1.1 Researcher's Motivation

Throughout my career as a nutritionist in various settings, I witnessed firsthand the challenges communities face with regards to behaviour change. Later on during my MSc, I further learnt of the various theories of behaviour change that try to explain and predict behavioural patterns and I understood that behaviour change is complex and its influencing factors need to be considered when trying to enforce behaviour change in people. Type 2 diabetes further picked my interest as it is a condition whose management requires behaviour change (diet and physical activity) alongside pharmacological management to witness positive health outcomes otherwise the condition may lead to other morbidities and even mortality.

1.2 Background to the Study

Diabetes management is a dynamic and continuous process with unending new knowledge flow, treatment strategies' changes and changes in health care settings. The process also demands patients' active participation (Kunkes, 2022). Diabetes is among the non-communicable diseases whose prevalence all over the globe is steadily on the rise. According to Magliano et al. (2021), the expectation is for the trend to continue, with a forecasted increase from 537 million adults between the ages 20-79 years in 2021 to 643 million adults by 2030 and 783 million adults by 2045. Of all the cases of diabetes mellitus, type 2 diabetes mellitus (T2DM) accounts for more than 90% while gestational and type I diabetes accounting for less than 10% of all diabetes mellitus cases (Khunti et al. 2021).

According to International Diabetes Federation (IDF) Diabetes Atlas 10th Edition, diabetes prevalence among adults aged 20-79 years in Africa was 4.5% in 2021; representing an increase from 3.9% prevalence rate in 2019. This proportion is likely to be higher due to the fact Africa has the largest proportion of adults with undiagnosed diabetes. Approximately, 53.6% of adults who are presently living with diabetes in Africa remain unaware of their status (Ogurtsova et al. 2022). In Kenya, estimates by IDF (2021) indicate 3.3% diabetes prevalence with forecasts projecting an increase by 2025 to 4.5% (Guariguata et al. 2014). Type 2 diabetes mellitus is the most common in Kenya and accounts for 90% and above of all diabetes cases (World Health Organization, WHO, 2021).

Therefore, T2DM is one of the epidemics that has threatened to overpower health services provision and affect the economy of Kenya. For instance, the total cost of diabetes management in Kenya has been estimated at USD 372, 184, 585 which equates to approximately 37.3% of the entire health budget for the financial year 2021/2022; with T2DM taking the largest portion of this expenditure (Adamjee, & de Dieu Harerimana, 2022). Due to its status as a developing nation, Kenya's resources are limited to cater any additional diabetes burden.

Since T2DM is a chronic illness, its management is throughout the patient's life. Management of T2DM calls for a complex approach which involves not just adhering to medication but also adopting varying self-care behaviours and skills to manage the illness effectively (Alhuseen et al. 2023). The Kenya National Guidelines for T2DM Management recommends self-care practices to comprise of dietary practices that are healthy, regular exercises, daily foot care, treatment regimen compliance, handling complications such as hypoglycaemic episodes and monitoring blood glucose regularly (Ministry of Health, 2018). Other scholars such as Karthik et al. (2020) and Almutairi et al. (2020) outline healthy diet, exercise, blood glucose self-monitoring, medication adherence, reduction of risk behaviours, problem-solving and health coping mechanisms as leading T2DM self-management practices. Majority of the self-care practices for T2DM relies on the patients and close family members. However, most T2DM patients find it difficult to achieve the self-care practices since they perceive them to be challenging, demanding and difficult because they require changes to be made in their entire lives (Almutairi et al. 2024).

1.3 Behaviour Change and Health

Health behaviours are all the actions that an individual takes which may in turn affect disease, health, disability or mortality (Rubinelli & Diviani, 2020; Short & Mollborn, 2015). Behaviours may be either negative or positive depending on how they affect health. Positive or healthy behaviours in most instances are preventive in nature, for example, regular physical activity or healthy diets (Rubinelli & Diviani, 2020). On the other hand, negative health behaviours have detrimental outcomes, for example, unprotected sex, excessive alcohol consumption (Rubinelli & Diviani, 2020), smoking and substance use (Short & Mollborn, 2015). According to Rubinelli and Diviani (2020), behaviour change can only be achieved when the determinants

of specific health behaviour are identified. As depicted by the social ecological model, health behaviours are complex and occur as a result of interaction of societal, interpersonal and individual level factors (McLeroy et al., 1988). Individual level determinants include personal factors (for example, beliefs), cognitive abilities (for example, knowledge and critical thinking skills), and psychological attributes (for example, self-efficacy). People with lower health literacy levels have been found less likely to take on preventive behaviours such as screening for cancer (Berkman et al. 2011). The interpersonal level determinants relate to interactions between people and social contexts with peers, family and communities. For example, peer influence among youths has been associated with substance abuse (Borsari & Carey, 2001). Finally, health behaviours may be determined by environmental or social factors, for example, the availability of cancer screening clinics in the case of early cancer detection and treatment, availability of gyms for engaging in physical activity and laws, regulations and policies that address these health determinants (Rubinelli & Diviani, 2020).

The rising type two diabetes mellitus (T2DM) prevalence is largely due to unhealthy dietary practices, lack of physical activity, economic development, urbanisation, and an ageing population (Cradock et al. 2021). T2DM management involves pharmacological treatment and or lifestyle behaviour changes focusing on diet and physical activity behaviour modifications (Cradock et al. 2021). Diet and physical activity behaviour modifications are crucial in T2DM management (Van Rhoon et al. 2020), but behaviour change is complex and challenging (Cradock et al. 2017; Rubinelli & Diviani, 2020) and more so in diet and physical activity behaviours as these are influenced by a myriad of behavioural, social, emotional and environmental neuroendocrine and genetic factors (Cradock et al. 2021). Behaviour change thus remains one of the most significant public health concerns (Short & Mollborn, 2015).

1.4 Health Behaviour Change in Developed and Developing Countries

1.4.1 Health Behaviour Change in Developed Countries

Smoking, excessive alcohol consumption and illicit drug use are among the major public health concerns in developed countries (Bauman & Phongsavan, 1999). In the UK, smoking is a risk factor for chronic diseases, disability and accounts for 16% of all deaths (Rajani et al. 2019). Excessive alcohol consumption is associated with

accidental injury, chronic diseases including liver disease, diabetes, cardiovascular disease, cancer, a range of mental health conditions and alcohol dependence (Caudwell et al. 2015). In Australia alone, the annual costs of excessive alcohol consumption is approximated at 15 billion dollars attributed to strain on the health care system, road accidents, crime and associated costs, decreased workplace productivity, illness and death (Caudwell et al. 2015). Excessive alcohol consumption is particularly rampant in universities where up to a third of students drink to hazardous levels (Caudwell et al. 2015; Hallett et al. 2012; Todd & Mullan, 2011). Discussed below are a range of health behaviours (smoking, alcohol consumption and illicit drug use) showing how various strategies were selected based on evidence.

In the USA, the most widely used school curriculum based drug prevention programme was the Drug Abuse Resistance Education (DARE) project (Bauman & Phongsavan, 1999). This was a two-year programme made up of personal skills and resistance skills training designed for use from kindergarten through to grade twelve with key components being taught at grade five and six (Bauman & Phongsavan, 1999). An initial decline in smoking was noted but disappeared twelve months later. No significant effects on smoking decline and illicit drug use were observed on any follow up (Clayton et al. 1996). Other curriculum based drug prevention programmes had obtained similar lack of positive project outcomes (Palinkas et al. 1996).

A different approach and target population was employed by the Northland project still in the USA where the social resistance skills approach was used among students from grade six to eight to prevent alcohol consumption (Perry et al. 1996). Evaluation findings indicated a reduction of 27% alcohol use, 50% marijuana use and 37% tobacco use among students exposed to the programme with this positive behaviour change being maintained for three years (Bauman & Phongsavan, 1999).

A multi-faceted intervention, named the two year STAR intervention programme, involving school, health policy change and family evaluated a social resistance skills training for grade five to eight students and revealed a 30% reduction in alcohol, tobacco and marijuana use at twelve months follow up and a significant effect on belief regarding drug use at eighteen months of follow up (Pentz et al. 1989).

From the above interventions it can then be concluded that, to achieve sustainable positive behaviour change, one may need to adopt a multi-faceted intervention and go beyond the education environment (Gostin et al. 1997; Hawkins et al. 1992; Tobler, 1992) to include the community and family members, parental training, media support, limiting availability of these substances through regulations and laws and changing the school environment (Bauman & Phongsavan, 1999).

1.4.2 Health Behaviour Change in Developing Countries

Behaviour change is paramount to achievement of many of the Millennium Development Goals (MDGs) (Aboud & Singla, 2012). Positive behavioural changes relating to condom use, breastfeeding and hygiene are some of the low cost and low technology behavioural solutions to public health concerns such as malnutrition, child mortality, child growth and development (Black et al. 2008; Engle et al. 2007; Jones et al. 2003) all of which in the long run have a significant impact on reducing disease, disability and death (Aboud & Singla, 2012).

Regardless of the specific health problem, behaviour change research in developing countries in many ways fits a similar pattern (Aboud & Singla, 2012). Typically, researchers and social scientists collaborate with governments and local organisations to implement and evaluate intervention programmes. Second, behaviours addressed by researchers are those to be performed at individual and household level that are at a low level and not normative for example health care seeking behaviour, responsive feeding, new born care, safe delivery, Human immune-deficiency virus (HIV) prevention, latrine use, safe water and hand washing. Third, intervention behaviour change activities mostly have components of social marketing/behaviour change communication (BCC) which typically aims to inform, mobilise and sell a product or practice. Fourth, the behaviour change activities target an audience whose behaviour is guided by more than cognitions i.e. maybe by social forces, resources or habits. Lastly, it is unfortunate but most of the behaviour change activities are met by common problems hence leading to little change. It is important to acknowledge that changing behaviour is difficult as they are normative, habitual and preventive. They are normative in that behaviours bear the weight of approval and traditions. Habitual behaviours are not easy to change because they are done without much thought i.e. automatically while, on the other

hand, preventive behaviours are difficult to change as outcome of behaviour change is not immediate (Aboud & Singla, 2012).

Discussed below are a range of empirical health behaviour change studies conducted in developing countries including Malawi, Burkina Faso, Bangladesh, Guatemala, South Africa and Brazil that looked into hand-washing, complementary feeding, safe water use and safer sex (Aboud & Singla, 2012). These show how various strategies were selected based on evidence, theories and an in-depth knowledge of their audience (Aboud & Singla, 2012).

1.4.2.1 Hand Washing

Articles in this section reveal the challenges in behaviour change relating to sanitation and hand washing in Bangladesh. The evaluation of an 18 month scale-up programme in Bangladesh by Huda et al. (2012) found that hand washing rates were still below 50%. According to Briscoe and Aboud, (2012), smaller scale interventions where messages were theory based and incorporated several ways of learning a practice were far more successful. As in these two studies, a majority of the interventions relating to sanitation and hand washing are developed from cohort studies or case studies that identify key determinants (Curtis & Cairncross, 2003). This means that most behaviour change activities are limited to giving advice on hand washing before handling food and after using the toilet to members of the household mainly children and mothers (Aboud & Singla, 2012). Interventions that provided soap, supervised hand washing and performed demonstrations were very few (Aboud & Singla, 2012). A study by Affleck and Pelto (2012) in Bangladesh revealed that diarrhoeal diseases reduced by 47% as a result of hand washing interventions but noted a difficulty in demonstrating sustained behaviour change regarding hand washing which could have been due to the fact that germs are not necessarily visible to the human eye and hand washing not being a habit meant that mothers would easily become complacent. Therefore, in the above study, changes in self-efficacy, knowledge and attitudes were not sufficient. This particular behaviour would benefit from intervention based on theories with components of social action, social support and norms (Aboud & Singla, 2012).

1.4.2.2 Safe Water Use

Adequate water and sanitation services are severely lacking in developing countries (Aboud & Singla, 2012). Statistics by UN/WHO (2012) showed that 37% of people

live without improved sanitation and 11% have no access to improved drinking water. Moreover, 60% of all of infant mortality was linked to infectious disease mostly related to poor water, hygiene and sanitation. To address this burden, millennium development goal (MDG) number seven aimed to halve the proportion of people without access to safe drinking water and basic sanitation by 2015 (Aboud & Singla, 2012). This target was met five years ahead of schedule (Martinez-Santos, 2017). Point of use treatments are majorly the interventions of choice to provide safe water and not much of large infrastructure projects. This means that, in addition to behaviour change, purchase of a solar heated water vessel or daily use chlorine tablets (Aboud & Singla, 2012). A review by Fiebelkorn et al. (2012) on sustained behaviour change found that only 23% of 22 studies revealed a maintenance in behaviour regarding use of point of use water among half or more of the population fourteen months beyond the intervention phase. According to Fiebelkorn et al. (2012), some of the reasons for a lack of maintenance of the behaviour were the financial inability to purchase, repair or replace the water vessel and a lack of readiness to change. The research also concluded that showing the health benefits of the use of a simple technology does not guarantee behaviour change. Qualitative interviews by Wood et al. (2012) in Malawi found that 12% of maintained behaviour was attributed to understanding the benefits and regular interaction with health workers. Mertens et al. (2012) also found community support to be important in facilitating the harvesting of edible fish from contaminated water in Brazil. A review of 12 studies on chlorine use by Arnold and Colford Jr (2007) found that there was high adherence in short efficacy studies and although some incorporated education messages, the benefits of these were not examined on long term behaviour change. A follow up study in Guatemala by Luby et al. (2008) found that 5% of their efficacy study sample bought the water treatment when it was part of a social marketing programme. This means that theories with an element of social marketing and those that aim to understand their audience's resources would be useful in ensuring sustained behaviour change.

1.4.2.3 Complementary Feeding

Complementary feeding aims to address MDG number one which aims to reduce hunger and malnutrition among young children. Studies among mothers by Affleck and Pelto (2012) and Yates et al. (2012) in Bangladesh found some of the barriers to behaviour change relating to infant and young child feeding included a lack of

money, time and inconvenience. Moreover, the role of family members was crucial in hindering or enabling behaviour change relating to child feeding which meant that theories or interventions that targeted the cognitive reasoning were not sufficient to elicit the change. This was mostly because food preparation and feeding occurred at the family setting and solutions regarding child feeding would have to be tailored to the family. It is therefore important to have an understanding of one's audience while preparing education messages and interventions (Aboud & Singla, 2012). Behaviour change theories are rarely considered when planning behaviour change interventions relating to complementary feeding, most often, group food demonstrations and individual and group counselling are performed (Aboud & Singla, 2012).

1.4.2.4 HIV Prevention in Youth and Women

According to UNAIDS (2008), people aged 15-24 years are at highest risk of acquiring HIV as over a half of the annual infections are from this age group and 76% are in females. Thus MDG number seven aimed to stop HIV spread by 50% by 2015 using HIV prevalence among pregnant 15-24 year olds as an indicator (Aboud & Singla, 2012). New infections amounted to about 3.4 million in 2001 but had declined to 2.1 million in 2013 (WHO, 2018). Heterosexual behaviour is the focus of behaviour change that targets HIV prevention hence behaviour change interventions seek to delay onset of sexual intercourse, encourage condom use and reduce number of sexual partners (Coates et al. 2008). Nine randomised control trials of behavioural interventions conducted in developing countries have not shown any significant effect on HIV infection (Ross, 2010). In developing countries, community structures and social norms play a role in influencing the non-normative use of condoms (Rotheram-Borus et al. 2009). This was seen to be the case in Bangladesh in a locally developed programme for sex workers (Sarafian, 2012). Sarafian (2012) found the role of instrumental and emotional social support by peer educators to be beneficial in enabling treatment seeking and condom use. A meta-analysis of HIV interventions in South Africa by Lennon et al. (2012) highlighted the role of depression whereby, interventions were more successful at reducing risky sexual behaviour when they targeted depressive symptoms through social support, education and self-efficacy. This means that when theories of social action, support and ecology are considered in programme interventions then behaviour change may be witnessed (Aboud & Singla, 2012).

1.5 Diabetes Introduction

Diabetes is a chronic metabolic disorder that is characterised by distinct persistent hyperglycaemia (Goyal & Jialal, 2018). The hyperglycaemia may be due to resistance to peripheral insulin actions and or impaired insulin secretion (Goyal & Jialal, 2018; Hussein et al. 2021). Diabetes is broadly classified into three i.e. gestational diabetes mellitus (GDM), type 1 diabetes mellitus (T1DM) and T2DM based on aetiology and clinical presentation.

1.5.1 Gestational Diabetes Mellitus

Gestational diabetes mellitus (GDM) is hyperglycaemia which develops at some point during pregnancy more commonly during second or third trimester and resolves after childbirth (Goyal & Jialal, 2018; Hussein et al. 2021; McIntyre et al. 2019). GDM occurs in about 7% of all pregnancies (Goyal & Jialal, 2018) due to pregnancy at a later age, maternal overweight and obesity, familial history of DM, ethnicity and a previous maternal history of GDM (McIntyre et al. 2019). GDM on the mother often leads to preeclampsia, hypertension and increased chances of birth by caesarean section (Goyal & Jialal, 2018). The effect on the foetus is congenital defects, macrosomia where the foetus has increased size and weight and effects beyond birth including obesity in childhood, adolescence and adulthood and respiratory problems (Goyal & Jialal, 2018).

1.5.2 Type 1 Diabetes Mellitus

Type 1 diabetes mellitus (T1DM) accounts for 5-10% of all diabetes cases and can develop at any age but is most commonly identified among children and adolescents (Goyal & Jialal, 2018). It occurs following an autoimmune destruction of the beta cells that produce insulin and are located in the islets of the pancreas (Goyal & Jialal, 2018; Hussein et al. 2021). The autoimmune destruction causes a total insulin deficiency (Goyal & Jialal, 2018; Hussein et al. 2021). Risk factors for T1DM are genetic susceptibility and environmental factors including toxins, viral infections whilst also some dietary factors have been associated with the autoimmunity (Goyal & Jialal, 2018).

1.5.3 Type 2 Diabetes Mellitus

Type 2 diabetes mellitus is the most common form of diabetes mellitus accounting for approximately 90% of all diabetes cases. It is most common among people over 45 years of age but is also seen among younger adults, adolescents and children

due to physical inactivity, energy dense diets and rising obesity levels (Goyal & Jialal, 2018). T2DM is a chronic disorder characterised by hyperglycaemia (American Diabetes Association, 2009; Waly et al. 2010) that occurs when there is hepatic glucose overproduction, abnormalities with insulin secretion and insulin resistance in peripheral tissues i.e. the liver and skeletal muscles (Hussein et al. 2021; Wang & Cefalu, 2010). In the instance of insulin resistance, there is no response to insulin by the fat, muscle and liver cells which then causes a need for more insulin in the body to maintain normoglycaemia (Jain et al. 2012). What happens then is that, at first, insulin production increases in the pancreas to counterbalance the insulin resistance and thus maintain normal glucose levels (Jain et al. 2012). Eventually, in many people, the pancreas fails to keep up with the body's demand for insulin leading to hyperglycaemia which then sets the stage for development of diabetes (Jain et al. 2012). T2DM usually occurs as a result of interactions between genetic factors, environmental factors and modifiable lifestyle behaviours such as a sedentary lifestyle and unhealthy high fat diets (Murea et al. 2012), excessive alcohol intake, tobacco consumption, obesity and psychosocial factors including stress, anxiety and depression (Issaka et al. 2018). These drivers of T2DM continue to pose a public health challenge globally and more so in developing countries including Kenya (Azevedo & Alla, 2008).

1.5.4 Symptoms

Distinct symptoms of T2DM include excessive thirst and hunger, frequent urination, blurred vision, tingling or numbness in hands and feet, slow healing wounds, lack of energy, tiredness (Goyal & Jialal, 2018; International Diabetes Federation, 2016). It is therefore important to have routine check-ups because if left untreated, hyperglycemia may cause long term macrovascular and microvascular complications including retinopathy, neuropathy, nephropathy and atherosclerosis (Goyal & Jialal, 2018; Waly et al. 2010).

1.5.5 Risk Factors for T2DM

Table 1.1 presents the risk factors for T2DM categorised into modifiable and non-modifiable risk factors.

Table 1.1: Risk Factors for T2DM

Modifiable	Non-modifiable
Impaired glucose tolerance	Familial history i.e. first family relative with T2DM
Obesity	Ethnicity
Unhealthy diets and physical inactivity	Age above 40 years
Tobacco use and alcohol abuse	Hypertension
Dyslipidemia	Previous occurrence of gestational diabetes

1.5.6 Screening

It is recommended an annual screening for T2DM for persons above 40 years but in case of additional risk factors such as physical inactivity, overweight and obesity, familial history of T2DM, low high density lipoprotein (HDL) cholesterol, history of hypertension or cardiovascular disease and certain ethnicity or race (in the United States of America) then more frequent screening is recommended (Goyal & Jialal, 2018; Hussain & Chowdhury, 2019; Martinez et al. 2019).

1.5.7 Diagnosis of T2DM

Diagnosis of T2DM can either be by plasma glucose concentration (fasting or two hour) or haemoglobin A1C criteria.

1.5.7.1 Fasting Plasma Glucose

After an eight hour overnight fast, a blood sample is taken and a T2DM diagnosis can be confirmed when fasting plasma glucose (FPG) levels is more than 7.0mm/l (Goyal & Jialal, 2018).

1.5.7.2 Two Hour Oral Glucose Tolerance Test

In the two hour oral glucose tolerance test (OGTT), plasma glucose level is tested then 75 grams of glucose ingested then plasma glucose level measured again after two hours (Goyal & Jialal, 2018). If plasma glucose level after the two hour test is above 11.1mmol/L then a diagnosis of diabetes mellitus can be concluded. Though it is a standard test, it is expensive and inconvenient as it involves dietary and medication regulation prior to taking the tests (Goyal & Jialal, 2018).

1.5.7.3 Glycated Haemoglobin A1C

The haemoglobin (Hb) A1C test averages blood glucose levels for the past two to three months and a level above 48mmol/mol implies a diabetes mellitus diagnosis (Goyal & Jialal, 2018). It is a standardised test that is rapid and convenient as it is unaffected by acute illness (Goyal & Jialal, 2018). In presence of hyperglycaemia

characterised by increased urination, thirst and hunger a random plasma glucose level above 200mg/dL confirms a DM diagnosis (Goyal & Jialal, 2018).

1.5.8 Pathophysiology of Diabetes Related Complications

1.5.8.1 Acute Complications

Uncontrolled blood sugar levels are the causes of diabetes mellitus (Goyal & Jialal, 2018; Orban et al. 2018). When uncontrolled, blood sugar levels can be higher than normal (hyperglycaemia) or can be lower than normal (hypoglycaemia) due to a mismatch in insulin production by the pancreas versus the amount needed by the body (Orban et al. 2018). When T2DM patients take too little medication then hyperglycaemia occurs while taking too much medication (insulin or anti-diabetes drugs) causes hypoglycaemia both of which lead to acute T2DM related complications (LeRoith et al. 2004).

In hypoglycaemia, there is a blood glucose level deficit yet the brain and other body cells require this for energy production. Other than medication, hypoglycaemia may also be caused by unplanned exercise without medication adjustments, skipping of meals and excessive alcohol consumption (Orban et al. 2018). Without proper management, T2DM patients on synthetic insulin or insulin releasing pills are at greater risk of hypoglycaemia compared to those on lifestyle medication and blood sugar normalising drugs (Brunner, 2010).

Hyperglycaemia is characterised by three distinct classic symptoms polydipsia, polyuria and polyphagia and others including weight loss, blurred vision and nocturia (Brunner, 2010; Orban et al. 2018). T2DM patients experience increased urination when blood glucose levels rise above 10mmol/L which exceeds the kidneys' glucose threshold meaning that excesses have to be excreted. Hypovolemia and osmotic diuresis occur when there is elevated blood glucose levels hence causing polydipsia (increased thirst) resulting to hyperosmolar hyperglycaemic nonketotic coma (Brunner, 2010). High blood sugar levels cause T2DM patients to present with symptoms of both dehydration and increased urination at the same time, a condition called hyperglycaemic hyperosmolar state. Blood becomes thicker and more concentrated with blood glucose due to hypovolemia. In response to the high blood glucose levels, the body eliminates excess blood glucose through urine further worsening the hyperglycaemic

hyperosmolar state. T2DM patients are however able to produce enough insulin to prevent formation of ketone bodies (LeRoith et al. 2004).

The hyperglycaemia and dehydration causes the patient to be confused and becomes a serious emergency where patient goes into a coma and ultimately death can occur. At this juncture medical treatment is by intravenous fluid therapy and insulin. In most instances the hyperglycaemic hyperosmolar state occurs in T2DM patients who do not properly manage the condition or those unaware that they have T2DM (Brunner, 2010). In essence, the complications that arise from T2DM are the major causes of mortality rather than the T2DM itself (Brunner, 2010).

1.5.8.2 Chronic Complications

Poorly controlled T2DM especially prolonged hyperglycaemia may lead to long term damage to nerves, eyes, kidneys and blood vessels.

Peripheral diabetic neuropathy is damage to the nerves that leads to a loss of sensitivity pain sensations on T2DM patients' feet and hands (Brunner, 2010). T2DM patients experience numbness in affected area, a tingling sensation and an altered sense of pain that leads to skin damage and ultimately diabetic foot related complications which are troublesome to treat and most often lead to amputations (Deli et al. 2013).

Diabetic retinopathy is eye damage that occurs when either the lens or retina of the eye is destroyed leading to loss of vision gradually and ultimately blindness when T2DM is poorly managed (Heidelbaugh, 2015).

Diabetic nephropathy is when the kidneys begin losing functionality when its nephrons are overworked due to polyuria (increased urination) experienced in T2DM (Gray & Jandeleit-Dahm, 2014). Initial signs of nephropathy are the presence of albumin in urine and an excretion of beyond 300mg within a day causes kidney failure (Brunner, 2010) warranting a need for dialysis or transplant (Gray & Jandeleit-Dahm, 2014).

1.5.9 Prevention of T2DM

Prevention of T2DM is the best approach to its non-occurrence (Chatterjee et al. 2017). Failure to prevent T2DM leads to decades of complications and drug therapy in its management (Chatterjee et al. 2017).

1.5.9.1 Primary Prevention

Lifestyle changes aimed at increasing physical activity and weight control are crucial in T2DM prevention (Kenya National Guidelines for Management of Diabetes Mellitus, 2010). Lifestyle modification components include;

Weight loss

Obesity especially central/abdominal adiposity is the major driver towards development of T2DM. Increased physical activity is a great contributor to weight loss and management which is paramount in T2DM management. (Van Gaal & Scheen, 2015).

Reduction in intake of saturated fats

A higher dietary intake of fat has been thought to be a contributor to insulin resistance but findings from metabolic studies in humans dispute this (Risérus et al. 2009). Observational studies have shown that diabetes risk is not increased by total fat intake (Halton et al. 2008; Hu et al. 2001). Of far greater importance is the quality of fat where plant sources of fat are healthier than animal sources where especially omega 6 polyunsaturated fatty acids (PUFA) are associated with a lower risk of T2DM and should thus replace saturated fats (Hu et al. 2001; Ley et al. 2014; Salmeron et al. 2001).

Increasing fibre intake and better carbohydrate quality

A fibre rich diet especially fibre from cereals reduces risk of T2DM (Ley et al. 2014). There is an inverse association between cereal fibre products and risk of T2DM as revealed by a meta-analysis of prospective cohort studies by Schulze et al. (2007). The inverse association is however weaker in fibre from fruits (Schulze et al. 2007). Carbohydrate quality may be assessed by their glycaemic response to carbohydrate-rich foods also known as glycaemic index (Ley et al. 2014). A meta-analysis of prospective studies by Bhupathiraju et al. (2014) revealed that regardless of the amount of cereal fibre in the diet, low glycaemic index foods were associated with lower risk of T2DM than higher glycaemic index foods.

Increasing physical activity levels

Increasing physical activity levels is paramount in prevention of T2DM especially alongside caloric reduction as it helps in weight control and in enhancing insulin sensitivity and ultimately reducing risk of T2DM (Albikawi & Abuadas, 2015; Sigal et

al. 2018). The Kenya National Guidelines for Management of Diabetes Mellitus (2010) recommends exercise such as brisk walking for at least 30 minutes at least three times a week.

Reducing alcohol intake

Excessive amount of alcohol consumption especially in obese adults is said to increase T2DM risk as alcohol intake increases total energy intake by 6-10% (Paulson et al. 2010). On the contrary, epidemiological data shows a decreased risk of T2DM when moderate amounts of alcohol are consumed (Hu, et al. 2001; Koppes et al. 2005) as alcohol improves insulin sensitivity (Davies et al. 2002).

Cessation of smoking

Decades of epidemiological studies have linked cigarette smoking with increased risk for T2DM (Shi et al. 2013; Willi et al. 2007) by increasing insulin resistance and aggravating macro and microvascular T2DM complications (Chang, 2012).

1.5.9.2 Secondary Prevention

Secondary prevention of T2DM involves early detection and prevention of T2DM related complications (Kenya National Guidelines for Management of Diabetes Mellitus, 2010). Beyond reducing the need for treatment, early diagnosis and management may improve quality of life, reduce cost of treatment and prevent hospitalisations (Kenya National Guidelines for Management of Diabetes Mellitus, 2010).

1.5.10 The Burden of T2DM

T2DM is one of the major global public health emergencies of the 21st century ranking 10th in the causes of death globally with approximately 4 million deaths among people aged 20-79 years in 2017 which translates to a death every eight seconds (IDF, 2017). Globally, there were approximately 537 million adults between the age of 20-79 with T2DM with a majority of these in low and middle-income countries wherein Kenya is part of (IDF, 2021). That was over 100 million increase from 2017 (IDF, 2017 and IDF, 2021).

The International Diabetes Federation (IDF) (2021) also revealed that by region, Middle East and North Africa had the highest prevalence (16.2%) and 2045 projection (19.3%) while Sub-Saharan Africa had the lowest prevalence (4.5%) in 2021 and 2045 projection (5.2%) (IDF, 2021) as shown in Table 1.2. If interventions

are not put in place to prevent and appropriately manage T2DM then prevalence will increase and more deaths may be expected as projections show (IDF, 2021).

Table 1.2: Regional % T2DM 2017, 2021 Prevalences and 2045 Projections

Region	T2DM prevalence 2017 (%)	T2DM prevalence 2021 (%)	T2DM prevalence 2045 projection (%)
North America and Caribbean	13.0	14.0	14.8
Middle East and North Africa	9.6	16.2	12.1
South East Asia	8.5	8.7	11.1
Western Pacific	9.5	11.9	10.3
South Central America	8.0	9.5	10.1
Europe	8.8	9.2	10.2
Africa	3.3	4.5	3.9

(IDF, 2017, IDF, 2021)

The IDF, 2017 report also notes that Africa's figures may not present the real picture as the highest regional number of deaths due to T2DM was in Africa with 0.23 million deaths in 2017. In addition, the highest regional proportion of undiagnosed T2DM is in Africa at 69.2% being double that of high-income countries (37%). Undiagnosed cases of T2DM are a public health concern with cost implications as they are likely to develop a T2DM related complication even before a diagnosis leading to additional cost implications on the household (Kankeu et al. 2013) and already burdened health systems (IDF, 2017; WHO, 2010). This depicts a need to prioritise screening, diagnosis and provision of appropriate care to people diagnosed with T2DM in Kenya and other African countries (IDF, 2017).

In Kenya, there is a dearth of large country-wide T2DM prevalence studies. However, T2DM prevalence monitored by IDF reveal a prevalence of 3.96% in 2011, 3.6% in 2013 and 2.2% in 2015 (IDF, 2011, 2013a, 2015) which shows a declining trend which may not be so due to undiagnosed cases. Varying prevalence has been revealed by some smaller scale studies. A cross sectional diabetes knowledge, attitudes and practices study in eight districts by Maina et al. (2010) revealed a rural area prevalence of 8.6% and 13.2% in urban areas. A cross sectional study survey by Oti et al. (2013) in Nairobi's Korogocho and Viwandani slums revealed a gender based prevalence with that of women being higher at 4.8% and men at 4.0%. El-Busaidy et al. (2014) diabetes impact study in rural Isiolo revealed a prevalence of 16%.

1.6 Behaviour Change in Diabetes Management

Health behaviours in the aftermath of T2DM diagnosis play a significant role in the management of disease. Behaviours such as drugs use and abuse, mostly smoking and excessive alcohol consumption, physical inactivity and diets that are poor increase diabetes complications risk. Therefore, health lifestyle importance has been emphasised in T2DM management and treatment guidelines (Newman et al. 2017). Diagnosis of T2DM generates a trigger for behaviour change where patients become aware of the benefits of adopting behaviours that promote healthy living. According to Batalha et al. (2021), T2DM management surpasses control of blood glucose and calls for adoption of multidimensional approaches that include diet and physical exercises so as to reduce T2DM complications risk. Interventions founded on change of health behaviours empower T2DM patients to adhere to treatment, manage symptoms, outcomes and changes in lifestyle inherent to the illness. This forms the principle of T2DM self-management (Beck et al. 2017).

Various lifestyle interventions have been demonstrated to enhance T2DM management and also reduce T2DM risk in healthy persons. Overall, behaviour change for T2DM management targets modifiable risk factors for T2DM (Estlin et al. 2021). Hackett et al. (2018) found smoking rates to have fallen among T2DM patients and found this positive behaviour change to be maintained in the long run after T2DM diagnosis. This is inspiring since it has been established in Section 1.3.5 that tobacco use is an established risk factor for T2DM (Maddatu et al. 2017). The risk of T2DM is not just affiliated with cigarette smoking only but heavy use of alternative products of smoking such as smokeless tobacco. Therefore, tobacco use cessation in relation to smoking affiliated and smokeless products decreases T2DM risk (Maddatu et al. 2017). Patients diagnosed with T2DM have also been found to consume less alcohol on average than non-diagnosed patients in response to managing the illness (Hackett et al. 2018). Reduced alcohol intake has been established to increase insulin sensitivity by the body which is vital in management of T2DM (Mastrototaro & Roden, 2021). Reduced alcohol consumption leads to sugar levels that are predictable and also decreases hypoglycaemia risk due to increased gluconeogenesis and glycogenolysis (Kalaria et al. 2021).

In T2DM management, nutrition is an integral component with intake of diet rich in fruits, vegetables and fiber emphasised by nutritionists for weight management and

low load in glycaemic (Magkos et al. 2020). Unhealthy diets that are high in calorie content, large processed meat quantities, large portion carbohydrates that are highly refined, unhealthy fats, sugary beverages and high-energy snacks have been shown to increase the risk of T2DM. Patients are therefore advised to minimise or cease their intake for better management of the disease (Kelly et al. 2020). Increased physical activity and fitness significantly contribute to T2DM remission. However, they only work best when combined with healthy diet especially restricted calorie intake and weight loss programmes (Magkos et al. 2020).

Behaviour change in T2DM management should also target sedentary behaviour so as to ensure a lifestyle that is more active (Hamilton et al. 2014). This may involve reduction and break up of sitting time so as to improve glucose control, quality of life and reduce fatigue. Prolonged sitting time should be interrupted with extra activities of light-intensity especially for physically inactive patients (Syrjälä et al. 2022). Sedentary behaviour reduction should also target specific workplaces so as to minimise occupational sedentary behaviour. This may involve redesigning workplaces so as to have sit-stand workstations and incorporating alternating sit and stand workplace activities (Pereira et al. 2020).

1.7 Diabetes Care and Management in Kenya

1.7.1 The Health System in Kenya

For a long time, the Kenyan health system remained as it was in the early post-colonial era where it was three-tiered system that included (i) the central government at the district, provincial and national levels (ii) missionaries at the sub-district levels and (iii) local government in urban areas (Shiroya et al. 2019). The health system was restructured and is now pluralistic with three sub-systems (i) the public sector which makes up most of the health care facilities (ii) the commercial private sector and (iii) private not-for profit providers (Oyando et al. 2020; Shiroya et al. 2019).

A new constitution was adopted in 2010 ushering in a devolved system of governance with 47 new autonomous counties (Shiroya et al. 2019) which means that the Kenyan health system is also devolved.

Under this devolved system of government, the responsibility for health services was decentralised from the national government under the Ministry of Health

(MoH) to the 47 autonomous county governments each with its own health ministry. The role of the National Ministry of Health (MOH) is to provide policy support and technical guidance for priority national programmes (Asiki et al. 2018; Oyando et al. 2020; Shiroya et al. 2019). With this, the healthcare model also changed to a six-tier system comprising of community health services (level I), primary health care (PHC) facilities (level II and III), County hospitals (level IV), regional hospitals (level V) and national referral hospitals (level VI) (Asiki et al. 2018; Lu et al. 2021). Community health services comprise of all non-facility-based health and associated services each serving a population of approximately 5,000 people in a community unit. Level II PHC facility is the first physical level of the health care system in place for approximately every 10,000 people to offer curative, preventive, or health promotion activities as outpatient services. Level III PHC facilities serve approximately 30,000 people and have capacity for at least four deliveries in a day in addition to outpatient services. Level IV health facilities are the primary referral facilities at the county level offering services which complement the primary care level to allow for a more comprehensive package close to the clients. Level V facilities are found within a cluster of counties providing secondary referral services with a comprehensive set of services, offering internships, research and serving as training centres for paramedical staff. Level VI facilities are the tertiary hospitals offering highly specialised services and also include training of specialists, biomedical research and serve as internship and apprenticeship training centres (Asiki et al. 2018).

Diabetes care services are offered at specialised clinics at level IV to VI hospitals though in some instances, medication is available in dispensaries and health centres (Oyando et al. 2020). As per the “Kenya Essential Package for Health”, each of the above mentioned levels is expected to provide promotive, preventive, curative and rehabilitative services for T2DM (Ministry of Health, 2006). Similar services are offered by private healthcare providers though with poor referral linkage as a majority are stand-alone units. The Kenyan health system is financed in a number of ways; i) household contributions to the National Hospital Insurance Fund (NHIF), ii) household contributions to private health insurance companies, iii) tax revenues collected by the government, iv) donor funding and v) out of pocket payments at hospitals (Oyando et al. 2020).

1.7.2 Type Two Diabetes Management Policies in Kenya

Currently, policies feature diabetes under the non-communicable diseases (NCDs) umbrella of related risk factors reflecting efforts towards an integrated approach of managing NCDs in Kenya (Shiroya et al. 2019). In this respect, the “Kenya Strategy on Prevention and Control of NCDs 2015-2020 and 2020/21-2025/26” represents the current overarching policy document for all NCDs in Kenya. Currently, implementation of diabetes policies is mostly driven at the national level. Lobbying is underway for the inclusion of diabetes and NCDs into the county health strategies and counties are expected to prioritise this area of the health policy (Shiroya et al. 2019).

Prior to the 2011 United Nation’s (UN) declaration, Kenya had already begun making steps towards reforming and improving diabetes care. Operating under the MoH NCD department, the “Kenya National Diabetes Strategy (KNDS) 2010-2015, 2015-2020” and was launched. The aims of the strategy were to prevent or delay development of diabetes, reduce diabetes related complications, improve quality of life and prevent premature mortality (Shiroya et al. 2019). Emphasis lies on the prevention aspect with interventions targeting obesity, unhealthy diet and physical inactivity; capacity building; resource mobilisation; research; diabetes policies, legislation and regulations; and monitoring and evaluation (Shiroya et al. 2019). The KNDS was supported by associated guidelines “(Kenya National Clinical Guidelines for Management of Diabetes Mellitus, 2010)” for management of diabetes and capacity building. As its name suggests, the policy was disease and context specific and aimed to align with existing health programmes. Research by Shiroya et al. (2019) however found that the policy lacked a monitoring framework to monitor or evaluate the progress of implementation.

The second is the overarching policy developed in the post-declaration era that is the “Kenya National Strategic Plan for Prevention and Control of NCDs 2015-2020 and 2020/21-2025/26” (Shiroya et al. 2019). This policy aligned with global and international policy documents including the “Global Action Plan for the Prevention and Control of NCDs 2013–2020” (World Health Organization, 2013) and the “Brazzaville Declaration on NCDs” (World Health Organization, 2011). This Kenyan policy document emphasised the need for an integrated approach towards addressing NCDs and their associated risk factors and advocated for the integration

of NCDs into existing PHC platforms. It differs from the KNDS 2010-2015 in that, it incorporated a set of national NCD targets and an implementation monitoring framework (Shiroya et al. 2019) meaning that progress would be measured against an existing baseline. However, key informants from Shiroya et al. (2019) study indicated a lack of a concrete baseline data (one not considering local realities) as a limitation as targets set for Kenya were too close to the ambitious international targets.

1.8 Rationale for the Study

Underpinning this research study is the continued challenge with behaviour change among T2DM service users that leads to development of T2DM related complications and even death. First this study seeks to understand behaviour change among T2DM service users as per the health belief model then goes on to consider the social and cultural factors of behaviour change among T2DM service users from the perspective of health care professionals.

In addition to understanding T2DM service users' behaviour change, the perspectives of health care professionals regarding the required behaviour change is very important for especially influencing the hospital's required way of effectively managing and supporting T2DM service users. Therefore, the findings will help policy makers especially healthcare practitioners to come up with interventions towards enhancing behaviour change for T2DM management. Health practitioners dealing with T2DM treatment and management seek to benefit from the study since they will understand on the need to adopt a non-pharmacological approach in T2DM treatment and management especially one advocated by behaviour change. The findings will also be useful in influencing national guidelines and policies and constructing new knowledge as this has not been studied as much especially in Kenya as per the literature review.

1.9 Purpose of the Study

The purpose of this study was to examine the likelihood to change behaviour so as to avoid T2DM related complications and to explore whether being in receipt of the recommended care services had any influence on likelihood to change behaviour. This is particularly important because numerous interventions have been carried out but while change may be initially noted, the positive behaviour is in many cases not sustained over time. The main impact of this study is to provide an

understanding on the influences of behaviour change as influenced by the health belief model and to explore hinderances to access to the diabetes recommended care services.

1.10 Research Aim

The aim of this study is to examine potential for behaviour change among Kenyan type two diabetes service users attending a select diabetes clinic in Kenya and to understand behaviour change from Kenyan healthcare professionals' perspectives.

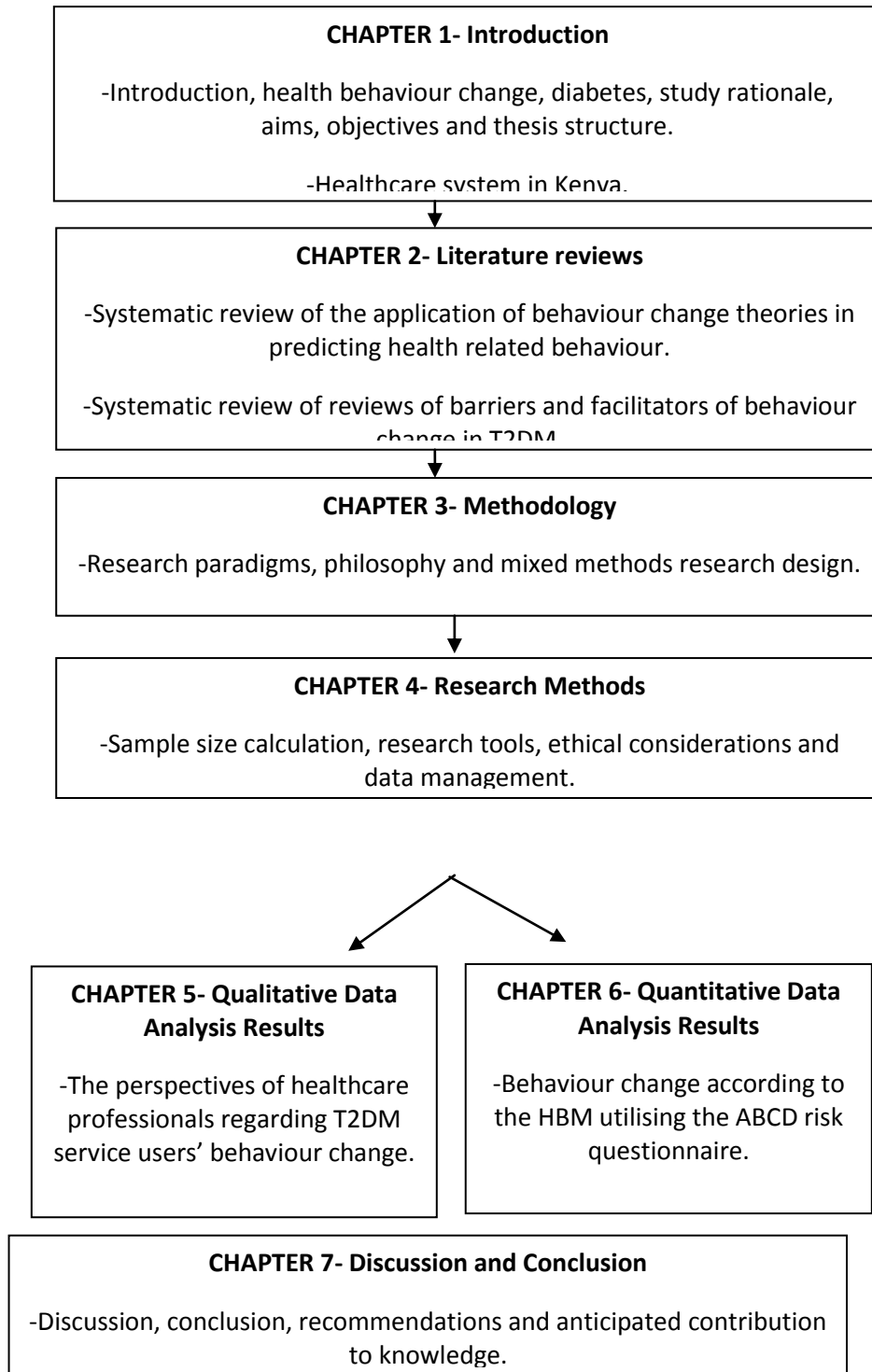
1.10.1 Research Objectives

- i) To examine behaviour change based on the health belief model constructs among Kenyan T2DM service users attending a select diabetes clinic in Kenya;
- ii) To explore the factors affecting the management of T2DM among its service users attending a select diabetes clinic in Kenya from healthcare professionals' perspectives;
- iii) To explore T2DM management processes in the Kenyan healthcare system among T2DM service users attending a select diabetes clinic from healthcare professionals' perspectives;
- iv) To make practical recommendations/suggestions that could be applied within the Kenyan system from healthcare professionals' perspectives.

1.11 Thesis Structure

This thesis is divided into seven chapters as shown in Figure 1.2.

Figure 1.1: Structure of the Thesis



1.12 Types of Models/Theories of Behaviour Change in Health Psychology

This section discusses the various theories of behaviour change which are classified into three as shown in Table 1.3;

Table 1.3: Theories of Behaviour Change

	Categories of the models	Theories of behaviour change	References
1	Cognition models	Health belief model	(Rosenstock, 1974)
		Protection motivation theory	(Rogers, 1975)
2	Social cognition models	Theory of reasoned action	(Fishbein & Ajzen, 1975)
		Theory of planned behaviour	(Ajzen, 1991)
3	Stage models	Precaution adoption process model	(Weinstein et al. 1998)
		Trans-theoretical model/ Stage of change model	(Prochaska & DiClemente, 1983)
4	Integrated theoretical frameworks/models	Theoretical domains framework (TDF)	Michie et al. (2005)
		Capabilities, opportunities, Motivation and behaviour (COM-B) model	Michie et al. (2011)

Over the decades, models have been developed by social psychologists to understand and predict human behaviour (Yazdanpanah & Forouzani, 2015). These have been labelled by social psychologists as expectancy value models which are the most popular paradigms that have been designed to predict and understand human behaviour (Eagly & Chaiken, 1993). Psychology theories that explain health and pro-environmental behaviours include the health belief model (Rosenstock, 1974), the protection motivation theory (Rogers, 1975), the theory of reasoned action (Fishbein & Ajzen, 1975) and its successor the theory of planned behaviour (Ajzen, 1991), the precaution adoption process model (Weinstein, 1988) and the trans-theoretical model (Prochaska & DiClemente, 1983). Recently, integrated theoretical frameworks/models involve models/frameworks synthesised from existing theoretical constructs and theories. They help reduce the burden of selecting from a large pool of theories of behaviour change that may sometimes overlap. The most common integrated theoretical frameworks/models of behaviour change include TDF (Michie et al. 2005) and COM-B model (Michie et al. 2011).

1.12.1 Cognition Models

1.12.1.1 The Health Belief Model

Developed in the 1950's, the health belief model's (HBM) main aim was to try and understand why people did not take up preventive services (Glanz & Bishop, 2010). The HBM assumes that, unless prompted by a certain belief, people will not take up preventive services or treatment (Bishop et al. 2015; Daddario, 2007). Over the years, the HBM model has evolved and is now made up of six constructs as shown in Table 1.4.

Table 1.4: Constructs of the Health Belief Model

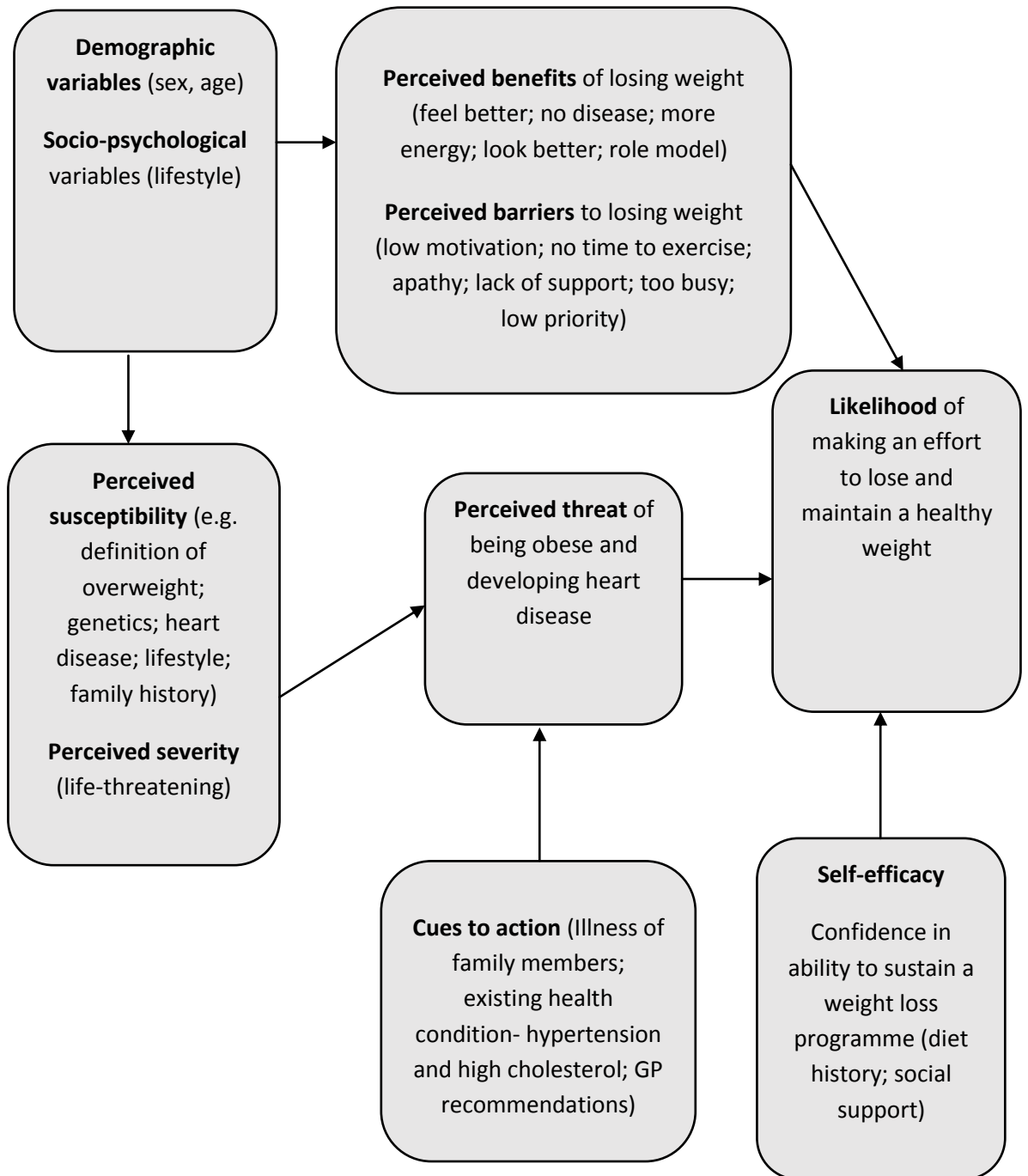
	HBM constructs	Explanation of construct
1	Perceived susceptibility	A person's view of him/herself being at risk of an illness or health condition as a result of engaging or not in a certain behaviour.
2	Perceived severity (Both termed as perceived threat)	A person's subjective perception on the magnitude of impact of contracting an illness.
3	Perceived benefits	A person's perception of the good that could result from behavioural change.
4	Perceived barriers	A person's perception of the hindrances that could be encountered during the behavioural change process.
5	Cues to action	A person's motivation for behaviour change.
6	Self-efficacy	A person's confidence in his/her ability to take up a recommended behavioural change.

Adapted from: (Abood et al. 2003; Bishop et al. 2015; Daddario, 2007; James et al. 2012).

The HBM has effectively been utilised in predicting behaviour change in prevention strategies including breast cancer screening, food allergen avoidance and influenza vaccination (Jones et al. 2014). For instance, a greater perception of severity of a food allergen has been associated with more adherence to avoidance of the allergen (Jones et al. 2014). This effectiveness could be due to the HBM's consideration of the beliefs about a recommended behaviour as major behaviour change determinants (Jones et al. 2014). In addition, the HBM encourages adherence as it comprehensively describes the health-related potential barriers and benefits (Jones et al. 2014).

The HBM however does not consider the role of emotion in decision making and thus received criticism (Henshaw & Freedman-Doan, 2009; Jones et al. 2014; Sutton, 2001). Additionally, despite being one of the older theories of behaviour change, the HBM constructs perceived susceptibility and perceived severity still do not have a standardised measure which means that one may not get a full picture of susceptibility to an illness or to its severity (Jones et al. 2014). The HBM's ability to predict long term health behaviours as opposed to one off treatments has also been criticised as it remains unresolved (Henshaw & Freedman-Doan, 2009; Ogden, 2003). Figure 1.3 shows behaviour change according to the HBM (applied to weight management).

Figure 1.2: Behaviour Change according to the HBM



Adapted from: (James et al. 2012)

1.12.2 Protection Motivation Theory

The protection motivation theory (PMT) was first developed by Rogers (1975) to explain the effects of fear appeals on human behaviours and attitudes (Floyd et al. 2000). A fear appeal is an informative communication about a threat to a person's well-being which then comes with suggestions of measures that can be taken to avoid the threat or reduce its impact (Milne et al. 2000). For example, a health education pamphlet detailing the threat of breast cancer with recommendations for breast self-examination to ensure early detection thus reducing its potential impact

is a fear appeal (Milne et al. 2000). It is widely accepted that fear arousing communication can change attitudes and thus ultimately change behaviour but the variables involved in fear appeals and their cognitive mediational effects are not well known (Milne et al. 2000; Rogers, 1975). To bring clarity in the area of fear appeals and to address this gap between research on fear appeals and research on attitude change, Rogers developed the PMT (Milne et al. 2000). PMT was designed to specify and operationalise the components of a fear appeal in order to determine the common variables that produced attitude change (Milne et al. 2000). It was assumed that each component of a fear appeal would begin a corresponding cognitive mediating process (Milne et al. 2000). These processes would then in turn influence protection motivation in the form of an intention to adopt a suggested behaviour contained within the fear appeal (Milne et al. 2000). Protection motivation was said to be an intervening variable that arouses, sustains and directs activity (Milne et al. 2000; Milne et al. 2002; Rogers, 1975). PMT was revised by Rogers (1983) into a more general theory of cognitive change which incorporated a broader spectrum of information services that could initiate a coping process (Milne et al. 2000). Fear appeals remained a source of information while new sources of information capable of initiating cognitive activity leading to protection motivation were personality, observational learning and prior experience (Floyd et al. 2000; Milne et al. 2000). Other cognitive mediating processes were added including an account of the appraisal processes leading to mal-adaptive coping responses such as continuing or starting to smoke cigarettes (Milne et al. 2000). The revision included a component of appraising rewards of not adopting the advised coping response as part of the threat appraisal (Floyd et al. 2000; Maddux & Rogers, 1983; Milne et al. 2000; Rogers, 1983).

The 1983 revision also acknowledged the importance of social learning theory and incorporated into the model Bandura's (Bandura, 1977, 1986) self-efficacy construct (Milne et al. 2000). The PMT structure was developed based on the expectancy-value theory (Edwards, 1954; Rogers, 1975). In the expectancy-value theory, the tendency to adopt a behaviour is a function of the expectancies regarding the consequences of the behaviour and the value of those consequences (Milne et al. 2000).

The earlier Hovland et al. (1953) expectancy-value theory suggested that there are three main stimuli variables in a fear appeal; (a) magnitude of the event, (b) the probability that a given event will occur if no protective behaviour is adopted or existing behaviour is modified, and (c) the availability and effectiveness of a coping response to reduce or eliminate the harmful stimuli (Milne et al. 2000; Norman et al. 2005; Rogers, 1975). Adopted as the basis for the original formulation of PMT, Rogers proposed that each of these constitutes a cognitive mediational process: The magnitude of the problem initiates perceived severity; the probability of occurrence initiates perceived vulnerability; and the efficacy of the recommended response initiates perceived response efficacy (Milne et al. 2000). These cognitive mediational processes are characterised as having two forms; threat appraisal and coping appraisal (Bubeck et al. 2018; Floyd et al. 2000; Milne et al. 2002; Milne et al. 2000; Norman et al. 2005 and Shafiei & Maleksaeidi, 2020).

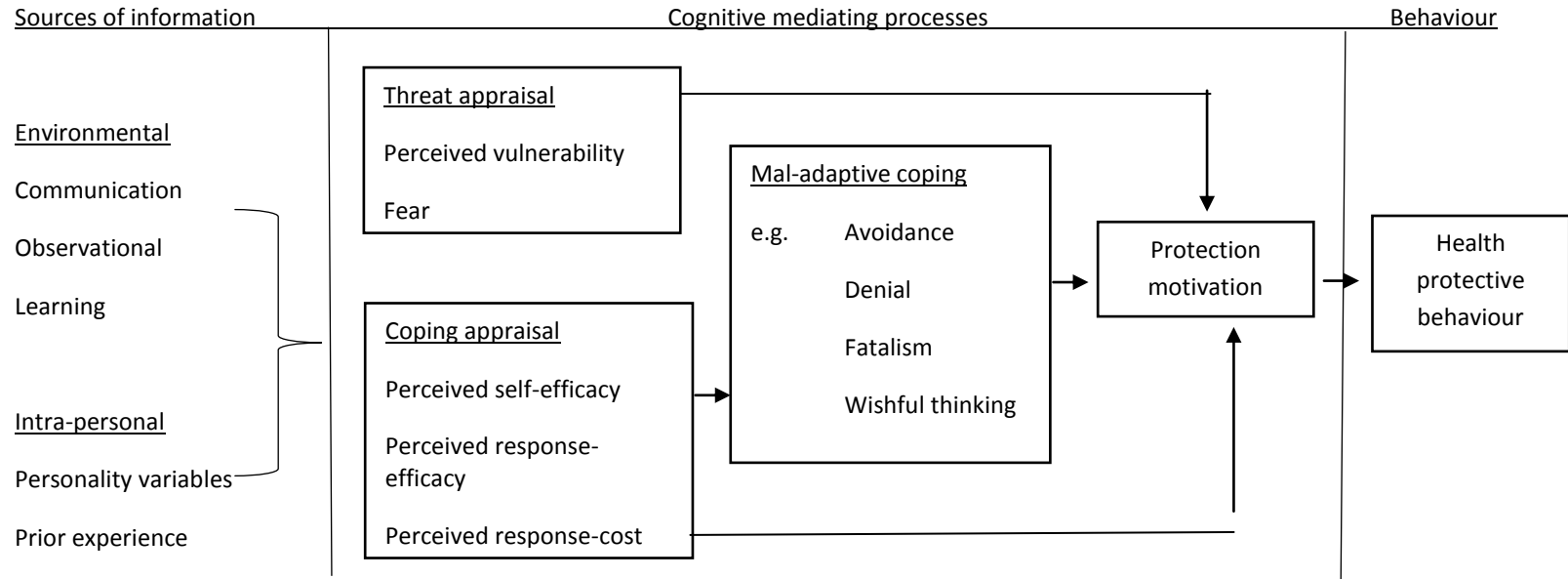
Threat appraisal is concerned with the evaluation of the components of a fear appeal that are relevant to a person's perception of how threatened he/she feels (Milne et al. 2002; Milne et al. 2000; Shafiei & Maleksaeidi, 2020). PMT variables that capture threat appraisal are: perceived vulnerability (assesses how susceptible one feels to the communicated threat); perceived severity (assesses how serious one believes that the threat would be to his/her life) and fear arousal (assesses how much fear the threat evokes in an individual)(Milne et al. 2000; Shafiei & Maleksaeidi, 2020). Fear acts as the intervening variable where the more vulnerable an individual feels to a threat, the more serious he/she believes it to be hence more fear will be aroused and the greater the appraised threat will be (Milne et al. 2000). In other words, the greater the perceived threat, the more likely an individual is to protect himself/herself i.e. the more likely a behavioural intention to adopt a protective behaviour will be formed (Milne et al. 2000). As part of the threat appraisal process, the revised PMT includes a component of rewards.

Coping appraisal is concerned with the evaluation of the components of a fear appeal relevant to one's assessment of the suggested coping response to the appraised threat (Milne et al. 2002; Milne et al. 2000; Shafiei & Maleksaeidi, 2020). As the main determinant of coping response, response efficacy is concerned with beliefs on whether the suggested coping response will be effective in decreasing the threat to the individual (Milne et al. 2000; Shafiei & Maleksaeidi, 2020). As part of

the coping appraisal component of the model, the revised PMT includes self-efficacy and response costs/response efficacy (Milne et al. 2002; Milne et al. 2000; Shafiei & Maleksaeidi, 2020). Self-efficacy involves an individual's belief about whether he/she feels able to perform the suggested coping response (Milne et al. 2000 & Shafiei & Maleksaeidi, 2020). Response costs involves beliefs of how costly performing suggested response would be to an individual (Milne et al. 2000). An individual is more likely to intend to adopt suggested coping response if he/she believes that the response will be effective, feels able to perform suggested behaviour and perceives the behaviour cost to be low (Milne et al. 2002; Bubeck et al. 2018; Shafiei & Maleksaeidi, 2020).

Protection motivation is an important mediator of the relationship between threat, behaviour and coping appraisal (Bubeck et al. 2018; Milne et al. 2000). Protection motivation is synonymous with the intention to perform a behaviour (for example, 'in the next month, I intend to carry out a breast self-examination') and is a positive linear function of the belief: the threat is severe, the person is vulnerable to the threat, the suggested response is effective, the person is able to perform the suggested response and is a linear function of the belief: the perceived costs of suggested coping response is high (Milne et al. 2000). A schematic representation of PMT is shown in Figure 1.4.

Figure 1.3: Schematic Representation of Protection Motivation Theory



Adapted from: (Bubeck et al. 2018; Milne et al. 2000; Rogers, 1983)

Protection motivation theory has been useful in predicting uptake of preventive behaviour relating to cancer (Norman et al. 2005). A prospective study by Orbell and Sheeran (1998) used PMT measures to predict cervical cancer screening uptake among a sample who had never been screened whereby, screening intentions could be predicted by their perceived vulnerability, response efficacy (finding peace of mind), response costs (perceived negative emotional reactions to test procedure) and self-efficacy. In turn, intention was predictive of actual cervical cancer screening uptake at one year follow-up along with perceived vulnerability and response efficacy (belief that, if detected early, then it could be treated and cured) (Norman et al. 2005; Orbell & Sheeran, 1998).

Protection motivation theory has also been put through a number of experimental tests where studies have manipulated PMT variables within a fear-arousing communication to explore the effects of an intervention (exercise) on subsequent beliefs, intentions and behaviour among persons at risk of heart disease and stroke (Fruin et al. 1992; Milne et al. 2002; Stanley & Maddux, 1986; Wurtele & Maddux, 1987). Fruin et al. (1992), Plotnikoff and Higginbotham (2002) and Stanley and Maddux (1986) examined intentions and cognitions while in addition Wurtele and Maddux (1987) also looked into subsequent behaviour. With regards to changing PMT cognitions, all four studies were successful whereby in all four studies, self-efficacy was found to predict intentions to begin exercise while also perceived response efficacy was found to influence intention to exercise according to Plotnikoff and Higginbotham (2002) and Stanley and Maddux (1986). According to Wurtele and Maddux (1987), perceived vulnerability to heart disease and stroke was the only threat or coping appraisal that predicted the taking up of aerobic exercises. Experimental manipulations are thus useful in influencing subsequent cognitions and intentions but have limitations on influencing subsequent behaviour (Milne et al. 2000; Milne et al. 2002).

In the real world, applying such experimental manipulations for example, in education intervention programmes may raise ethical concerns as it may involve providing study participants false information so as to manipulate the levels of a variable e.g. telling participants that heart disease is not a serious condition so as to

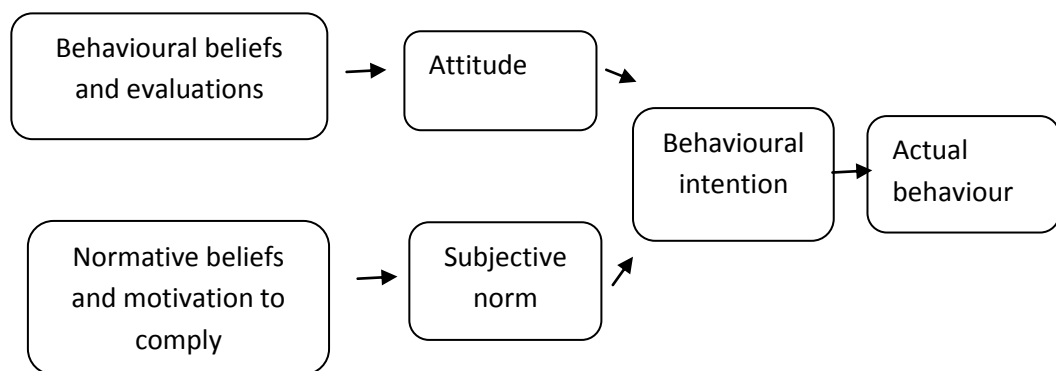
produce a low perceived severity (Milne et al. 2002). Another challenge is that most PMT experimental tests involve two experimental groups (i.e. one receiving high severity and another receiving low severity communication) but do not include a control group that would receive no communication or information at all (Fruin et al. 1992; Maddux & Rogers, 1983; Milne et al. 2002; Rippetoe & Rogers, 1987). It is thus unclear as to how successful interventions are relative to not receiving the intervention (Milne et al. 2002; Sturges & Rogers, 1996; Tunner Jr et al. 1989).

1.12.2 Social Cognition Models

1.12.2.1 Theory of Reasoned Action

The theory of reasoned action (TRA) is a cognition model relating to the decision to engage in a behaviour (Fishbein & Ajzen, 1975). It assumes that the decision to engage in behaviour is influenced by its expected outcomes. For example in teen sexual behaviour (Gillmore et al. 2002), the motive or expected outcome for sex may be positive (pleasure, regard and intimacy) or negative (unplanned pregnancy, disapproval and disease). One's assessment of the outcomes can be measured and combined into TRA's testable causal model as shown in Figure 1.5 links beliefs to intention and behaviour (Gillmore et al. 2002).

Figure 1.4: Theory of Reasoned Action



Adapted from (Fishbein & Ajzen, 1975)

In TRA, one's decision to engage in a behaviour (e.g. to have sex) is directly predicted by the intention to engage in or perform the behaviour (Gillmore et al. 2002; He et al. 2019; Park, 2000). In turn, behavioural intention is a function of two factors i.e. a person's attitudes towards the behaviour (how desirable it seems to

be) and their perception of social norms regarding the behaviour (what others think one should do) (Gillmore et al. 2002; Park, 2000). Norms and attitudes are formed based on two sets of beliefs i.e. beliefs about the consequences of engaging in the behaviour (in this instance, I will get pregnant), and beliefs about how our significant others feel about one engaging in the behaviour (for example, my best friend's belief)(Gillmore et al. 2002). An individual's attitude towards a behaviour entails two components: belief of the likelihood of the outcome of engaging in the behaviour (how likely is it that I will get pregnant?) and evaluation of the outcomes of engaging in the behaviour (how good or bad would getting pregnant be?) (Gillmore et al. 2002; Park, 2000). According to Park (2000), intention to engage in a behaviour is more likely where the consequences of engaging in a behaviour are favourable and highly likely. Subjective norms are a function of normative beliefs about social expectations of significant others (what does my best friend think I should do?) and one's motivation to comply with those significant others (how much do I want to do what my best friend wants me to do?) (Gillmore et al. 2002; Park, 2000). This means that these subjective norms are the perceived social pressure one faces whether to behave in a certain way (Park, 2000). Several studies have found an individual's attitude towards a behaviour and subjective norms to be sufficient determinants to behavioural intention (Bowman & Fishbein, 1978; Goldenhar & Connell, 1993; Jaccard & Davidson, 1972; Jones, 1989; Vinokur-Kaplan, 1978).

In TRA, both social and personal factors influence a person's likelihood of wanting to engage or participate in a behaviour (Park, 2000). Behavioural intention, a predictor of engaging in a behaviour, is directly affected by social and personal variables (Ajzen, 1988), one's attitudes towards a behaviour and subjective norms respectively (Park, 2000).

Attitude towards a behaviour is a social variable as these are internally generated based on one's beliefs about possible outcomes of engaging in a certain behaviour and their evaluation of the outcomes (Park, 2000). Subjective norms are a social variable as they are based on external information (one's significant others) and a person's perceived social pressure to engage in a certain behaviour (Park, 2000).

A great deal of research has been generated by TRA explaining and predicting health and social behaviours including AIDS-related sexual behaviours (Fishbein et al. 1992), condom use (Baker et al. 1996; Díz-Loving & Villagrán-Vázquez, 1999), recycling (Park et al. 1998), continuing professional education (Becker & Gibson, 1998), smoking cessation (Godin & Kok, 1996; Zhikun & Fungfai, 2009) and engaging in physical activity (Godin & Kok, 1996; Zhikun & Fungfai, 2009).

Empirical studies have also generally been supportive of the TRA. For example, a review by Ryan and Bonfield (1975) of ten studies in the field of marketing reported an average multiple correlation of .60 on attitudes and subjective norms on behavioural intentions thus concluding that the TRA model yields stable predictions.

Despite the widespread application, the TRA is not without its critics (Chang, 1998). According to Randall and Gibson (1991), when researchers used the TRA, they only tested the linkage hypothesised by TRA without considering linkages between its constructs. A number of studies have however revealed that attitudinal and normative structures are not independent; attitude was found to be influenced by subjective norm (Shepherd & O'Keefe, 1984; Shimp & Kavas, 1984; Vallerand et al. 1992).

The TRA as an attitude theory has been criticised as not being a good indicator of human behaviour prompting more research leading to revision of the model by Fishbein and Ajzen (1975) to overcome any discrepancies in the next decade which led to the development of the theory of planned behaviour (TPB) (Gillmore et al. 2002).

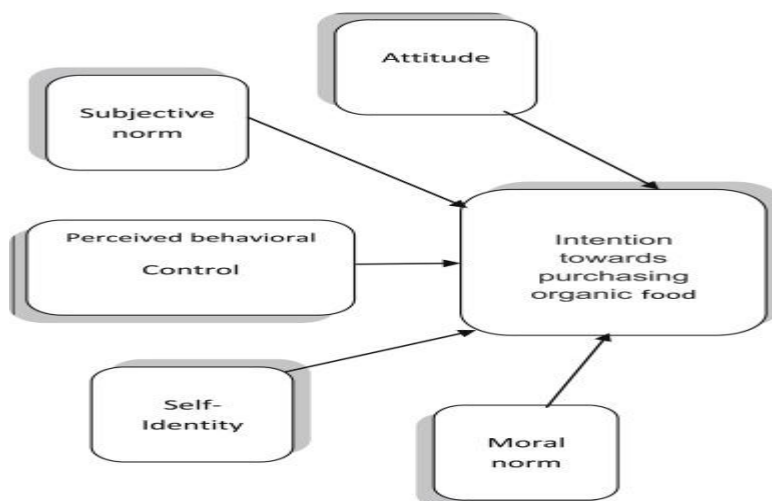
1.12.2.2 Theory of Planned Behaviour

The theory of planned behaviour (TPB) was developed as an extension of the theory of reasoned action (TRA) (Fishbein & Ajzen, 1975). TPB is an important social psychological model (Fishbein & Ajzen, 1975; Yazdanpanah & Forouzani, 2015) that aims to explain variance in volitional behaviour (Ajzen, 1991) i.e. assessing intention to engage in a behaviour when the behaviour is under a person's volitional control (Gakobo, Jere, & Griffith, 2016). The TPB as shown in Figure 1.6 focuses on the cognitive factors that determine motivation or behavioural intention (Wong & Mullan, 2009) namely; attitude, subjective norm and perceived behavioural control

(PBC) (Fishbein & Ajzen, 1975; Gakobo et al. 2016; Wong & Mullan, 2009; Yazdanpanah & Forouzani, 2015). The first TPB construct is attitude which refers to the degree to which one has a favourable or unfavourable evaluation of the behaviour in question (Ajzen, 1991; Fishbein & Ajzen, 1975; Gakobo et al. 2016; Liñán & Chen, 2009; Wong & Mullan, 2009; Yazdanpanah & Forouzani, 2015). It comprises affective (for example, it is attractive, I like it) and evaluative considerations (it has advantages) (Liñán & Chen, 2009). The second construct is subjective norms which refers to perceived social pressure by significant others to engage in or not in the behaviour (Ajzen, 1991, 2001; Wong & Mullan, 2009; Yazdanpanah & Forouzani, 2015). Subjective norms comprise of two components which work together; beliefs about how significant others would like them to behave (normative beliefs) and the negative or positive judgements about each belief (outcome evaluations) (Ajzen, 2001). The third TPB construct is perceived control which is one's perception of ease or difficulty of performing behaviour in question (Ajzen, 1991, 2001; Liñán & Chen, 2009; Wong & Mullan, 2009; Yazdanpanah & Forouzani, 2015) or degree to which a person perceives the behaviour in question to be under their volitional control (Fielding et al. 2008; Gakobo et al. 2016). The TPB unlike TRA assumes that behaviour should comprise of voluntary and involuntary aspects (Yazdanpanah & Forouzani, 2015). The more behaviour is dependent on circumstances external to a person, the less the behaviour is intentionally controllable which means that, according to TPB, people who have positive attitudes believe there is more normative support and thus feel it is easier to engage in a behaviour and therefore should have strong intentions to engage in the behaviour (Kaiser, 2006). By its definition, perceived control has been argued to be ambiguous (Armitage & Arden, 2002). A behaviour may be regarded as easy if a person is confident in his/her ability to perform the behaviour and may be perceived as difficult if one lacks opportunities to engage in the behaviour or lacks resources to engage in the behaviour (Armitage & Arden, 2002). According to Terry and O'Leary (1995), the distinction is referred to as internal and external control with internal control operationalised as Bandura's self-efficacy (Bandura, 1977) and external control as perceived control over behaviour.

In terms of predicting behaviour, the success of the TPB has been proven (Kaiser, 2006; Liao et al. 2007; Nigbur et al. 2010). However, the theory continues to evolve with some scientists suggesting the inclusion of other variables to increase the predictive utility of the model for some behaviours and contexts (Yazdanpanah & Forouzani, 2015). Ajzen (1991) had clearly stated that the TPB model was open to the addition of predictors if they could be shown to capture a significant proportion of the variation in intention or behaviour. Worthy to note is that, in as much as inclusion of other variables was important in certain situations, it was not necessary in all cases (Burton, 2004).

Figure 1.5: Constructs of the Theory of Planned Behaviour



Adapted from: (Yazdanpanah & Forouzani, 2015)

Studies have found subjective norms to be the weakest predictor of intention in TPB (Armitage & Conner, 2001). This problem in TPB was affirmed by Ajzen who recommended the inclusion of moral obligations into the TPB so as to improve its predictive validity (Ajzen, 1991). Moral obligation is one's perception of the moral correctness or incorrectness of performing a behaviour (Ajzen, 1991). Moral obligation has been found to be a significant predictor of recycling behavioural intention among university undergraduate students in the United States (Largo-Wight et al. 2012).

There is growing evidence that self-identity (how one perceives oneself) significantly increases the prediction of behavioural intention in TPB (Burton, 2004;

Nigbur et al. 2010; Pelling & White, 2009; Sparks & Shepherd, 1992). According to Cook et al. (2002), self-identity is a label that people use to describe themselves and is also something expected to have an influence on intention. Inclusion of the self-identity construct helps address the concern of the failure of subjective norms to account for large proportions of the variance in intention compared with perceived control and attitude (Godin & Kok, 1996). Inclusion of self-identity on a conceptual level extends the normative component beyond measures of social coercion towards the more subtle influence of societal culture (Armitage & Arden, 2002). Self-identity reflects the extent to which people perceive themselves as fulfilling certain societal roles (Armitage & Arden, 2002). For example, if a person perceives themselves as being concerned about the health related consequences of eating, it is more likely that self-identity will exert influence on behavioural intentions (Armitage & Arden, 2002). A review by Conner and Armitage (1998) indicated that self-identity accounts for significant proportions of variance in intentions over other TPB constructs.

Past behaviour has also been suggested as a predictor of intention and behaviour (Sommer, 2011). The findings of a study by Ouellette and Wood (1998) revealed that, past behaviour is the strongest predictor of future behaviour exceeding the predictive power of behavioural intention and other TPB constructs. For example, according to Conner et al. (2002), past behaviour of breakfast consumption is most likely to be a strong determinant of future breakfast behaviour due to the habitual eating nature.

As a model for predicting social behaviour, TPB has been applied in diverse fields including preventive healthcare such as smoking (Conner et al. 2006), alcohol consumption (Huchting et al. 2008), physical activity (Dunn et al. 2011; Pakpour et al. 2011), oral health (Pakpour et al. 2012; Pakpour & Sniehotta, 2012) and other social behaviours such as drinking and driving (Chan et al. 2010; Moan & Rise, 2011) and aggressive driving (Forward, 2009; Iversen, 2004; Parker et al. 1992).

Although research confirms the significance of intentions in predicting behaviour, it also highlights that not all intentions are translated into behaviour (Abraham et al. 1999). Reviews of TPB especially in health behaviours indicate that TBP variables

better predicts intentions than behaviours (Godin & Kok, 1996). An intention-behaviour gap occurs as humans inconsistently perform behaviours despite their intentions (Hall et al. 2008; Sniehotta et al. 2005). This is mostly seen in health behaviours that cause discomfort or negative immediate outcomes or those that require endurance or inconvenience (Sniehotta et al. 2005). To bridge the intention-behaviour gap, the construct action planning was suggested (Sniehotta et al. 2005). Action planning is a self-regulation strategy which translates intention into action by specifying when, where and how to act (Pakpour et al. 2014). It therefore acts as a post-intentional volitional process that helps initiate an intended action (Pakpour et al. 2014). There are several studies that have shown that action planning has a positive influence on performing or engaging in a behaviour (Pakpour et al. 2012; Pakpour & Sniehotta, 2012; Pakpour et al. 2011; Sniehotta et al. 2005).

1.12.3 Stage Models

1.12.3.1 Precaution Adoption Process Model

The precaution adoption process model (PAPM) was initially suggested by Weinstein, (1988) who argued that most traditional behaviour change theories applied only to persons engaged by the threat and did not take into account the different stages people might be at with regards to adoption of the positive behaviour. PAPM like the trans-theoretical model is a stage of change model of health behaviour change (Buchanan et al. 2020).

The PAPM has successfully been used to explain behaviour change relating to mammography screening (Clemow et al. 2000) , home radon testing (Jassempour et al. 2014; Weinstein et al. 1998), colorectal cancer screening (Costanza et al. 2007; Jassempour et al. 2014), oral hygiene (Aleksėjūnienė & Brukienė, 2012), teen pregnancy (Stranger-Hall & Hall, 2011), nutrition (De Vet et al. 2007; Mohr et al. 2010; Sniehotta et al. 2005) in studying meat consumption during a livestock epidemic (Jassempour et al. 2014; Sniehotta et al. 2005) and in osteoprotective behaviour and treatment (Blalock et al. 1996; Mauck et al. 2002).

The process of adopting or quitting a behaviour was described as a logical sequence of qualitatively different cognitive stages whereby, the type of information and intervention needed to move people closer to action at each stage varies (Sharma,

2007). The ability to tailor messages to different sections of population is one of the greatest advantages of the stage of change model PAM (Sharma, 2007).

In 1992, the model was further refined by Weinstein and Sandman (1992) who suggested seven distinct stages of PAM ranging from completely unaware of the problem to action and maintenance of positive behaviour (Mohamed & Tayel, 2012; Sharma, 2007). The constructs of the PAM stage model of change are shown in Table 1.5;

Table 1.5: Constructs of the Precaution Adoption Process Stage of Change Model

No.	PAM stage	Explanation
1	Unaware of issue	A person at this stage has never heard of the hazard or accepted the risks posed. They have not formed opinions about the proposed solutions.
2	Unengaged by issue	A person at this stage has learnt about the hazards and possible solutions but hasn't yet considered whether they need to do anything about it.
3	Undecided about acting	This is the decision-making stage where people have become engaged as they are aware of the hazard and possible solutions. Here, they are considering their response.
4	Deciding not to act	A person in this stage has knowledge of the hazard but decides not to take protective actions. Liang & Xue (2009) and Wang et al. (2017), however, argue that persons in this stage often either avoid the issue or take up other maladaptive approaches to balance emotion.
5	Decided to act	A person in this stage has knowledge of the hazard and protective actions required and decides to take some actions.
6	Acting	A person in this stage has already initiated the proposed positive behaviour.
7	Maintenance	A person in this stage has engaged in the proposed positive behaviour and maintained it over time.

Adapted from (Weinstein et al. 2020).

Table 1.6 demonstrates stage transitions that are allowed in PAM.

Table 1.6: Stage Transitions Allowable in Precaution Adoption Process Model

Stages of change	1	2	3	4	5	6
1	√	√				
2		√	√			
3			√	√	√	
4			√	√		
5			√		√	√
6						√

Adapted from (Sutton, 2005)

Table 1.6 is a transition matrix for the six-stage version of PAPM which excludes the maintenance stage. The ticks indicate the allowable transitions through the stages of change. The diagonal ticks imply that one can stay indefinitely in any of the stages. For instance, one person may remain blissfully unaware of a health threat while another may constantly be trying to decide what to do. Forward movements are represented by the transitions above the diagonal. For instance, moving from unaware to aware but unengaged. Forward skips are represented by the transitions in the upper diagonal which do not have a tick. For instance, when one makes a spur of the moment decision without having thought about it hence may move from stage 2 to 5, skipping stages 3 and 4. This example may be interpreted as rapidly moving through the intervention phase rather than skipping it completely. It is conceptually neater to proscribe skips and assume that change follows the step by step sequence but it is almost impossible to distinguish between the two interpretations in practice (Sutton, 2005).

Backward movements are represented by the transitions below the diagonal. (Weinstein and Sandman, 2002) stated movement to an earlier stage can occur without having to go through all the intermediate stages though obviously it is not possible to move from the latter stages to stage 1 or 2. Table 1.7 shows the factors that influence transitions in the PAPM.

Table 1.7: Factors that Influence Transitions in the Precaution Adoption Process Model

Stage transition	Important issues
Stage 1 to 2	Messages from the media regarding the hazard and precaution.
Stage 2 to 3	Communication from significant others. Personal experience with the hazard.
Stage 3 to 4 or 5	Beliefs regarding personal susceptibility. Beliefs regarding hazard likelihood and severity. Beliefs regarding precaution difficulty and effectiveness. Perceived social norms. Behaviours and recommendations of others. Fear and worry.
Stage 5 to 6	Resources needed to act, effort and time. Comprehensive 'how to' information. Cues to action and reminders. Assistance in carrying out action.

Adapted from (Weinstein & Sandman, 2002).

Weinstein and Sandman (2002) emphasise the importance of media messages in triggering a shift from stage 1 to 2. They also point out that the factors which influence transition through the stages may differ for different behaviours. Although the factors listed above seem plausible and with quite a lot of indirect supporting evidence, there is yet still little direct evidence from the few studies conducted of the PAPM to date (Sutton, 2005).

In addition to PAPM's allowance for messages to be tailored for each stage, with the PAPM, only one question is required to assess at which stage a person is at hence making it suitable for use in both individual and group settings (Sharma, 2007; Weinstein & Sandman, 2002). Finally, according to Weinstein and Sandman (2002) PAPM has proven to be advantageous where behaviour change is difficult and resistance to change is high because in such situations then having separate messages for each stage is rather useful.

The PAPM has several limitations. First, PAPM has not been widely tested with regards to health behaviours which means empirical evidence is limited and confined to only a few behaviours (Sharma, 2007). Second, PAPM is not suitable for actions that require gradual behaviour change such as diet or exercise (Weinstein & Sandman, 2002). Third, the constructs corresponding to each stage that need to be modified for progression along the stages have not been delineated (Sharma, 2007). Fourth, the behavioural and psychological characteristics of each stage of the model have not been developed (Borrelli et al. 2002; Hamzekolayee et al. 2018). Finally, being stage based, the PAPM is more expensive compared to a standard intervention geared towards an entire population (Sharma, 2007).

In conclusion, more interventions that make the PAPM more concrete need to be developed and tested because, with more empirical evidence, then deductions about the utility of the PAPM can be ascertained (Sharma, 2007).

1.12.3.2 The Trans-Theoretical Model

The trans-theoretical model (TTM) is a theory of behaviour change that was first described in 1982 to explain cessation of smoking while at the same time giving

suggestions to aid behaviour change (Adams & White, 2003; Prochaska & DiClemente, 1983; Prochaska et al. 1992). Rather than a one-time event, the TTM explains behavioural change as a process that continually checks for readiness for behaviour change (Adams & White, 2003; Marshall & Biddle, 2001). TTM suggests five stages of change that differ according to a person's current behaviour and intention as described in Table 1.8 (Adams & White, 2003; Marcus et al. 1992; Marshall & Biddle, 2001).

Table 1.8: Trans-Theoretical Model Stages of Change Applied to Physical Activity

Stages of Change	Definition
Pre-contemplation	A person is not engaging in regular physical activity and not intending to in the next 6 months.
Contemplation	A person is not participating in regular physical activity but has intentions to begin in the next 6 months.
Preparation	A person is intending to start participating in regular physical activity in the next 6 months and is to make some little changes in their physical activity behaviour.
Action	A person is actively engaged in regular physical activity and has done so for less than 6 months.
Maintenance	A person is actively engaged in regular physical activity for 6 months or more
Note: TTM acknowledges the possibility of relapse.	

Adapted from (Adams & White, 2003; Fahrenwald & Walker, 2003; Marcus et al. 1992).

The TTM is mediated by three constructs; processes of change, self-efficacy and decisional balance and movement through the stages is linear (Bridle et al. 2005; Marshall & Biddle, 2001). Self-efficacy as defined by Bandura (1986) is confidence in one's ability to engage in a behaviour even when it is challenging. Decisional balance considers the pros and cons linked with the behaviour that is recommended (Bridle et al. 2005).

The processes of behaviour change outline strategies that a person may utilise to change their behaviour, feelings and thoughts (Marshall & Biddle, 2001). These are classified into behavioural and experimental as described in Table 1.9 (Marshall & Biddle, 2001).

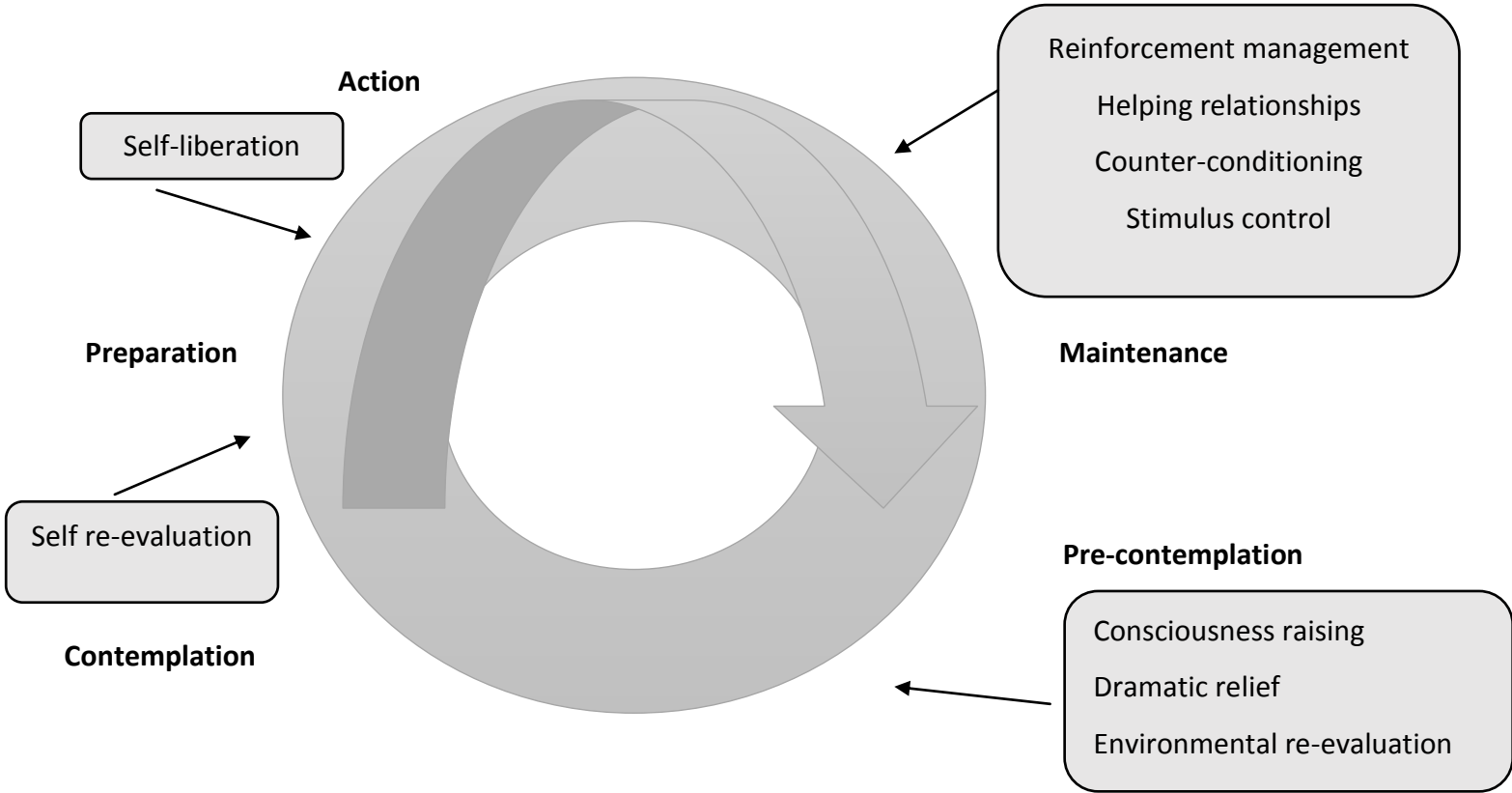
Table 1.9: Processes of Behaviour Change Applied to Physical Activity

Behaviour change processes	Definition
Experimental processes	
Consciousness raising	Deliberate effort to seek out new information and gain understanding on physical activity.
Dramatic relief	Affective experience or emotional reaction to the repercussions of sedentary behaviour
Environmental evaluation	A person's assessment on how sedentary behaviour affects the social and physical environments.
Self-re-evaluation	A cognitive and emotional assessment of the benefits of engaging in physical activity.
Social liberation	Acceptance and awareness of available alternatives for sedentary lifestyle.
Behavioural processes	
Counter-conditioning	Replacement of sedentary behaviours with physically active behaviours.
Helping relationships	Trusting, accepting support and care from others for physical activity behaviour change.
Reinforcement management	Rewarding self for physical activity.
Self-liberation	A person's beliefs, commitment, choice and goals pertaining to physical activity behaviour change.
Stimulus control	Including prompts to healthy choices while eliminating cues to unhealthy habits.

Adapted from (Fahrenwald & Walker, 2003; Prochaska et al. 1992; Marcus et al. 1992; Marshall & Biddle, 2001; Nigg & Courneya, 1998).

At each stage, tactical use of the processes of change is critical for behaviour change (Adams & White, 2003). Figure 1.7 shows the interaction of the stages and processes of change;

Figure 1.6: Transtheoretical Model of Behaviour Change; stages in bold and processes in boxes



Adapted from (Adams & White, 2003).

The TTM has successfully been utilised in predicting behaviour change in diet modification, physical activity and cessation of smoking (Adams & White, 2003; Bridle et al. 2005; Marshall & Biddle, 2001). Marshall and Biddle (2001) attribute the successes to the logical validity of the relations between the stages of change and the sequential nature of the theory.

The model has however been criticised for majorly focussing on behaviour change without much effort to increase knowledge levels which would make the model more wholesome (Bridle et al. 2005; Marshall & Biddle, 2001). Marshall and Biddle (2001) suggest that this may contribute to challenges with of behaviour change maintenance in the long-term.

All the theories of behaviour change (the health belief model, the protection motivation theory, the theory of reasoned action, the theory of planned behaviour, the precaution adoption process model and the stage of change model) discussed have all been successful and utilised in predicting health related behaviour. This study will however select the most appropriate theory of behaviour change for predicting behaviour change in type 2 diabetes mellitus.

1.12.4 Integrated Theoretical Frameworks

1.12.4.1 Theoretical Domain Framework

Behaviour and behaviour change theories identified in literature are multiple and transverse disciplines in behavioural and social sciences (Atkins et al. 2017). As a result, it has been challenging for researchers to select from such a large pool of theories that are possibly relevant and in some cases overlapping. To overcome this challenge, a group of behavioural scientists who collaborated with an implementation team established theoretical domain framework (TDF). The TDF is an integrated theoretical framework created from 128 theoretical constructs originating from 33 theories. While developing TDF, the cross-disciplinary group adopted the following consensus process as outlined in Atkins et al. (2017): (i) identification of theories and theoretical constructs with relevance to behaviour change; (ii) simplification of the theories and constructs into theoretical domains that are overarching; (iii) evaluation of the theoretical domains' importance; (iv) cross-disciplinary evaluation and creation of the constructs and domains; (v) validation of the list of domains; and (vi) pilot study involving a series of interview questions to gather views around the domains and constructs.

Overall, the simplification of the 33 theories and 128 constructs produced 14 domains which form the backbone of TDF. These domains include: (i) knowledge, (ii) social influences, (iii) skills, (iv) beliefs on capabilities, (v) social/professional role and identity, (vi) optimism, (vii) intentions, (viii) beliefs on consequences, (ix) goals, (x) reinforcement, (xi) memory, attention and decision processes, (xii) behavioural regulation, (xiii) emotion, and (xiv) environmental context and resources. Knowledge domain entails awareness that something exists and may include knowledge about a condition, procedure and task environment. Skills domain relate to ability obtained through practice and include constructs such as development of skills, competence, interpersonal skills, ability, practice and assessment of skills (Michie et al. 2005).

Social/professional role and identity domain entails coherent set of behaviours and an individual's personal qualities that are displayed in a setting. Its constructs include professional identity, role, boundaries and confidence, social identity, leadership, commitment and group identity. Beliefs about capabilities domain refers to accepting reality, truth or validity related to talent, ability or facility that can be put to constructive use by a person. The constructs in this domain are self-efficacy, self-confidence, self-esteem, professional confidence, empowerment, beliefs, perceived confidence and perceived behavioural control. The domain of optimism describes confidence that occurrence take place for the best or for attaining of desired goals. Constructs outlined under optimism include optimism, pessimism, identity and unrealistic optimism. Beliefs about consequences as outlined in TDF involve accepting the truth, validity or reality about the consequences of a behaviour in a given scenario and include constructs such as expectations of outcome, characteristics of outcome expectancies, consequences, beliefs and anticipated regret (Michie et al. 2005).

Reinforcement domain outlines increasing the likelihood of a response through an arranged dependent relationship or between a response and a stimulus or contingency. Reinforcement constructs are rewards, punishment, incentives, sanctions, consequents, contingencies and reinforcement. Intentions domain refers to a decision that is conscious to perform a behaviour or a determination to act in a given way. The constructs in this domain include intentions' stability, change model stages, transtheoretical model, and change stages. Under the goals

domain, mental outline of outcomes or end results to be achieved are evident. Constructs in the goals domain include goals, priority of goals, setting of goals, planning for the goals and implementation. Memory, attention and decision processes is the capacity for information retention, selective focusing on environmental aspects and ability to make a choice between competing alternatives. Constructs in this domain are memory, decision making, attention control, attention and cognitive overload (Michie et al. 2005).

Environmental context and resources domain relates to any circumstances that encourage or discourage skills and abilities development, independence, adaptive behaviour and social competence. The constructs include environmental stressors, resources, organisational climate and culture, critical incidents, interaction with the environment and barriers and facilitators. The domain of social influences establishes interpersonal processes that can lead to individuals changing their thoughts, behaviours or feelings. In this domain, social pressure, norms, social comparisons, group conformity, social support, power, intergroup conflicts, modelling, group identity and alienation are the constructs. Emotion domain outlines a complex pattern of reaction involving behavioural, experiential, and physiological elements by which there are attempts by a person to deal with a matter or event that is significant. Constructs included in this domain are fear, affect, anxiety, stress, burn-out and depression. Lastly, behavioural regulation domain refers to anything that aims at managing or changing actions. Self-monitoring, action planning and breaking habit are the constructs included in this domain (Michie et al. 2005).

The TDF has found applications in a wide range of settings in healthcare and clinical behaviours. Studies show that it has been applied in identification of influences on behaviours. This is evident in studies such as Michie et al. (2007) who adopted TDF to investigate barriers and facilitators to family intervention offering to schizophrenia patients; McSherry et al. (2012) on human papillomavirus (HPV) vaccination discussion with patients; Patey et al. (2012) on routine pre-operatives ordering; Bussieres et al. (2012) on acute low back pain management without X-ray ordering; Dyson et al. (2011) on diagnosis and management of dementia; and Tavender et al. (2014) on management of mild traumatic injuries of the brain. The TDF has also been applied

in designing systematic interventions. This is notable in studies such as Backman et al. (2015) on adherence to national guidelines on suspected viral encephalitis management by clinicians and Taylor et al. (2014) on implementation of nasogastric tubes safe use guidelines. Further, TDF has been adopted by scholars such as Cane et al. (2015) and Michie et al. (2008) to offer guidance on behaviour change techniques identification.

1.12.4.2 Capability, Opportunity, Motivation and Behaviour Model

The Capability, Opportunity, Motivation and Behaviour (COM-B) model refines the TDF into three domains whose interaction predict behaviour. The three domains include capability, motivation and opportunities for behaviour. The domains are further divided into six sub-domains which capture factors that are believed to influence the capacity of an individual to adopt new behaviours. Capabilities domain relate to an individual's capacity to engage in behaviour. Capability is subdivided into physical capability (an individual having the required physical skills, stamina and ability) and psychological capability (knowledge to engage in activities that are involved in behaviour performance). Opportunity refers to the environmental factors that affect behaviour. Opportunity domain therefore represents factors outside an individual which influence ability for one to perform a behaviour. The sub-domains in this domain include physical opportunity (time, environment and resources) and social opportunity (norms, social structures, social cues and interpersonal influences). The motivation domain refers to an individual's willingness to change. motivation is sub-divided into two sub-domains: reflective motivation (entails planning, beliefs and reflection about an individual's capacity to do something) and automatic motivation which is ignited by impulses and emotions that originate from innate dispositions or dissociative learning such as pleasure, disgust or fear (Michie et al. 2011).

The COM-B model has been applied by different researchers in explaining behaviour change in management of various health related conditions. Hearn et al. (2024) adopted the COM-B model in a study to evaluate barriers and facilitators in the development of health seeking behaviour in endometriosis patients. The study established five COM-B sub-domains including physical and psychological capability, social and physical opportunity and reflective motivation

to explain health seeking behaviour development among patients. McClintic et al. (2022) applied COM-B model to evaluate development of behaviour change strategy for stunting reduction among caregivers of children aged below two years in Western Kenya. The study established caregivers to possess psychological capabilities (skills and knowledge) which enhanced key infant and maternal nutrition behaviours. Caretakers also possessed reflective motivation to engage in optimal behaviours but this was undermined by lack of social and physical opportunities such as lacking sufficient time, mothers' competing priorities, unavailability and inaccessibility of diverse foods, fears of negative consequences associated with some foods and appropriate practices and low self-efficacy for exclusive breastfeeding.

1.13 Theory of Diabetes Care

1.13.1 Orem's Theory of Self-Care

The theory of self-care by Orem (1945) presents guidelines for planning and implementation of principles in self-care. According to the theory, self-care comprises of activities performed by a person to promote or maintain one's health, life, well-being in addition to preventing and curing a disease. Orem's philosophy operates on the principal that a patient should be prepared to take responsibility for his/her own care through the belief that persons have the capacity to take care of themselves (Ampofo et al. 2022). According to the model, self-care is a behaviour that is acquirable and can meet many of the needs by the patients during sickness. According to the self-care theory by Orem (1985), self-care comprises of three components: (i) universal self-care, (ii) development self-care, and (iii) illness-related deviations in health. Universal self-care includes basic needs by people such as water, food and air while development self-care refers to the ability to take care of people (Snowden et al. 2014).

Self-care has presented a paradigm shift in care of patients especially those with chronic illnesses. Underlying abilities of patients are identified and patients are then motivated to best utilise them towards managing their condition. Chronic conditions, such as diabetes mellitus, cancer, heart conditions, chronic hypertension, and drugs abuse among others significantly impact on a patient's quality of life. Patients are faced with multiple mental and physical challenges, for example, weakness, fatigue, pain, sleep disorders and anxiety. Therefore,

application of self-care practices is an effective way for promoting quality of life of patients who are chronically ill. By so doing, health care is directed towards the needs of the patient (Goodwin, 2021).

The theory of self-care by Orem has been found to benefit heart failure patients by helping improve their life's quality. Heart failure patients whose self-care behaviour is active positively affect their life's quality making self-care to be the primary and first treatment for heart failure patients. Heart failure patients who are more engaged in self-care demonstrate better life quality, lower mortality and reduced hospital readmission rates than those who are less active in self-care (Jaarsma et al. 2017).

According to Abdi El Kader et al. (2023), self-care activities aid in early discovery and management of diabetes. Sustained self-care helps minimise negative effects of diabetes. For diabetes patients, self-care calls for changes in diet and lifestyle to complement the support by the health team. Diabetes patients engaging in self-care practices are expected to expertly manage their illness and lead satisfactory lives. On the other hand, reduced activities in self-care among diabetes patients can worsen complications (Agrawal & Agrawal, 2016).

As a result of self-care theory, self-care process is continuously evolving and involves education and awareness so as to enable patients navigate diabetes' complexities (Alhuseen et al. 2023). Health care practices have also evolved to take note of the potential by patients in engaging in self-care activities and encourage them. They have further evolved to recognise that a larger portion of diabetes care take place within family settings which makes it crucial to equip patients with skills in self-care (Rakhshani et al. 2022).

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter outlines two broad sections. The first section represents Review Number One which is a systematic review of reviews that provides a summary of barriers and facilitators of behaviour change in T2DM management. The second section represents Review Number Two which is a systematic literature on on predictors of behaviour change based on behaviour change theory. For each section, detailed outline of the review aims and objectives, search criteria and results is provided.

2.2 Review Number 1: Systematic Review of Reviews of the Barriers and Facilitators of Behaviour Change in T2DM

2.2.1 Introduction

This review outlines a thorough search strategy that was used to obtain systematic reviews relevant to barriers and facilitators of behaviour change in T2DM management and the manner in which it was analysed. Systematic reviews on behaviour change in T2DM have been conducted in different parts of the world. However, this comprehensive review is important as it will summarise, reveal the barriers and facilitators that cut across and those that are unique to some regions. The results from this review of systematic reviews should be beneficial especially for health service providers and policy makers in applying them in public health and clinical practices.

2.2.2 Review Aim

The aim of this review of reviews of literature was to conduct an umbrella review of systematic reviews so as to summarise the evidence that is available to explain barriers and facilitators of behaviour change in T2DM management and to identify gaps in literature. The review question was: What are the barriers and facilitators of behaviour change in T2DM management? The focus of the question is to establish the determinants (barriers and facilitators) of behaviour change in T2DM management in various contexts globally.

2.2.3 Objectives of the Review

- i) To conduct review of reviews on the barriers and facilitators of behaviour change in T2DM management.
- ii) To examine barriers and facilitators to behaviour change in T2DM management.

2.2.4 Methods

The methodology for this review of reviews was conducted in line with the proposal registered in the International Prospective Register of Systematic Reviews PROSPERO registration PROSPERO 2022 CRD42022333164. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were also utilised in this review of reviews to illustrate the literature search and selection of articles to be included in the review (Page et al. 2021).

2.2.5 Criteria for Considering Systematic Reviews for Inclusion

The Population, Intervention, Comparator, Outcome and Study design (PICOS) (Methley et al. 2014) sciences framework was adhered to so as to guide study selection as outlined in Table 2.1.

Table 2.1: Framework of Systematic Review of Reviews of Barriers and Facilitators of Behaviour Change in T2DM Management

Research question	What are the barriers and facilitators of behaviour change in T2DM?
Population	T2DM service users
Intervention	Use of behaviour change method
Comparator	Use of other methods
Outcome	Changed behaviour
Study design	Any

2.2.6 Search Strategy and Terms

Multiple databases were searched for systematic reviews that were relevant including CINAHL, Cochrane Library, Web of Science, Medline and PubMed. For systematic reviews conducted between January 2011 and November 2023. Search terms are described as shown in Table 2.2.

Table 2.2: Search Terms for Review of Reviews

SEARCH TERMS	
Barrers and facilitators	“Barriers and facilitators” OR “Determinants” OR “Factors” OR “Causes”
Behaviour change	“Behavi*r change*” OR “Lifestyle* change*” OR “Lifestyle modification*” OR Behaviour modification*” OR “Lifestyle* Behaviour* Change*”
T2DM	“T2DM” OR “T2DM mellitus” OR “t2dm”

2.2.7 Inclusion and Exclusion Criteria

In terms of the inclusion criteria, this review of reviews considers all systematic literature reviews that address barriers and facilitators of behaviour change in T2DM patients. Reviews were regarded as “systematic” based on the following screening for quality: if the methodology used was explicit and reproducible, had a clearly described search strategy, applied a predefined eligibility criteria in selecting the studies and contained a synthesis of results. The coverage of the review of reviews was global and focused on reviews that looked into barriers and facilitators of behaviour change in T2DM. Only articles that were written in English were selected. The review of reviews considered articles related to T2DM service users as the target population. Articles published between 2012-2023 were considered. The exclusion criteria involved articles that did not pass the quality screening test, did not address barriers and facilitators of behaviour change in T2DM, were not written in English language, did not involve T2DM service users as the population and involved articles prior to 2012.

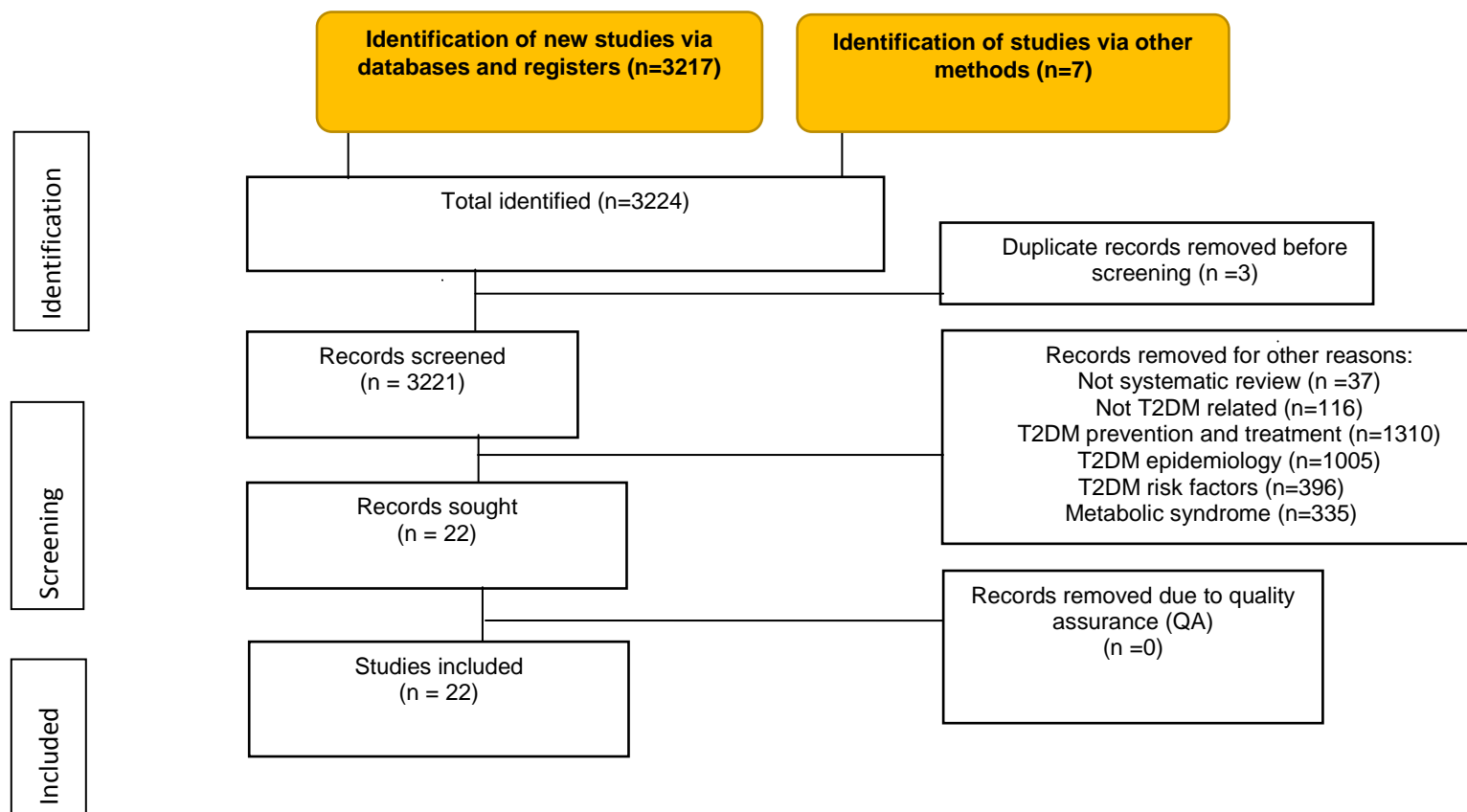
2.2.8 Screening, Study Selection, Data Extraction and Quality Assessment

The primary researcher, Eva Waithaka (E.W), independently reviewed titles and abstracts and selected eligible systematic reviews based on the inclusion criteria. Data extraction was performed based on review author, year of publication, timeframe of studies included, number of articles included in the systematic review, study population, geographical area, review aims, key findings, conclusion and AMSTAR score/rating (Shea et al. 2017). Systematic reviews that met the inclusion criteria were extracted and reviewed in full by the primary researcher.

The quality assessment tool for quantitative studies was used to assess for the risk of bias (Thomas et al. 2003). The Assessing the Methodological Quality of Systematic Reviews-2 (AMSTAR-2) tool developed by (Shea et al. 2017) was used to assess the methodological quality of systematic reviews as it assesses in more detail systematic reviews that include non-random control trials and/or randomised control trials (RCTs) relating to health related interventions. The earlier developed AMSTAR contained 11 domains and was only suitable for RCTs (Shea et al. 2007) whilst the latest AMSTAR-2 is suitable for both RCTs and non-RCTs (Shea et al. 2017). AMSTAR-2 contains critical and non-critical domains. The critical domain comprises of seven items (protocol registration prior to commencing review, adequacy of literature search, justification of excluding studies, risk of bias assessment, appropriateness of meta-analytical methods, risk of bias consideration when interpreting results and assessment of publication bias). The non-critical domain consists of nine items. Each item was graded as yes, partial yes or no and overall quality of the reviews rated as follows;

- i) High- For reviews without any major flaws in the critical domains but with up to three flaws in non-critical domains.
- ii) Moderate- For reviews with more than three flaws in non-critical domains.
- iii) Low- For reviews with one major flaw in a critical domain.
- iv) Critically low- For reviews with more than one major flaw in the critical domains (Shea et al. 2017).

Figure 2.1: PRISMA Flow Chart-Review of Reviews of Barriers and Facilitators of Behaviour Change in T2DM



Adapted from PRISMA 2020 (Page et al. 2021)

2.2.9 Selection of Review Studies

Data on study characteristics and methodological quality were analysed descriptively. AMSTAR-2 rating for each included review is presented and details for each are available on request.

This section presents the results of the reviews included in this review of reviews which contains review articles published between 2011-2023. A total of twenty two (22) systematic reviews were included with a majority (eight) being global (Gupta et al. 2019; Othman et al. 2020; Reshma et al. 2021; Rushforth et al. 2016; Saunders, 2019; Usman and pamungkas, 2018; Vilafranca-Cartagena et al. 2021 and Vongmany et al. 2018), three (3) were from Africa (Bekele et al. 2020; Masaba & Mmusi-Phetoe, 2021 and Suglo & Evans, 2017), two (2) were from Europe (Lopes et al. 2021 and Patel et al. 2017), two were from Asia (Rai et al. 2023 and Sohal et al. 2015), two (2) were from Middle-East and Asia (Alsairafi et al. 2016 and Nor et al. 2019), two (2) were from Europe, America and Asia (Majeed-Ariss et al. 2015 and Vanstone et al. 2017), two (2) were from North America (Heiss & Petose, 2014 and Strom & Egede, 2012) and one (1) was from Middle-East (Al-Sahouri et al. 2019).

2.2.10 Results and Discussion

Various barriers and facilitators of behaviour change in T2DM service users were identified based on the following themes: patients' characteristics, social support, cultural and religious determinants, health systems and institutional determinants, psychological determinants and financial determinants.

2.2.10.1 Patients' Characteristics

This was the most cited determinant of behaviour change in the systematic reviews. Various personal characteristics were found to have an influence on behaviour change in T2DM service users. Patients' knowledge was found to have an effect on behaviour change in T2DM management (Alsairafi et al. 2016; Bekele et al. 2020; Heiss & Petosa, 2014; Majeed-Ariss et al. 2015; Masaba & Mmusi-Phetoe, 2021; Nor et al. 2019; Othman et al. 2020; Patel et al. 2017; Reshma et al. 2021; Rushforth et al. 2016; Saunders, 2019; Sohal et al. 2015; Usman & Pamungkas, 2018 and Vanstone et al. 2017). For instance, Masaba and Mmusi-Phetoe (2021) found that patients' possession of poor knowledge on T2DM cause and self-care influences

behaviour change. For example, some T2DM patients indicated that T2DM comes from God while other patients indicated that the diet recommended is not acceptable by their religion and culture thus affecting adoption of appropriate dietary practices. Usman and Pamungkas (2018) demonstrated that knowledge enhances understanding of patients on appropriate practices such as diet, exercise and adherence to medication thus enhancing positive practices towards T2DM management for knowledgeable patients.

Patients' education also influences behaviour change in T2DM management (Bekele et al. 2020 and Masaba & Mmusi-Phetoe, 2021). As noted in Masaba and Mmusi-Phetoe (2021), patients with higher formal education adhered better to dietary practices that were recommended as compared to their counterparts. Other personal characteristics that influence behaviour change include a patient's demographic characteristics such as age (Heiss & Petosa, 2014; Vilafranca Cartagena et al. 2021) gender (Heiss & Petosa, 2014; Vilafranca Cartagena et al. 2021) status of the disease (Heiss & Petosa, 2014) and patient's BMI (Heiss & Petosa, 2014). Vilafranca Cartagena et al. (2021) opine that older patients and women have lower likelihood of engaging in physical activity. Older subjects are less likely to engage in physical activity due to complications, physiological changes as they age, high prevalence of non-communicable chronic illnesses and a feeling of inability to exercise. Women are less likely to engage in physical activity since they need to overcome barriers such as lack of gender specific facilities for exercise (Heiss & Petosa, 2014; Vilafranca Cartagena et al. 2021).

Patients attitudes also influence behaviour change in T2DM service users (Majeed-Ariss et al. 2015; Patel et al. 2017 and Usman & Pamungkas, 2018). Knowledge alone is not sufficient in behaviour change and should be complemented by positive attitudes in relation to diabetes and treatment plans (Majeed-Ariss et al. 2015).

2.2.10.2 Social Support

Social support from family members and friends was also found to have an effect on behaviour change in T2DM management (Al-Sahouri et al. 2019; Bekele et al. 2020; Gupta et al. 2019; Heiss & Petosa, 2015; Majeed-Ariss et al. 2015; Masaba & Mmusi-Phetoe, 2021; Othman et al. 2020; Rai et al. 2023; Reshma et al. 2021; Sohal et al. 2015; Strom & Egede, 2012; Suglo &

Evans, 2017; Usman & Pamungkas, 2018; Vanstone et al. 2017; Vilafranca Cartagena et al. 2021; Vongmany et al. 2018). Presence of family and friends' support through encouraging the patient, preparation of advocated diet, escorting during exercises was noted to have an influence on behaviour change (Al-Sahouri et al. 2019). The role of family in behaviour change among T2DM service users cannot be under-estimated as the family can either be a facilitator or barrier to behaviour change (Vanstone et al. 2017). T2DM demands specific dietary changes which in a household may be challenging to adapt and adhere to due to because of already established family habits and preferences which may especially be of cultural significance (Vanstone et al. 2017).

2.2.10.3 Cultural and Religious Determinants

Religious and spiritual beliefs can either promote or hinder behaviour change among T2DM service users (Al-Sahouri et al. 2019; Alsairafi et al. 2016; Majeed-Ariss et al. 2015; Nor et al. 2019; Patel et al. 2017; Rai et al. 2023; Saunders, 2019 and Sohal et al. 2015). Some T2DM service users believe in complementary or alternative medicines (CAMs) in the management of T2DM (Saunders, 2019). When such CAMs are incorporated in management of T2DM, patients may withdraw from medical treatment (Al-Sahouri et al. 2019).

According to Alsairafi et al. (2016), behaviour change towards T2DM management is influenced by the religious beliefs of patients, including "fatalism". Fatalism is the belief that Deity controls and predetermines events and that humans have little or no control over their fate. Cases of severe diabetes can cause death, and there exist verses in the Holy Quran that insist on prevention and treatment of diseases. However, religious beliefs and extreme faith that God is in control discourage patients from undertaking activities that contravene the will of God. There also beliefs about fasting, for example during Ramadhan, where people abstain from taking food and drinks between sunrise and sunset. Diabetes patients alter their medication behaviour without considering their doctor's advice (Al-Sahouri et al. 2019; Alsairafi et al. 2016).

2.2.10.4 Health System and Institutional Determinants

The review of reviews also identified health system and institutional determinants of behaviour change in T2DM management comprising of health education (Rai et al. 2023 and Othman et al. 2020), support of health institutions (Masaba & Mmusi-Phetoe, 2021), treatment complexity and convenience (Masaba & Mmusi-Phetoe, 2021; Lopes et al. 2021 and Vilafranca Cartagena et al. 2021), poor perceptions of health systems and health professionals (Masaba & Mmusi-Phetoe, 2021; Lopes et al. 2021; Othman et al. 2020; Alsairafi et al. 2016), health guidelines (Masaba & Mmusi-Phetoe, 2021), lack of access to care systems (Reshma et al. 2021), healthcare providers' skills, knowledge, attitudes and beliefs (Usman & Pamungkas, 2018), insurance (Usman & Pamungkas, 2018), inequity in healthcare (Rai et al. 2023) and facilities (Sohal et al. 2015 and Heiss & Petosa, 2014).

Othman et al. (2020) established that availability of diabetes self-management education (DSME) programmes in healthcare facilities supports self-management of T2DM in the long-term. However, too much information dispensation at one point was not helpful in retaining knowledge on T2DM management thus negatively influencing behaviour change. Failure to support health institutions in mass education, development of treatment guidelines and stocking of drugs was found to lead to non-adherence to treatment plans and recommendations (Masaba & Mmusi-Phetoe, 2021). The issue of treatment complexity was associated with multiple treatment plans, such as drugs and non-pharmacological approaches, being recommended thus negatively influencing adherence (Masaba & Mmusi-Phetoe, 2021).

Adherence to treatment plan and recommended practices was found by Lopes et al. (2021) to be more challenging when patients perceive the treatment to be more complex, painful and costly. In cases of patients who are polymedicated, decreased adherence to plans for treatment and recommended T2DM management behaviours have been observed (Lopes et al. 2021). Behaviour change has also been found to be influenced by poor perceptions of health systems and health professionals. When T2DM users trust health professionals, they are in a position to address their needs and concerns during consultations which ensures adherence to recommended practices for T2DM management (Lopes et al. 2021). In Alsairafi et al. (2016),

weak patient-healthcare provider interaction, as perceived by the patients, hinders proper communication on intended behaviours and also hinders participation by the patients in T2DM management process. Patients who perceive healthcare providers as inexperienced were less likely to adhere to their recommendations (Alsairafi et al. 2016).

Masaba and Mmusi-Phetoe (2021) reported T2DM patients being affected in behaviour change due to poor healthcare professionals' adherence to diabetes management guidelines. Reshma et al. (2021) established that self-care behaviours were influenced by lack of access to systems of care and self-care services such as gyms. Healthcare providers play essential roles in behaviour change through provision of health literacy. Therefore, their beliefs, knowledge and attitudes could affect adherence to T2DM management plan by patients. Inability by healthcare providers to provide proactive, patient-driven management and low capacity to provide adequate and appropriate diabetes self-management education are obstacles to adherence to prescribed self-management (Usman & Pamungkas, 2021). Usman and Pamungkas (2021) further establish that insufficient health insurance acts as a barrier to self-management since some services are limited to insurers and there is no multidiscipline collaboration among healthcare providers and insurers. Therefore, there is restricted reimbursement of insurance funds that only targets pharmacological treatment which acts as a barrier to behaviour change.

Rai et al. (2023) notes inequity in healthcare access and care affected behaviour change. Inequities in healthcare were as a result of language barriers between patients and healthcare professionals in addition to being in a position to negotiate with providers to organise follow-ups. Other T2DM users are barred by language restrictions since they cannot write, read or speak the language of prescription since there are limited opportunities for T2DM presentation in local languages even at the local health facilities. Sohal et al. (2015) view inadequate facilities, especially availability of gender specific facilities, as a hindrance for behaviour change among women in South Asia. Availability of facilities for exercise and ease of access to these facilities were found to be a hindrance to engagement in exercise (Heiss & Petosa, 2014).

2.2.10.5 Psychological Determinants

The review of reviews also identified psychological factors such as self-efficacy (Heiss & Petosa, 2014; Nor et al. 2019; Usman & Pamungkas, 2018; Vilafranca Cartagena et al. 2021), mental components comprising of depression and stress (Vilafranca Cartagena et al. 2021), denial of illness (Reshma et al. 2021), emotions (Vanstone et al. 2017), identity importance comprising of emotional responses and confidence (Majeed-Ariss et al. 2015) and behavioural control (Heiss & Petosa, 2014). Self-efficacy relates to the patients' beliefs that they have the ability to change (Nor et al. 2019). Self-efficacy is significantly linked with adherence to treatment plans and recommended practices. Patients with lower self-efficacy exhibit great resistance to treatment plans and recommendations. Patients with higher self-efficacy believe that they have control over T2DM treatment plan and recommendations and adhere better to any recommendations. Depression in T2DM is associated with poor diabetes self-management and adherence to management activities such as physical activity and recommended diet (Vilafranca Cartagena et al. 2021). According to Vanstone et al. (2016), negative emotions such as loneliness, stress and depression are barriers to dietary changes. Stress can divert focus and energy away from physical activity and diet management.

Majeed-Ariss et al. (2015) noted the importance of self-identity in enhancing behaviour change. How T2DM identify themselves in terms of their emotions especially in response to T2DM diagnosis and living with the illness and confidence levels influence behaviour change. Patients whose emotional response to T2DM diagnosis is negative, full of anxiety, depression, pessimism, resignation and denial are less likely to adhere to self-management practices. Patients whose confidence levels are high as evidenced by demonstration of an empowered perspective to behaviour change are able to embrace new practices towards management. Heiss and Petosa (2014) outline behavioural control in terms of how much control T2DM patients perceive to have over performance of certain behaviours such as physical activity. Though T2DM patients may believe the T2DM to be serious, the perception that they are capable to engage in self-management behaviours can lead to behaviour change resulting to reduced severity.

2.2.10.6 Financial Determinants

Financial determinants of behaviour change range from treatment costs (Bekele et al. 2020; Lopes et al. 2021; Reshma et al. 2021) and financial well-being of households (Masaba & Mmusi-Phetoe, 2021; Nor et al. 2019; Rushforth et al. 2016; Usman & Pamungkas, 2018). According to Lopes et al. (2021). Lopes et al. (2021) categorises treatment costs into two: direct and indirect costs. Direct costs refer to the total amount that a patient pays when purchasing therapy and have been linked with non-adherence to T2DM management especially when the purchase value is high. Indirect costs are related to costs incurred in adherence to diet recommendations, physical activities such as gym services and other T2DM management activities. When these costs are high, T2DM patients are less likely to adhere to behaviour change activities. Reshma et al. (2021) found that medical expenditures attribute the largest portion of diabetes care; however, financial factors such as family income, logistics and income from employment are directly connected to self-care administration. Behaviour change in T2DM patients was found to be lower in patients whose socio-economic status was lower as compared to those in higher socio-economic status (Usman & Pamungkas, 2018).

2.2.11 Strengths of the Review of Reviews

The selection of systematic review journal articles was due to a lack of a comprehensive umbrella review that incorporates findings from different geographic areas of the world which according to the researcher is the first attempt to systematically collate a review of reviews' data on the barriers and facilitators of behaviour change in T2DM. The umbrella review was not limited to a specific location; rather, it focused on systematic reviews conducted in different regions of the globe thus providing a wide scope and a reflection of global outlook of behaviour change determinants.

2.2.12 Limitations of the Review of Reviews

Limitations of this umbrella review include possible bias due to consideration of English-language only systematic reviews. This lead to exclusion of other systematic reviews that potentially contained relevant information for this study. Secondly, it is possible that the search using a select number of terms resulting in identification of 3, 212 articles lacked specificity.

There was therefore an increased chance of missing other relevant articles during the process of selection. Finally, the umbrella review focused on articles published from 2012 to 2023, hence excluding relevant articles published outside these timelines.

2.3 Review Number 2: Systematic Literature Review on Behaviour Change Predictors in Kenya Based on Theories of Behaviour Change

2.3.1 Introduction

The nature of the systematic literature review was a traditional review that involved a manual selection of articles to be reviewed. The preference for this method was based on the reason that it pays attention to the active role of the researcher in reading, interpreting and analysis of research articles (Paré & Kitsiou, 2017). To make the systematic review more detailed, the search commands were defined manually. Different terms used in describing behaviour change theories with regards to health related behaviours were listed so as to find out the behaviour change outcomes in health related behaviours as predicted by the theories of behaviour change. The search was restricted to articles in Kenya. Manually defined search commands enable the researcher to guide the research by defining all the relevant key words that should be extracted. This is advantageous as compared to automated methods in systematic literature review such as text mining where articles utilising different terms that define the same concept may be excluded since they were not included in the search command (Salamon & Sokolowski, 2016). Due to time constraints the systematic literature review was rapid in nature (Dobbins, 2017).

2.3.2 Search Criteria

The systematic literature review was guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses 2020 statement (PRISMA 2020 statement). According to Page et al. (2021), the PRISMA 2020 statement has been primarily designed for systematic literature reviews evaluating health intervention effects, regardless of the included studies' design. Seven stages were used in carrying out the systematic literature review. The first stage was the planning stage which involved formulation of research questions. The review question was: What is the extent of application of the behaviour change theories with regards to health related behaviours in Kenya? This question focused on finding out the behaviour change outcomes in health related behaviours as predicted by the theories of behaviour change in Kenya. The main reason for this focus of the literature review is to report on challenges with changing health behaviours. However, no review study

has compared the behaviour change outcomes in health related behaviours as predicted by the theories of behaviour change.

To achieve the aim of this review, articles that focus on behaviour change outcomes in health related behaviours were searched and retrieved.

2.3.3 Objectives of the Systematic Literature Review

- i) To conduct a literature review on behaviour change theories in health related behaviours in Kenya
- ii) To compare behaviour change predictors based on the theories of behaviour change.
- iii) To examine the facilitators and barriers to health behaviour change in Kenya.

The second phase involved determining the relevant databases. To ensure a comprehensive review, this review began with a systematic advanced search and retrieval of articles related to this study from major academic databases including CINAHL, Cochrane Library, Medline, NICE evidence search, PubMed, Science Direct and Web of Science for easy and fast retrieval of relevant articles (Cooper et al. 2018). The choice of these databases is based on their wide content of publications on the research question in the current systematic literature review. Additionally, journals contained in these databases are of standards of high quality and impact.

Reviews should be unbiased. A common form of bias is publication bias which may occur when there is a higher likelihood to publish studies which obtain positive results with statistically significant differences rather than studies with negative results (Cooper et al. 2018; Perestelo-Pérez, 2013) also known as grey literature (Hajje & Mulla, 2018). Another form of bias is the exclusion of studies that may be relevant to the review but are in different languages commonly known as language bias (Perestelo-Pérez, 2013). To avoid these biases this was then followed by other search methods including Google and Google scholar were used to identify other relevant unpublished articles including conference abstracts, theses and contacts with experts in the field.

The third phase determined the admissibility criterion. The scientific articles that were included in the review were those published from 2012 to 2022. The study's scope was limited using the admissibility criterion described as follows. First, the search used different linked terminologies that are linked to behaviour change theories in health related behaviours in Kenya. Table 2.3 shows the search terms utilised for this review. Secondly, articles written in English-language were filtered. The third phase limited the search to categories that were closest to the study area.

Table 2.3: Search Terms with Synonyms

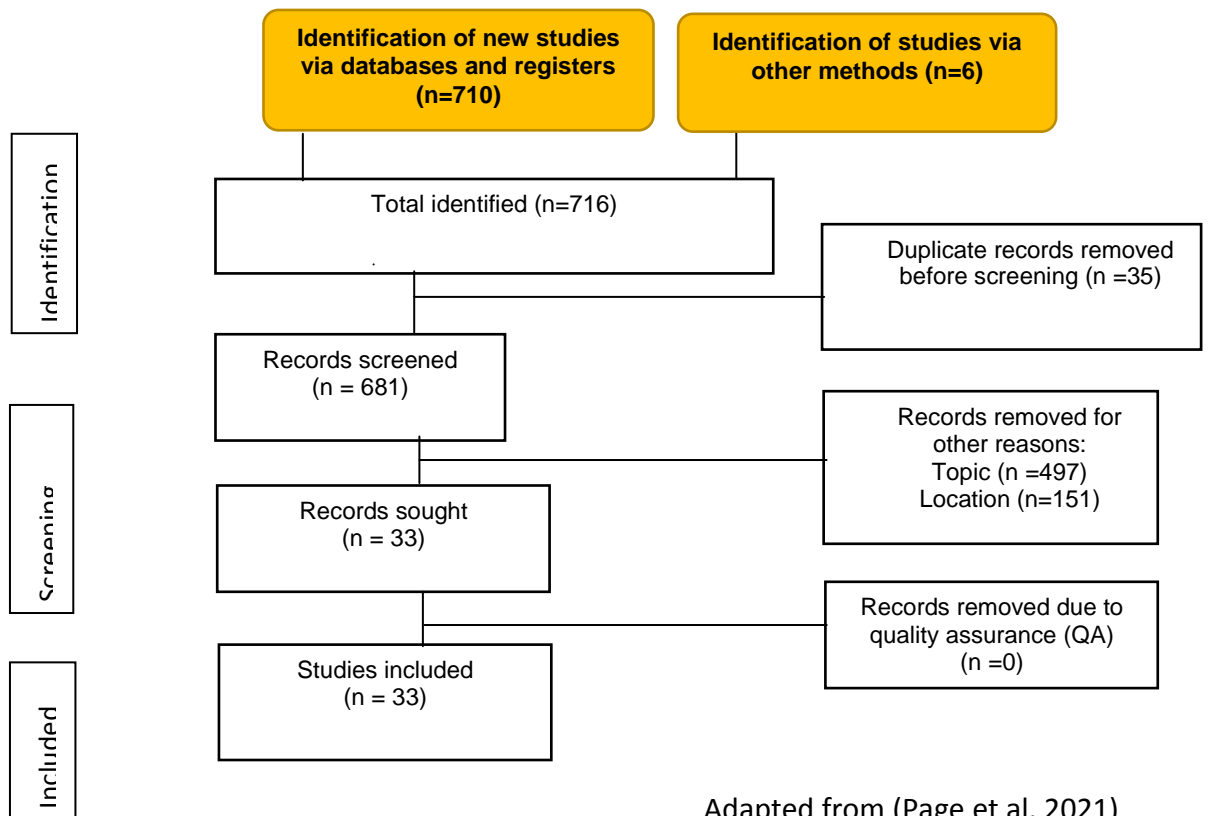
SEARCH TERMS	
Theory	Theor* OR Model* OR Framework* OR Concept* OR "Health belief model" OR "protection motivation theory" OR "theory of reasoned action" OR "theory of planned behaviour" OR "precaution adoption process model" OR "trans-theoretical model"
Behaviour change	"Behavi*r Change*" OR "Lifestyle* Change*" OR "lifestyle modification*" OR behave*r modification*" OR "Lifestyle* Behavi*r* Change*"
Health or disease	health* OR wellbeing OR well being OR fit* disease* OR illness* OR sickness* OR condition* OR "disease prevention*" OR "disease management*"
Kenya and its 47 Counties	"Kenya*" OR Keny* OR Mombasa OR Kwale OR Kilifi OR Tana River OR Lamu OR Taita Taveta OR Garissa OR Wajir OR Mandera OR Marsabit OR Isiolo OR Meru OR Tharaka Nithi OR Embu OR Kitui OR Machakos OR Makueni OR Nyandarua OR Nyeri OR Kirinyaga OR Muranga OR Kiambu OR Turkana OR West Pokot OR Samburu OR Trans Nzioia OR Uasin Gishu OR Elgeyo Marakwet OR Nandi OR Baringo OR Laikipia OR Nakuru OR Narok OR Kajiado OR Kericho OR Bomet OR Kakamega OR Vihiga OR Bungoma OR Busia OR Siaya OR Kisumu OR Homa Bay OR Migori OR Kisii OR Nyamira OR Nairobi

An advanced search with the command: Theory= ((Theor* OR Model* OR Framework* OR Concept* OR "Health belief model" OR "protection motivation theory" OR "theory of reasoned action" OR "theory of planned behaviour" OR "precaution adoption process model" OR "trans-theoretical model") AND Behaviour change= ("Behavi*r Change*" OR "Lifestyle* Change*" OR "lifestyle modification*" OR behave*r modification*" OR "Lifestyle* Behavi*r* Change*")) AND Health=

(health* OR wellbeing OR well being OR fit*disease* OR illness* OR sickness* OR condition* OR "disease prevention*" OR "disease management*") AND Kenya= ("Kenya*" OR "Keny*" OR "Mombasa" OR "Kwale" OR "Kilifi" OR "Tana River" OR "Lamu" OR "Taita Taveta" OR "Garissa" OR "Wajir" OR "Mandera" OR "Marsabit" OR "Isiolo" OR "Meru" OR "Tharaka Nithi" OR "Embu" OR "Kitui" OR "Machakos" OR "Makueni" OR "Nyandarua" OR "Nyeri" OR "Kirinyaga" OR "Muranga" OR "Kiambu" OR "Turkana" OR "West Pokot" OR "Samburu" OR "Trans Nzioua" OR "Uasin Gishu" OR "Elgeyo Marakwet" OR "Nandi" OR "Baringo" OR "Laikipia" OR "Nakuru" OR "Narok" OR "Kajiado" OR "Kericho" OR "Bomet" OR "Kakamega" OR "Vihiga" OR "Bungoma" OR "Busia" OR "Siaya" OR "Kisumu" OR "Homa Bay" OR "Migori" OR "Kisii" OR "Nyamira" OR "Nairobi")) was carried out.

The fourth phase entailed a preliminary reading of the selected articles involving the heading, abstract and key words. Articles with no direct link to the area of the study were not considered for further analysis. The fifth phase comprised of knowledge development of the topic under study by reading through the articles selected. The sixth stage involved selecting articles that only discussed behaviour change theories in health related behaviours in the Kenyan context. The article search results were screened by reading the title, abstract and if relevant a full text read. This review used the Preferred Reporting Items for Systematic Reviews (PRISMA) to show the selection process of the articles (Page et al. 2021) including literature search. This is presented in Figure 2.2;

Figure 2.2: PRISMA Flow Chart-Application of Behaviour Change Theories



2.3.4 Data Analysis

The seventh phase involved analysis of the extracted articles. An interpretative approach was used to analyse the contents of the documents gathered based on the context of the research questions. Themes were constructed guided by the research questions of the study. This ensured that the analysis was structured to respond to the questions of this study.

2.3.5 Results

2.3.5.1 Behaviour Change Theories in Health Related Behaviours in Kenya

A total of 33 studies that adopted behaviour change theories in explaining health related behaviours in Kenya were identified. Health belief model was the most frequently adopted model in explaining health related behaviours in Kenya (n= 21; 63.6%), theory of planned behaviour (n= 6; 18.2%), theory of reasoned action (n = 3; 9.1%), social cognitive theory (n = 3; 9.1%), protection motivation theory (n = 3; 9.1%), Capabilities, Opportunities, Motivations and behaviour (COM-B) change model (n = 2; 6.1%) and Precaution adoption process model (PAPM) (n = 1; 3.0%). Four studies (n =4; 12.1%) utilised two theories distributed as follows: one study utilising HBM and TPB, one study adopting HBM and social cognitive theory, one study adopting protection motivation theory and social cognitive theory and another study utilising HBM and TRA. Lastly, one (n = 1; 3.0%) utilised three theories, HBM, TPB and social cognitive theory.

2.3.5.2 Behaviour Change Predictors Based on Theories of Behaviour Change

Theories of behaviour change have been utilised to explain predictors of behaviour change on a range of health issues. From the 21 articles identified in the systematic literature review to apply the HBM, six broad components have been identified. One is perceived susceptibility which refers to a person's perception that a threat may occur. The second component is the perceived severity which is an individual's perception of how serious a health situation is. Perceived benefit, the third component, relates to an individual's perception of how a recommended action would result to a decline in the risk of a threat in health. The fourth component, perceived barriers relate to impediments towards adopting a behaviour. Cues to action, the fifth component, relate to triggers that prompt

engagement in behaviours that promote health. Lastly, self-efficacy is an individual's perceived capacity to perform an action that is recommended.

Perceived susceptibility as outlined in HBM was found by Ngugi et al. (2012) to predict behaviour change in cancer screening. Women in rural areas did not seek cancer screening since they perceived those in urban areas to have a higher likelihood of being affected since they ate "funny food" as compared to the poor who ate fresh food. Further, those who lived in the city were at a higher risk of cancer due to pollution in the urban areas as compared to those in rural areas where air is unpolluted. Morema et al. (2014) reinforces these findings by noting that individuals with no knowledge on cancer susceptibility have a low likelihood of being screened. Vermanderee et al. (2016) was of the opinion that perceived susceptibility to HPV affected willingness to vaccinate against HPV but did not have a direct influence on uptake of HPV vaccine. Oluoch et al. (2017) found perceived vulnerability to HIV and AIDs which explains individual's susceptibility to the disease to explain increased likelihood of home-based testing and counselling thus resulting in increased uptake of ART. To influence acceptability of male circumcision as a strategy for prevention of HIV and AIDs Otteng et al. (2020) noted that communication needs for circumcision should target uncircumcised men's susceptibility for HIV and AIDs.

Kigatiira (2020) drew on perceived severity component of HBM to understand why boda boda riders may be willing or not to participate in Covid-19 preventive measures. Appeals of fear were found to predict preventive measures of Covid-19 among boda boda riders where they adopt preventive measures if they feel they are susceptible to Covid-19, arrests by police, two-weeks compulsory quarantine, fines' payment and impounding of motorcycles. Gatumo et al. (2018) indicated that women perceived cervical cancer as a "scary" disease and therefore sought screening early enough. Katirayi et al. (2021) opined that the youths were discouraged from undergoing HIV testing due to the perception that being HIV-positive was equivalent to a death sentence; taking ARVs daily was also viewed as not easy thus also discouraging testing. The perception by women that breast cancer is a fatal disease influences breast cancer screening (Kisiangani et al. 2018).

Odeny et al. (2014) noted that diagnosis of HIV among infants should be encouraged through messages that do not instill fear in the mothers. When messages do not perceive HIV and AIDs as a scary disease, mothers seek early HIV diagnosis thus preventing mother-to-child transmission. Ngugi et al. (2012) linked low cervical cancer screening among women to perceived severity of the disease where women liken cervical cancer to AIDs by stating that there is no need for screening since it has no cure and once diagnosed one will definitely die.

Perceived benefits also influence behaviour change as outlined in Nyaoke et al. (2017) who indicated social benefits, associated health benefits and financial benefits to have an effect on volunteers to engage in clinical trials for HIV vaccine. This was also echoed in Fleming et al. (2017) who found that increased use of antenatal care and delivery services among mothers was prompted by incentives provided and desire for good birth outcomes. Mason et al. (2015) found increased likelihood of antenatal care and delivery care utilisation among women to be linked to better management of complications. In Otteng et al. (2020), uptake of male circumcision was influenced by perceived benefits such as hygiene, prevention of HIV infection, enjoyable sex and the act being smart and trendy. In Ngugi et al. (2012), perceived benefits of being treated in case of early detection and ability to detect other infections during screening are likely to affect cervical cancer screening among women.

The HBM also outlines that perceived barriers also affect behaviour change towards health related activities. Mason et al. (2015) findings note that women are less likely to seek antenatal and delivery care if they perceive that clinical staff's attitude to be unfriendly, expected long waiting times, expect to be tested for HIV and Aids and if the cost is high. In HPV vaccine uptake, Vermandere et al. (2016) list father's refusal for the child to be vaccinated as a foreseen barrier while Naanyu et al. (2016) list 27 barriers to hypertension care broadly categorised into individual and supply side barriers. Barriers to early breast cancer detection were outlined in Kisiangani et al. (2018) to include facility barriers, inadequate information and low income status. In the uptake of male circumcision for HIV prevention, perceived

barriers included attitudes and beliefs towards circumcision and time consuming for income generating activities.

Cues to action trigger positive behaviour. For instance, Ngugi et al. (2012) noted that women were prompted to undergo cervical cancer screening as a result of having friends or relatives who had been infected by the disease. Another cue to action comprised of having friends who had gone for screening and had advised them to be checked too while others were prompted to be checked by their friends or relatives working in the health sector. Self-efficacy is also a predictor for health related behaviour change as noted by Vermandere et al. (2016) who found that the feeling that participants perceived themselves capable of taking their children for HPV vaccination increased uptake. In Ngugi et al. (2012), women who had evidence of previous cervical screening attendance had intentions and confidence of attending next cervical cancer screening.

The theory of planned behaviour was also common in predicting behaviour change in health related issues. According to TPB, behaviour change is a function of attitude, subjective norms and perceived behavioural control. Attitude relates to beliefs concerning consequences of behaviour change while subjective norms relate to a person's estimate of the social pressure to engage or not engage in behaviour change. Perceived behavioural control refers to a person's confidence in engaging in behaviour change. Mwaliko et al. (2021) utilised TPB and found that clinical practitioners were motivated to conduct gynaecological examination by external variables of being a nurse and manageable workload of attending to patients not exceeding 50 per day. Nganda et al. (2020) utilisation of theory of planned behaviour in explaining the factors that influence youths' decisions for condom use found that perception by the youth that they are not risk of HIV infection and that condoms were of low quality obstructed use of condoms. Attitude of the youth towards HIV and AIDs, family members' and friends' opinions were also found to have a significant effect on condom use among the youth (Nganda et al. 2020). A study using theory of planned behaviour to establish cultural factors affecting prostate cancer screening among Kenyan men identified fatalistic beliefs, fear and pressure from family members to be the significant cultural factors (Mutua et al.

2017). Koyio et al. (2013) utilised a TPB-based questionnaire with 47 items and established that primary healthcare providers were influenced to conduct oral examination for oropharyngeal candidiasis by their attitudes and subjective norms.

Behaviour change in health related issues can also be explained by the theory of reasoned action (TRA). Three factors explain behaviour change as outlined in TRA: subjective norms linked to the behaviour, attitude of individuals towards the behaviour and intention by the individual to engage in behaviour change. Smillie et al. (2014) utilise TRA to explain that there are structural and individual barriers comprising of fear of stigma, depression and poverty to HIV care after diagnosis. The TRA is also utilised in Smillie et al. (2014) to outline facilitators of HIV care as family and friends support. Nyawade et al. (2016) while utilising TRA to study health professionals' beliefs about supporting exclusive breastfeeding found factors such as support by colleagues at workplace, mothers or couples support and disapproval by breast milk substitute companies to have a significant effect.

Social cognitive theory by Bandura (1989) offers an explanation of behaviour change by proposing that individuals have the capacity to influence their own behaviours through an interaction of emotional, cognitive and personal factors, action and environmental factors. This is evident in Mokaya et al. (2022) who established predictors of health dietary practices in adults with T2DM using social cognitive theory to comprise of internal facilitators such as food preparation and gardening skills, external facilitators such as inaccurate information and beliefs on dietary practices, family support, proximity to food selling points and food availability.

Protection motivation theory (PMT) by Rogers (1975) explain behaviour change through the influence of appeals of fear. Protection motivation theory explains behaviour change as a result of perceived threats and the need to avoid outcomes that are negative. Riang'a et al. (2017) utilise PMT to explain nutritional behaviours of pregnant women. The study found that perceived health threats that influence pregnant women's nutritional behaviour include haemorrhage, abstracted labour, complications or other diseases. Utilisation of PMT by Muturi (2022)

established that media and digital information sources when used to appraise threats of Covid-19 thus promoted self-protection behaviour during pandemics.

Capabilities, opportunity, motivation and behaviour change model (COM-B model) explains behaviour change using three domains: capability, opportunity and motivation. Capability refers to having the required physical capacity, skills or knowledge and stamina to engage in activities involving behaviour change. Opportunity refers to the factors external to the individual and influence an individual's ability to engage in behaviour change. Motivation refers to brain's processes that direct and energise behaviour change. Motivation under COM-B model is categorised into reflective motivation and automatic motivation. Under reflective motivation, there is planning, beliefs and reflection about an individual's capacity to perform an act, that is self-efficacy, while under automatic motivation, emotions and impulses spark motivation, for instance pleasure or fear. Oketch et al. (2019) utilised the COM-B model to explain participation of women in cervical cancer screening and found capability and opportunity domains under COM-B to facilitate screening. Capability was explained through knowledge, beliefs, encouragement from peers and partners and desire for good health outcomes. Opportunity dimension was explained by factors such as proximity to screening facilities, privacy and comfort. The motivation dimension explained barriers to cancer screening such as fear of the disease and death linked to cervical cancer. McClintic et al. (2022) adopted the COM-B model to identify psychological capabilities of caregivers in determining infants' dietary needs to comprise of knowledge and skills while physical and social opportunities that influenced diversity in infants' nutrition to include time limits, competing priorities for caregivers, diverse foods' unavailability and limited accessibility. Motivation dimension that influenced infants' nutrition included fears of negative effects in relation to specific diets and recommended practices.

The precaution adoption process model (PAPM) by Weinstein and Sandman (1992) outlines seven stages that are followed in taking an action to change a risky behaviour. The first stage is unawareness stage where a person is not aware of the health issue; the second stage involves learning of the dangers of the health issue.

The third stage is the decision making stage where a person is considering to either take an action or not take one. If the decision is to take no action, a person moves to stage 4 which is halting the process. If the decision is to take an action, a person moves to stage 5 which is adopting the precaution. The decision to adopt behaviour then transitions to stage 6 which is initiation of the behaviour. Lastly, stage 7 involves maintaining the behaviour. Omollo (2016) adopted PAPM to explain factors that influenced birth attendance choice by mothers. The study found that mothers preferred government facilities as compared to traditional birth attendants due to presence of skilled staff, availability of medicines and equipment. However, some mothers still preferred traditional birth attendants due to payments' flexibility, good relations, odd hours' accessibility, cultural reasons (avoid being attended by male birth attendants) and fear of being tested for HIV under the programme of prevention of mother to child transmission (PMTCT).

CHAPTER THREE: METHODOLOGY

3.1 Research Paradigms

Mackenzie and Knipe (2006) outline research paradigm as the 'worldview' of a researcher. This worldview relates to a researcher's perspective, or school of thought, or thinking, or a collection of beliefs that are shared, which informs research data's interpretation or meaning (Kivunja & Kuyini, 2017). According to Lather (1986), a research paradigm is an inherent reflection of the beliefs of a researcher regarding the world being lived in or the world that a researcher intends to live in. Guba and Lincoln (1994) define research paradigm as the conceptual lens through which methodological aspects of research are examined by the researcher so as to determine the research methods to be utilised and how data analysis will be done. In qualitative research, Denzin and Lincoln (2000) outline research paradigms as constructions in human beings dealing with principles that indicate the position that the researcher is coming from so as to create meaning entrenched in given data. Paradigms are therefore important since it is through them that beliefs and dictates are provided for researchers in a particular area, which influence what is to be studied, how the study will be done and how the study's results will be interpreted. Through research paradigms, the philosophical orientation of the researcher is defined which plays a significant role for decision making in the entire research process, including methodology and methods choice. A research paradigm informs how to construct meaning from the data gathered, based on researcher's individual experiences, that is, where the researcher is coming from (Velmans et al. 2021). The four main features of research paradigms will be discussed: ontology, epistemology, methodology, and axiology (Sullivan, 1991).

3.1.1 Ontology

Ontology of a paradigm concerns the assumptions that are made so as to believe that something is real or makes sense or the very nature or essence of a social phenomenon under investigation (Siddiqui, 2019). Ontology studies reality or nature of existence in addition to basic categorisation of things in existence and how they relate. It helps a researcher in the conceptualisation of reality's nature and form and what the researcher believes can be known regarding the reality.

Under ontology, philosophical assumptions about reality's nature help understand how a researcher make meaning of the data gathered. These assumptions help in orientation of the researcher's thinking about the problem under research, how significant the problem is and how it should be approached so as to provide a solution. Ontology helps in provision of an understanding of the constituents of the world since it is known (Scott & Usher, 2004).

Ontology is the philosophical study of the nature of reality and how there may be different perceptions of what is known (Busetto et al. 2020). The choice of decisions on research methods to be utilised in a study are formed by a researcher's ontological perspective depending on whether he/she sees an external, independent reality or an experienced, constructed reality based on individual or social understanding (Jackson, 2013). The perspective taken by the researcher determines whether quantitative research is necessary for a measurable and objective study or a qualitative research for a interpretative and subjective study or a mixed-methods research design (Jackson, 2013).

3.1.2 Epistemology

Epistemology describes how something is known; how the truth or reality is known; put in other words what comprises as knowledge within the world (Cooksey & McDonald, 2011). Epistemology is the philosophical study of knowledge and search for truth (Alharahsheh & Pius, 2020; Jackson 2013), i.e. what counts as knowledge and how it is obtained (Jackson, 2013). Epistemology concerns knowledge bases, that is, its nature, forms, acquisition and its communication to other parties. The focus under epistemology is on human knowledge and comprehension nature that the researcher should acquire so as to be in a position to widen understanding in his/her field of research. While considering the epistemology of his/her research, a researcher determines whether knowledge can be acquired on one hand, or should be experienced. The nature of the knowledge and the relationship between one who knows and what should be known are also determined. Further, the relationship between the researcher and what is known is determined. These determinations are important in helping the researcher towards positioning

themselves in the context of the research so as to determine what else is new, with the basis of what is known.

In order to understand the epistemological component of paradigm, the researcher asks the important question 'How do I know what I know?' which forms the foundation of truth investigation. Other factual questions are also asked in epistemology such as 'What should count as knowledge?' and 'How do we know the truth?' (Davidson, 2000). In an attempt to articulate the solutions to these questions, researchers can utilise four knowledge sources as outlined in Slavin (1984): intuitive, authoritative, logical and empirical. Reliance on knowledge forms such as faith, beliefs and intuition comprises of intuitive knowledge epistemological basis while reliance on data obtained from people who know, organisation's leaders and books comprise of authoritative knowledge epistemology basis. If emphasis is put on reason in knowledge acquisition, then this is logical knowledge while emphasis on understanding that knowledge can be best obtained from objective facts that are demonstrable and sense experiences, then the epistemological approach is empirical in nature.

According to Kivunja and Kuyini (2017), epistemology is significant since it enables the researcher establish the faith put in his/her data. This is because it affects how a researcher uncovers knowledge in the context under investigation. A researcher's epistemological stance is key to the choice of research methodology as the purpose of research includes obtaining new knowledge. The way this new knowledge is developed is dependent on the methodology and its rigour which ultimately determines the strength of the claim of new knowledge (Jackson, 2013). Epistemology lays the ground for the discovery of ontological truth (Charmaz, 2014). According to Ankersmit (2021), epistemology and ontology are interwoven, and neither could exist without the other.

In a study, there are different epistemological positions that can be taken by a researcher. Objective epistemology is the first one and its argument is that reality's existence is independent of the mind of an individual. The second epistemological position is subjective epistemology whose argument is that knowledge can be generated through personal experiences with the researcher and interaction with

respondents (Kivunja & Kuyini, 2017). Relational epistemology is another position whose argument is that there exists a relationship between the researcher and participants which is relative to the researcher who determines what fits a particular study as per the research questions (Saunders et al. 2009).

3.1.3 Methodology

Broadly, methodology refers to the methods, research design, procedures and approaches used in a well-planned research (Keeves, 1997). Cumulatively, methodology demonstrates the logic and flow of systematic processes that are followed when conducting a research. It also includes assumptions that are made, encountered limitations and their mitigation or minimisation. Methodology focuses on how we get to know the world or acquire knowledge about a portion of it (Kivunja & Kuyini, 2017). In selecting the methodology to be adopted in a research, the researcher should consider how to go about obtaining the required data, knowledge and understandings that will enhance in answering the research questions and thus contribute to knowledge.

According to Creswell (2003), two basic types of research methodologies exist: quantitative and qualitative research methodologies. Creswell (2014) adds a third research methodology referred to as mixed methods. Each methodology has unique properties in relation to its research designs and methods. Therefore, it is essential that a researcher selects an appropriate methodology for a given study. Quantitative methodology incorporates research designs such as experimental, correlational, quasi-experimental and survey designs. Further, quantitative methodology emphasises on procedures that are structured and utilisation of instruments that measure numerical data such as laboratory tests, measurements and questionnaires (Makombe, 2017). Under quantitative methodology, numerical data is collected and statistical analysis, such as descriptive analysis and hypothesis testing, is utilised.

In qualitative methodology, different research designs such as case study, phenomenology, narrative inquiry, ethnography and grounded theory can be adopted. Qualitative methodology utilises procedures that are relatively unstructured and data collection instruments such as unstructured and semi-structured interviews

and observation schedules. Qualitative methodology is reliant on qualitative data or data that takes the form of pictures, words and objects. Small samples are utilised in this methodology (Williams, 2007).

The mixed methodology combines quantitative and qualitative approaches (Creswell, 2014). In this methodology, methods of data collection and analysis from quantitative and qualitative methodologies are incorporated in a single research (Shannon-Baker, 2016). The quantitative approach under mixed methodology is selected to respond to questions of research that require numerical data and evaluation while the qualitative approach is adopted for research questions that require textual data and exploration and the mixed methods approach for questions that require both numerical and qualitative data (Williams, 2007).

3.1.4 Axiology

According to Collingridge and Gantt (2019), axiology is the ethical considerations that must be considered when designing a study project. It examines the philosophical approach to making valuable or correct decisions (Kaushik & Walsh, 2019). It requires identifying, analysing, and comprehending proper and improper conduct principles pertaining to the research (Nguyen et al. 2022), It analyses the value we will assign to the various parts of the research, the participants, the data, and the audience to whom we will present the findings (Basias & Pollalis, 2018). Axiology responds to the inquiry: 'What is the nature of ethical behaviour or ethics?'. In response to this inquiry, the researcher should consider the respect for human values for every participant involved in the research. The following questions facilitate this consideration. What values will the researcher live by or be guided by in the course of the research? What should be done for all rights of participants to be respected? What moral issues should be considered in a study? How will the moral issues that arise be addressed? How will the goodwill of the participants be secured? How will the research be conducted in a manner that is peaceful, respectful and socially just? How will the researcher minimise or avoid psychological, physical, social, legal economic or any other form of risk or harm? (Australian Research Council, ARC, 2015).

According to Mill (1969), these questions can be best answered guided by four ethical conduct criteria: teleology, fairness, deontology and morality. Teleology is a morality theory whose postulation is that it is a moral obligation to do what is right or desirable in every human undertaking. Under teleology, attempts should be made in research to ensure that results of research into meaningful outcome will be of satisfaction to as many stakeholders as possible. Deontology stipulates that every action undertaken in a research has its own consequence. The criterion of morality demonstrates the moral values to be upheld in the entire research period, for instance, being truthful in data interpretation. Fairness criteria ensure that the researcher is fair to all the participants in a research and ensures the upholding of their rights. This criterion ensures that the research actions are fair, the research participants are treated in the same way and the researcher's actions do not demonstrate discrimination or favouritism towards any participants in the study. Under axiology, the researcher should demonstrate ethical conduct that is best by demonstrating behaviours that are right as the research is conducted. This will ensure that the research is of high quality.

3.2 Paradigms

Candy (1989), one of the most influential researchers in the field grouped research paradigms into three main categories: positivism, interpretivism and critical paradigms. However, a fourth paradigm has been proposed by Tashakkori and Teddlie (2003a; 2003b) which integrates elements from the three paradigms and is referred to as pragmatism.

3.2.1 Positivism

Positivism as popularised by Comte (1975) is interpreted as a philosophy that is reliant on observation and one that sees individuals as phenomena which can be scientifically studied. Put otherwise, human beings are reduced into variables which can be scientifically studied under positivism. According to Richards (2003), positivism assumes existence of reality independently of humans. Ontologically, positivism assumes realism (Fard, 2012). This implies the objectivity, quantifiability and measurability of reality through processes that are researcher independent. Epistemologically, positivism assumes objectivity by assuming that the researcher

and the object being studied are different bodies with neither exerting influence on the other (Fard, 2012). The researcher is therefore detached from the participants making it possible to have objective knowledge. Researchers act as objective observers and study a phenomenon that is in existence independently of them; they do not manipulate what is being observed and offer description of a phenomenon in its real form. Rehman and Alharthi (2016) point out that positivism searches for relationships whose nature is cause and effect with an aim of providing explanations and making predictions based on outcomes that are measurable.

Gall et al. (2003) cites Hutchinson (1988) and state that the perception under positivism is that the world is 'out there' and open for study in a form that is more or less static. Under positivism, there are laws that govern phenomena, and through application of scientific methods, these laws can be formulated and presented through statements that are factual. A positivist approach to research emphasises experimentation, observation, control, measurement, dependability, and validity (Ranse et al. 2020). This suggests a quantitative method.

3.2.2 Interpretivism

Interpretivism emphasises understanding of individuals and how they interpret the world that surrounds them. As a result, researchers who adopt an interpretive paradigm start with individuals and attempt to understand how they interpret the world around them. The individuals' actual words act as evidence of reality (Krauss, 2005). Interpretivism requires that a phenomenon is understood through the participant's view rather than that of the researcher (Cohen et al. 2007). According to Guba and Lincoln (2005), interpretivism discards the idea that a reality that is single and verifiable exists independent of the researcher's senses. Ontologically, interpretivism assumes relativity whose claim is that generation or gaining of knowledge happens from the point of view of a directly involved individual. The advocacy for this is that is any phenomenon under study contains multiple realities. Epistemologically, interpretivism assumes subjectivity whose claim is that the knowing process involves both the researcher and the participants with reality being influenced by context (Nguyen, 2019). According to Punch (2005), subjectivity assumes that meaning is made of the data through the researcher's own thinking as

guided by their interactions with the respondents. By engaging the participants interactively, the researcher intermingles, questions, dialogues, listens, reads and writes and records information.

Gall et al. (2003) point out that those researchers who adopt interpretivism gather mostly qualitative data from the respondents. Therefore, the approach to data analysis is inductive where the researcher attempts to discover patterns in the raw data. The patterns are then collapsed into wider themes which help understand a phenomenon and in theory generation. Gall et al. (2003) further add that interpretivists employ qualitative data generation methods and though there may be involvement of numerical data, it is not relied upon.

3.2.4 Critical Paradigm

Unlike the previous approaches that confirm the status quo, the critical paradigm challenges the status quo and strives to ensure societal balance (Singh & Estefan, 2018). According to Asghar (2013), the paradigm is concerned about social ties, including power relations, class, gender, economy, religion, education, and other core institutions that contribute to the social system. The approach mainly seeks human emancipation to liberate people from the circumstances that enslave them (Ricke, 2018). The critical paradigm aims at changing the society but not merely explaining or understanding it (Patton, 2002). Ontologically, a critical paradigm's position is based on historical realism which assumes that there is existence of reality but it has been moulded by political, cultural, gender, ethnic and religious factors whose interactions create a social system. The epistemological position of a critical paradigm is subjective which assumes that no object can undergo research without being manipulated by the researcher. Researchers who adopt critical paradigm attempt to be self-conscious regarding their epistemological presuppositions which they communicate clearly prior to embarking on any research. This ensures there is no confusion with regard to any political and epistemological baggage brought by the researcher to the investigation location (Kincheloe & McLaren, 2005).

Asghar (2013) states that the critical paradigm is flexible to adopt any methodology or technique which could help in making improvements in an unbalanced social

system and also observe that critical researchers may utilise qualitative, quantitative or mixed methods. However, Richards (2003) states that in critical paradigm, it is qualitative data that is mostly generated.

3.2.5 Pragmatism

According to Kelly and Cordeiro (2020); Alise and Teddlie (2010) and Patton (1990) , pragmatism is a research philosophy which claims that there is no single way to learn but many different ways of understanding as there are multiple realities. Tashakkori and Teddlie (2003a; 2003b) advocate for pragmatism by stating that what is needed in research is a worldview where research methods provided are the ones that are perceived to be the most appropriate for a given phenomenon under study. Pragmatists therefore advocate for adoption of most practical approaches that are pluralistic in nature which allows a combination of methods which when utilised in a research problem could unearth the actual participants' behaviour, the beliefs behind the behaviours and the likely consequences from different behaviours. Pragmatism advocates for relational epistemology. This means that relationships in research are best established through methodologies that the researcher considers most appropriate to that research. Ontologically, pragmatism adopts a non-singular reality which implies that no single reality exists and individuals possess unique reality interpretations. Axiologically, pragmatism adopts a value-laden approach where research with benefits to the people is conducted (Kivunja & Kuyini, 2017).

Knowledge of the multiple realities is gained through several research methods i.e. qualitative and quantitative (Kelly & Cordeiro, 2020). Through this integration, the researcher hopes to understand better the problems under study from the views of people who lived the experiences and from scientific testing of facts (Michie et al. 2018). This mixed-method approach will enhance a more detailed understanding of research questions and results, leading to a balanced conclusion on the challenges and opportunities of the research problem. Pragmatism is therefore the most appropriate research philosophy because of its significance to the research questions and thus adopted for this study. According to Kaushik and Walsh (2019), unlike other approaches, this strategy is adopted based on the ability of the

methods to answer the research questions and not principally due to the researcher's commitment to a paradigm and the philosophical doctrine on which it is supposedly based. In this regard, the research questions are prioritised, and the epistemological and ontological arguments are side-lined, clearing the path for research combining quantitative and qualitative studies (Kaushik & Walsh, 2019). Kaushik and Walsh (2019) further point out that the supremacy given to the research question in this approach means that the research that combines quantitative and qualitative data is feasible, desirable and also required to address particular research questions or combinations of research questions. Thus, the pragmatic approach becomes more suitable as it allows the collection of both qualitative and quantitative data, which will allow the understanding of behaviour change among T2DM patients and the perspectives of Kenyan healthcare professionals. Though pragmatism advocates for utilisation of mixed methods, qualitative methodology was dominant in this thesis with quantitative methodology being less so.

3.3 Quantitative, Qualitative and Mixed Methods Research Designs

Selecting the most suitable research methodology to use in a research study is crucial in conducting effective scientific research (Kaushik & Walsh, 2019). This process is mainly based on the researcher's ability to link research objectives to the characteristics of the available research methods (McDaniel & Storey, 2019). Qualitative and quantitative approaches are the two major techniques that scholars have to choose from. However, a third research design has been proposed, the mixed methods research design, which draws from the strengths of both quantitative and qualitative research designs and ensures that their weaknesses are minimised. These approaches show major differences as discussed.

3.3.1 Quantitative Research Design

The research approach often involves the empirical and systematic investigation of the different phenomena through the use of statistics and mathematics and involves processing numerical data (Ricke, 2018). According to Basias and Pollalis (2018), the statistical analysis utilised in quantitative research is a major area in mathematics that is majorly used when analysing and processing large volumes of

quantitative data to verify existing hypotheses and test a theory. It is also utilised when there exists uncertainty relating to theories (Ricke, 2018). Basias and Pollalis (2018) also note that in the quantitative approach, data is normally analysed using distinctive statistical software.

Quantitative research design begins with a theoretical framework that is established from literature review; a hypothesis then emerges from the framework from which variables are identified. The hypothesis can also be converted into aims and objectives of a research. In a quantitative research design, it is only mandatory to have a hypothesis when the method of choice is experimental. However, the most appropriate research method should be determined, the sample calculated and the instruments of data collection designed within the confines of that method. Once data collection is complete, data analysis is conducted to support or reject the hypothesis. Generalisations are then made guided by the findings or general laws are formulated in case of experimental research. Therefore, the major characteristics of quantitative research design are its focus on deduction, testing of hypothesis, confirmation, prediction, explanation, standard data collection and statistical analyses (Johnson & Onwuegbuzie, 2004).

Questionnaires are the most widely used to collect quantifiable data in social settings. Overall, the quantitative approach is used to investigate a situation that exists or happens, especially when the cause or explanation is presented in the form of a question and solving the problem requires the collection, processing and presentation of quantitative data (Pham, 2018). However, according to Rahman (2020), a key limitation of quantitative research method is that it takes a snapshot of a phenomenon instead of providing an in-depth analysis of the issues and fails to consider the peoples' experiences and opinions.

3.3.2 Qualitative Research Design

According to Basias and Pollalis (2018), qualitative research is a broad term that involves research techniques that deal with phenomena by analysing experiences, relations, and behaviours without using statistics, mathematics, and numerical data processing. Pham (2018) further highlights that this method is often employed to answer questions such as what?, how?, when?, and where?, and the answers

provided are word-based. Researchers who apply this technique follow a series of steps where they try to describe, decode and translate phenomena and concepts rather than attempt to record the frequency of the phenomena in society (Sovacool et al. 2018).

Aspers and Corte (2019) however argue that the focus of qualitative research is multi-method, with an interpretative, naturalistic approach to its subject matter. This means that qualitative researchers investigate phenomena in their natural contexts, attempting to make sense of, or interpret, phenomena in terms of the meanings that people assign to them. Qualitative research entails the collection of various materials i.e. case study, personal experience, introspective, life story, interview, observation, historical, interactional, and visual texts that describe routine and difficult moments and meanings in individuals' lives (Rahman, 2020). According to Gorman and Clayton (2005), qualitative research design involves the assumption of a social construction of reality.

The qualitative approach is more natural as the researcher is required to make an interpretation of the data as well as draw conclusions based on what they observe (Michie et al. 2018). The key steps when using the qualitative research approach include observations, interviews, summaries, descriptions, analyses, and interpretations (Michie et al. 2018). According to Basias and Pollalis (2018), the advantage of this methodology is that it allows for in-depth research. However, there is a concern of the possibility of the researcher's subjectivity as the research may be influenced by their attitude, ethos, and culture (Kaushik & Walsh, 2019).

3.3.3 Mixed Methods Research Design

The study utilised a mixed-method approach to gain an in-depth comprehension of the topic. According to Creswell and Clark (2017), the strategy combines qualitative and quantitative research designs. Combining the two research designs is described as a process where the qualitative and quantitative elements are interlinked to produce a more detailed and realistic account of the research problem (Guetterman & Fetters, 2018). Thus, by combining the two designs, the researcher aims to take full advantage of the two strategies while compensating for their weakness to provide a more comprehensive understanding of the investigated issues. The logic

of inquiry for mixed methods research design involve utilising induction to discover patterns, deduction to test hypotheses or theories and abduction to uncover and rely on the best collection of explanations for understanding the study's results (de Waal, 2001).

Mixed methods research design legitimises the utilisation of multiple approaches in responding to research questions instead of restricting the researcher's choice (Johnson & Onwuegbuzie, 2004). It is therefore expansive and enhances creativity. For optimal results under mixed methods research design, the researcher should have a clear grasp of strengths and weaknesses of qualitative and quantitative methods (Johnson & Turner, 2003). This will ensure that multiple data is collected using various strategies, methods and approaches in a manner that the resultant mixture results in complementary strengths and weaknesses that are non-overlapping (Kono, 2019).

Different mixed methods research design typologies/dimensions have been presented by scholars such as Johnson and Christensen (2004), Mertens (2003), Morgan (1998), Morse (1991) and Tashakkori and Teddlie (1998). For instance, Tashakkori and Teddlie (1998) and Johnson and Christensen (2004) note that mixed-model designs can be constructed by combining quantitative and qualitative methods within and across research stages. For Morgan (1998) and Morse (1991), a researcher may also consider paradigm emphasis dimension whereby a decision is made to give qualitative and quantitative constituents of a mixed methods study a status that is equal or to offer one paradigm a status that is dominant. In this study, this dimension was adopted with the qualitative component taking a dominant stance. Mertens (2003) presents four dimensions of mixed methods designs. One involves time ordering of the quantitative and qualitative stages. The stages can be sequentially or concurrently carried out. In this research, a concurrent dimension was adopted. The second dimension is the level of mixture which would ensure fully mixed methods are adopted. The third dimension relates to where mixing occurs, for example, in the objectives, data collection methods, methods of research, at the point of data analysis or at the point of data interpretation. The fourth dimension involves whether the researcher desires to adopt a critical theory or a

transformative emancipatory approach or an approach that is less explicit to a study.

Two primary decisions must be made in order to follow a successful mixed-method design. One, whether researcher wants the research to be undertaken majorly within paradigm being dominant or not. Secondly, whether the researcher wants to undertake the phases sequentially or concurrently. Mixed method design is likened to undertaking one mini-study that is quantitative and another mini-study that is qualitative in one general study. However, to be regarded as a mixed-method design, the results must be mixed at one point. For example, a qualitative stage may be undertaken so that a quantitative phase is informed; sequential mixed methods. On the other hand, if qualitative and quantitative phases are concurrently undertaken, the results must be integrated at the point of findings interpretation. It should however be noted that a researcher can also create more mixed method designs that are user specific based on the researcher's creativity.

3.4 Strategies of Inquiry

Strategies of inquiry also referred to as research methodologies (Mertens, 1998) or inquiry approaches (Creswell, 2007) refer to types of quantitative, qualitative and mixed methods models that offer a specific path for processes in a research design (Creswell, 2014). Though strategies of inquiry available for research have developed over time due to technological advancement, the approach by Creswell (2014) that categorises them into main groups will be adopted to include quantitative strategies, qualitative strategies and mixed methods strategies.

3.4.1 Quantitative Strategies

For the period spanning the 19th and 20th centuries, inquiry strategies related to quantitative research design comprised of strategies such as experiments, correlational studies and quasi-experiments (Campbell & Stanley, 1963). For the same period, experiments focusing on specific single-subjects were also common (Neuman & McCormick, 1995). More recently, quantitative strategies have comprised of experiments that are complex containing many treatments and variables, for example, factorial and repeated measures designs. Further, they have included structural equation models that are elaborate which incorporate causal

paths and identifying multiple variables' collective strength. Surveys have also been put forward as other quantitative strategies of inquiry (Creswell, 2014).

3.4.1.1 Experimental Research

Under experimental research, a common quantitative inquiry strategy, the researcher seeks to assess if a given treatment has an influence on an outcome. The most common approach is providing the treatment to one group (the experimental group) and having another group (the control group) not undertaking the treatment and then evaluating the score on an outcome in both groups. Experiments comprise of true experiments where there is random subjects' assignments to the treatment and quasi-experiments where non-randomised designs are used (Creswell, 2014).

3.4.1.2 Survey Research

Survey research involves describing of a population's opinions, trends or attitudes using numerals and quantitative explanations. According to Babbie (1990), survey research involves longitudinal and cross-sectional studies that use questionnaire or interviews that are structured in collection of data. The intention is to generalise from a sample to a population. The quantitative strand for this study employed a survey research strategy of inquiry.

3.4.2 Qualitative Strategies

Creswell (2014) outlines four types of qualitative strategies to include ethnography, grounded theory, case studies and phenomenological research. Hennink et al. (2020) describe six qualitative design strategies: phenomenological, ethnographic, grounded theory, historical studies, case studies and action research strategies which are briefly described herein. However, more emphasis is put on phenomenological strategy since it guided the qualitative strand in this thesis.

3.4.2.1 Ethnography

According to Creswell (2007), ethnography is a research strategy which involves the researcher studying a cultural group that is intact, in their natural setting, over lengthy time period by collection of interview and observational data. The philosophical approach aims to provide inside knowledge into people's cultures and practices over time (Kurowska & Bliesemann, 2020). According to Ricke (2018), a

qualitative research method involves hands-on learning and is the primary social and cultural anthropology method. For instance, a researcher may live with members of a particular community for years, recording data about them and using the information to draw conclusions. Thus, it is an approach that aims to understand people's values and practices.

Ethnography aims to draw from personal experiences but focuses on a group rather than just one person (Nguyen et al. 2022). The approach utilises observations as the primary method of data collection and as a result, understanding people's behaviour may become a challenge as it is time consuming and requires professional researchers (Singh & Estefan, 2018). According to Michiel et al. (2018), when people are observed, they are most likely to alter their behaviour, affecting the results' credibility as the way they act may be influenced by the knowledge of being observed.

3.4.2.2 Grounded Theory

Grounded theory strategy of inquiry involves the researcher deriving a theory that is general and abstract regarding a process, interaction and action grounded in participants' views. It entails utilisation of multiple phases of data collection and refinement and interrelationship of information categories (Strauss & Corbin, 1998). According to Creswell (2014), grounded theory possesses two main characteristics: constant data comparison with categories that are emerging and theoretical sampling of varying groups for maximisation of information similarities and differences.

Many researchers utilise coding as well as categorising to organise, evaluate, and display evidence; they call this method "grounded theory" (Velmans et al. 2021). However, the approach involves more than classifying data and labelling themes (Kaushik & Walsh, 2019). According to Singh and Estefan (2018), grounded theory is a systematic research strategy for constructing an explanatory model or theory of an intriguing phenomenon. The theory integrates ideas and categories to analyse and explain the patterns or processes of a psychosocial reality (Charmaz, 2014). Grounded theory is useful for research in areas with significant gaps in people's understanding and where a fresh perspective may be advantageous (Watetu et al.

2021). To tackle the problems of fulfilling society's ever-changing health care demands, experts in the field require fresh expertise (Pham, 2018). Studies employing grounded theory methods can provide new knowledge gained from actual patient interactions and other essential components of health practice (Charmaz, 2014). Constructing a grounded theory involves comprehending the experiences of individuals and evaluating how they interpret their perceptions and behaviours (Singh & Estefan, 2018).

It is important to highlight that in the past, researchers either chose the subjective philosophy that led to the use of quantitative methods or the objective philosophy that resulted in the use of qualitative methods (Rashid et al. 2021). However, the approaches are now being challenged, leading to the widespread utilisation of mixed methods (Kono, 2019) which involves an integration of the quantitative objective and subjective qualitative knowledge and interpretation to form conclusions (Rashid et al. 2021).

3.4.2.3 Historical Research Studies

Historical studies involve identifying, locating, evaluating and synthesising past data with an aim of discovering past events and relate them with present and future events. Though historical research has been found to be of significance, it has found limited applications in health sciences. Historical research data are normally found in documents, artifacts or relics (Hennenik et al. 2020).

3.4.2.4 Case Studies

Case studies involve a detailed analysis of a group of people. In health sciences, case studies are concerned with a specific health condition which helps explore the condition in depth (Jacelon & O'Dell, 2005). A case study may be classified as either qualitative or quantitative based on the study's purpose and the design that the researcher chooses. Therefore, data collection in case studies may be through different means such as interviews, questionnaires, subjects' written accounts and observations.

3.4.2.5 Action Research Studies

Action research is qualitative research inquiry where action is sought in practice improvement. The effects of the action taken are studied (Streubert & Carpenter, 2002). In action research studies, solutions are implemented as an actual part of the process of research (Hennenik et al. 2020).

3.4.2.6 Phenomenological Research

Phenomenological qualitative approach uses detailed descriptions to examine participants' lived experiences to comprehend the attached meaning to their experiences (Sovacool et al. 2018). According to Rasid et al. (2021), Edmund Husserl first developed the theory, and he used it to explain how people give meaning to social phenomena in their everyday lives. The key role of the philosophical approach was to "explore the essence of consciousness as experienced from the first-person point of view" (Kono, 2019). This therefore implies that, studies that employ this methodology do not aim to provide a more comprehensive explanation of a given issue; rather, they focus on individuals' accounts in a specific setting. Overall, studies that apply the phenomenological approach collect data as in-depth semi-structured or unstructured interviews and personal documents such as diaries (Velmans et al. 2021).

Jackson et al. (2018) have however criticised the approach's inability to explain things that are beyond people's consciousness that are unpredictable. In addition, it is impossible in the natural world to understand people's experiences questioning things relating to them (Jackson et al. 2018). Given such limitations, it would be difficult to explain the external factors that affect T2DM patients' behaviour change.

3.4.3 Mixed Methods Strategies

Various mixed methods strategies have been presented by different scholars/researchers to include sequential (Greene, 2007; Morse, 1991; Tashakkori & Teddlie, 1998), concurrent (Creswell, 2014), transformative (Mertens, 2003), embedded design (Greene, 2007) and convergent parallel design (Creswell et al. 2003). A description of these strategies is outlined in the subsequent sub-section with detailed description of the convergent parallel design that was adopted for this research.

3.4.3.1 Sequential Mixed Methods

Sequential mixed methods strategy involves the researcher elaborating or expanding on the results of one method with another. For instance, it may entail starting with a qualitative interview for purposes of exploration and succeeding it with quantitative method. It may alternatively involve starting with a quantitative method which involves testing a concept or theory then succeeding it with qualitative methods for exploration (Greene, 2007). Sequential mixed methods are categorised into two modes: explanatory sequential design and exploratory sequential design (Tashakkori & Teddlie, 1998).

The explanatory sequential design involves two interactive but distinct phases; the first phase collects and analyses quantitative data and is the priority phase in responding to the questions of the study. The second phase involves qualitative data collection which is used to explain the quantitative findings from the first phase (Tashakkori & Teddlie, 1998). The exploratory sequential design also utilises sequential timing. It starts with and gives priority to qualitative data collection and analysis in the initial phase. With the foundation provided by the qualitative results, the researcher collects and analyses quantitative data in the second phase for testing and generalising the findings in the qualitative phase (Tashakkori & Teddlie, 1998).

3.4.3.2 Concurrent Mixed Methods

In this method, qualitative and quantitative data is converged or merged by the researcher so as to provide comprehensive research problem analysis. Both forms of data are collected at the same time and then integrated in the overall results interpretation. In this strategy, the researcher may also embed one smaller data form within another dataset that is larger so as to conduct analysis of different questions; the process is addressed by the qualitative design while the outcome by quantitative design (Creswell, 2014).

3.4.3.3 Transformative Mixed Methods

Under this strategy, the researcher utilises a theoretical framework as the main perspective within a design containing both qualitative and quantitative data. The theoretical framework provides the structure for topics of interest, data collection

methods and outcomes expected in the study. Within this framework could be a method of data collection that involves concurrent or sequential strategy. Therefore decisions such as mixing, interaction, timing and priority are made within the transformative framework's context (Mertens, 2003).

3.4.3.4 Embedded Mixed Methods Strategy

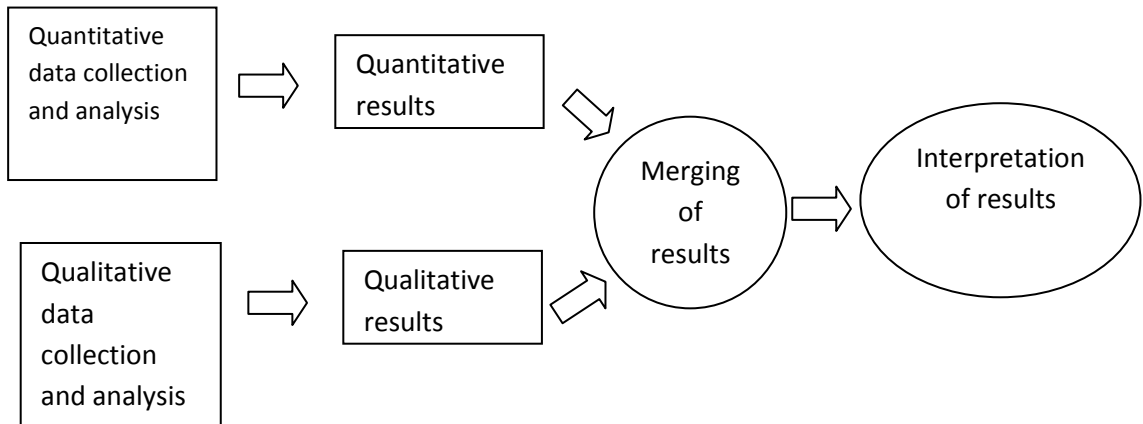
In this strategy, both quantitative and qualitative data is collected by the researcher using traditional qualitative or quantitative design. In an embedded strategy, either a qualitative strand is added within a quantitative one, for example an experiment, or a quantitative strand is added within a qualitative strand. The supplementary strand is added to improve the entire design. Take for example when a researcher wants to develop an intervention for adult male diabetes patients to overcome the pressure to take beer. The researcher may begin by data collection through a few focus group discussions with adult male diabetes patients to get an idea when the pressure to take alcohol is felt in addition to how some cope with it. Through these results, an appropriate intervention is developed and tested using a quantitative design such as an experiment involving different patients (Greene, 2007).

3.4.3.5 Convergent Parallel Design

This study employs a convergent parallel design. The convergent parallel design as described in Creswell et al. (2003) takes place when the researcher utilises concurrent timing in implementation of quantitative and qualitative components during the same stage of the research process, gives equal priority to the components and keeps the components independent at the time of analysis and mixes the findings during interpretation as shown in Figure 3.1. Data were collected concurrently, analysed separately, results were merged during interpretation with equal priority status (QUAN + QUAL). Due to the nature of the research questions, there was a need to collect both qualitative and quantitative (Demir & Pismek, 2018). While quantitative analysis might provide data from questionnaires that is measurable, it does not capture the subjective opinions, perceptions and experiences of the T2DM service users from the perspectives of the health care professionals. Thus the justification for a convergent parallel mixed methods design. The quantitative part of the study will establish likelihood of behaviour change

among T2DM service users based on the health belief model, while the qualitative part of the study provides a contextual understanding of their behaviour change.

Figure 3.1: Convergent Parallel Design



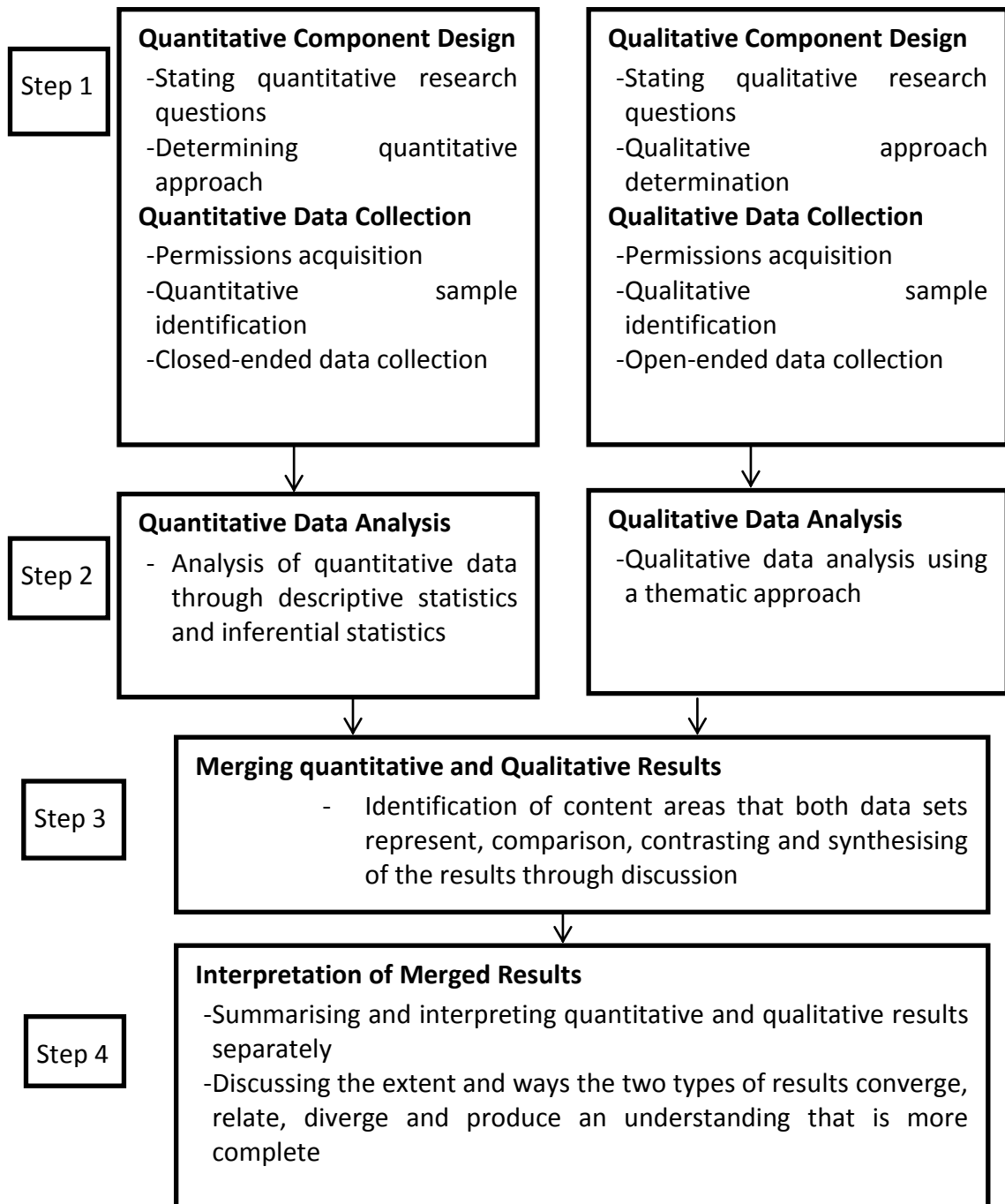
Convergent parallel design aims at obtaining data that is different but complementary on the same study topic. This ensures that the research problem is better understood. Further, the design enables the strengths and non-overlapping weaknesses of qualitative and quantitative methods to be brought together. It is applicable when the researcher requires triangulating both methods through comparison and contrasting the statistical results from the quantitative component with the qualitative results (Creswell et al. 2003).

The convergent parallel design is best suited when there is limited time for data collection and both types of data must be collected in one field visit. It is also applicable if the value is equal for collection and analysis of qualitative and quantitative data in resolving the research problem. Further, the researcher should have the necessary resources and skills for both qualitative and quantitative data collection. Moreover, for a researcher to use this design, he/she should be able to manage extensive activities in data collection and analysis (Creswell, 2021).

The study followed the procedures of convergent parallel design outlined in Creswell et al. (2003). The first step involved collection of both quantitative and qualitative data. This involved concurrent but separate data collection. The second step involved separate analysis of the data which was done independently by using

appropriate qualitative and quantitative analysis techniques. The third step was the merging phase which involved comparison of the separate results. The fourth and the final step involved interpretation and determining the extent to which the two data sets converged/diverged from each another, related to each other and combining to construct a better understanding that addressed the objectives of the study.

Figure 3.2: Procedure of Convergent Parallel Design



CHAPTER FOUR: RESEARCH METHODS

4.1 Introduction

This chapter presents the research methods that were used in carrying out this research study. It presents the methods including the research design, study population and data collection methods.

4.2 Study Design-Mixed Methods

This study collected data at one point in time meaning that it was cross sectional in nature (Levin, 2006). It provided a snapshot of the outcome and characteristics associated with it (Levin, 2006). This research was cross sectional because the quantitative section of the study was descriptive in the form of a survey and revealed prevalence of the outcome of interest i.e. in this case, the extent to which the HBM predicted behaviour change among T2DM service users.

A cross sectional study was conducted employing a mixed methods research design combining quantitative and qualitative methods of data collection for this doctoral study. The mixed methods research design employed in this study helped the researcher address two research questions on;

- i) The perspectives of healthcare professionals on behaviour change among T2DM service users.
- ii) Assessing behaviour change among T2DM service users based on the HBM model.

A major strength of combining the two is that they draw on the strengths of each other such that quantitative results can be explained by qualitative data thereby understanding the research problem better (Creswell, 2014; Johnson & Onwuegbuzie, 2004). A mixed methods research design is key in assisting a researcher answer specific research questions (Johnson & Onwuegbuzie, 2004). As guided by the research questions, the study was predominantly qualitative with a quantitative component with both data sets collected separately but concurrently and then merged later during the interpretation of the findings i.e. simultaneous triangulation (Fiorini et al. 2016).

4.3 Study Location

The study was conducted at Thika Level 5 Hospital (TL5H), a 300-bed government hospital located in Thika Sub-County, Kiambu County which is only 45km from the capital city of Kenya, Nairobi. The sub-county lies between latitudes 3' 53" and 1' 45" South of the Equator and longitudes 36' 35" and 37' 25" East (Figure 1.1). Kiambu County is part of greater Nairobi metro which has an estimated population of 2,417,735 with a majority of the population (60.8%) being urban due to the close proximity to Nairobi. Literacy levels in the county are above 95% (County Government of Kiambu Department of Finance and Economic Planning Annual Development Plan 2017/18 August 2016).

The hospital was thus selected for this research study due to its large outpatient coverage. Being the region's referral hospital, hospital records revealed that patients largely came from Kiambu, Murang'a, Nairobi, Maragua and Machakos. This would give the study a variety of service user demographics which would serve to increase the generalisability of the study findings across the County. Thika Sub-County borders Machakos on the east, Kiambu in the west, Nairobi in the South and Maragua in the North. The hospital has an outpatient diabetes clinic Monday to Friday with approximately 60 service users attended to per day (Wanyoike et al. 2019).

4.4 Target Population

The study was in two sections with two target populations. The first section (reported in Chapter Five) collected qualitative information to explore behaviour change among T2DM service users from the perspectives of Kenyan healthcare professionals. The target population in the first section was healthcare professionals such as doctors, nurses and nutritionists who are directly involved in T2DM at Thika Level 5 Hospital. The second section (reported in Chapter Six) collected quantitative data regarding behaviour change among T2DM service users according to the HBM. The target population in the second section of the study was T2DM service users at the Thika Level 5 hospital diabetes comprehensive clinic (DCC). Those included in the study were already diagnosed with T2DM, aged between 20-70 years and had been attending the clinic for at least the past six months.

4.5 Sample Size and Sampling Techniques

4.5.1 Sample Size

Sample size determination in quantitative studies uses a power calculation to arrive at a sample size which would enable generalisability of the findings (Gill, 2020; Moser & Korstjens, 2018; Rahman, 2020). To obtain an appropriate sample size for this study, power calculations were conducted using an online calculator G* power 3.1.9.7. The Power calculations (using an 80% confidence interval, a precision of 0.05, and a correlation coefficient of 0.15) were performed to arrive at a sample size of 346 T2DM service users. This means that responses from 346 T2DM service users will produce meaningful results. The correlation coefficient 0.15 was picked from a similar study examining behaviour regarding breast cancer screening using the health belief model and the theory of reasoned action (Firouzbakht et al. 2021). The target was achieved having collected 351 questionnaires.

On the other hand, there are no specific 'rules' for sample size determination in qualitative studies (Gill, 2020) although this has to be pre-determined to satisfy ethics review requirements (Young & Casey, 2019). Sample size may be revised as data collection progresses as one may perhaps need additional participants or saturation may be reached sooner than expected (Gill, 2020; Moser & Korstjens, 2018). Saturation is said to have been reached when one has obtained enough in-depth data illustrating patterns, categories and variety of the phenomenon being studied with no additional information emerging (Gill, 2020; Moser & Korstjens, 2018). The sample size should be sufficiently large and varied to elucidate the aims of the study (Malterud et al. 2016). The aim of qualitative studies is to understand a phenomenon and not generalisability hence sample size in qualitative studies is generally smaller than in quantitative studies (Moser & Korstjens, 2018).

Phenomenological studies would normally require less than ten interviews but these numbers should be carefully considered as they are very tentative (Moser & Korstjens, 2018). According to Ritchie et al. (2013), doctoral studies require a sample size ranging between fifteen and fifty participants. In section 2 of this study targeting health care professionals, the target was forty participants which was achieved after interviewing forty three participants.

4.5.2 Sampling Technique

Purposive sampling is a type of qualitative sampling technique whereby participants who meet predefined criteria are included in the study. Here, the participants' experience with the phenomenon under study is the most prominent criterion for selection (Moser & Korstjens, 2018). Purposive sampling has been described as a sampling technique that can be used to recruit participants in phenomenology study designs (Moser & Korstjens, 2018; Riger & Sigurvinsdottir, 2016; Ritchie et al. 2013). In this study, service users were purposively sampled based on the criteria that they were diagnosed with type 2 diabetes, aged between 20-70 years and had been attending diabetes comprehensive clinic at Thika Level 5 Hospital for at least the past six months. The healthcare professionals were purposively selected based on the criteria that they were worked at the diabetes comprehensive clinic at Thika Level 5 Hospital and were directly involved with type 2 diabetes service users.

4.6 Participant Inclusion and Exclusion Criteria

Some differences were expected in especially the qualitative study as different healthcare professionals were interviewed hence keeping the heterogeneity of the participants. Similarities in the opinions of the healthcare workers were also however expected due to the common work environment.

4.6.1 Inclusion Criteria

For the diabetes clinic service users, persons diagnosed with type two diabetes and aged 20-70 were invited to participate in the study. The nurse in charge of the diabetes clinic introduced me, the researcher, to the service users at the clinic and gave me an opportunity to explain the purpose of the study and how data collection would be conducted. Service users were then approached individually for consent and subsequent data collection. For the healthcare professionals, those who directly worked with service users with regards to behaviour change (diet and physical activity) i.e. doctors, clinical officers, nurses and nutritionists were included in the study. These were approached at their various work stations.

4.6.2 Exclusion Criteria

For the service users, those who had type one diabetes or were aged below 20 or above 70 years were excluded from the study. For the healthcare professionals,

those not directly involved with type two diabetes service users behaviour change (diet and physical activity) were not included in the study.

4.7 Research Tools

4.7.1 Questionnaires

Questionnaires (Appendix 1) were used to collect quantitative data in this section of the cross sectional research survey study that sought to establish behaviour change among T2DM service users as per the HBM. Cross sectional studies mostly use questionnaires as the major data collection tool (Ponto, 2015). Questionnaires comprise a series of questions that would eventually answer the primary research questions and may be administered individually, in a group by a professional or completed by self (Dillman et al. 2014; DuBenske et al. 2014; Ponto, 2015; Ponto et al. 2010). The questionnaire comprised of two sections. Section A with items on socio-demographic information of the service users and section B containing 26 items adopted from Woringer et al. (2017).

Among the 26 items, eight items assessed knowledge on type 2 diabetes and related complications. Respondents in this category achieved a correct score (of 1) or incorrect score (of 0) response. The other 18 items (Likert scale items) assessed the health belief model constructs comprising of perceived susceptibility, perceived severity/threat/ risk, perceived benefits, cues to action and self-efficacy. The study acknowledges that the 26 items under Woringer et al. (2017) were initially developed to assess the risk of cardiovascular diseases (CVDs). While developing and validating the risk assessment tool, Woringer et al. (2017) acknowledged that risk assessment of CVDs and management programmes were launched by the Health Department in 2009 in England among people in the age bracket 40-74 years to increase awareness in CVDs risk among those at risk. The aim was to prevent vascular diseases, diabetes, stroke and kidney illnesses. Therefore, most of the items are related to T2DM which makes it an appropriate tool for this study.

4.7.2 Interview Guide

In this study, the pre-determined open ended questions were put together forming an interview guide (Appendix 2). The semi-structured interview guide enabled data collection from the healthcare professionals who met the inclusion criteria. Semi-

structured interviews are the most commonly used form of interviews used both in the healthcare and qualitative research studies (DeJonckheere & Vaughn, 2019; Kallio et al. 2016). Interviews may be conducted in person, online via, for example, Skype, Zoom, Teams or via telephone (Ponto, 2015). In-person interviews were conducted adhering to all Kenyan government regulation regarding Covid-19 but when not possible, Skype, Zoom, Teams or telephone interviews were arranged according to the risk assessment (Appendix 5). Participants were asked to read an information sheet (Appendix 9) before deciding on participation.

The aim of semi-structured interviews is to contribute to a body of knowledge that is theoretical, conceptual and based on life experiences (Crabtree & DiCicco-Bloom, 2006). It was therefore appropriate to adopt semi-structured interviews for data collection in this qualitative section of the study which aimed to understand behaviour change among T2DM service users from the perspectives of healthcare professionals. In semi-structured interviews, a set of predetermined open-ended questions are used however, other questions arise during the interview session (Crabtree & DiCicco-Bloom, 2006; DeJonckheere & Vaughn, 2019). An interview guide is a list of guiding questions, which then depending on the interviewees' response, leads to other probing and follow up questions (DeJonckheere & Vaughn, 2019; Kallio et al. 2016). The interview guide was designed to understand behaviour change among T2DM service users from the perspectives of Kenyan healthcare professionals.

4.8 Pilot Study

A pilot study was conducted among nutrition students at the University of Chester i.e. five quantitative questionnaires and five individual interviews. Though limited, the pilot study allowed the researcher to familiarise herself with the interview guide, be able to make the interview more conversational, adjust questions as need be and time the interview sessions (DeJonckheere & Vaughn, 2019) thereby ensuring the feasibility of this study. It also helped the researcher ensure that quantitative analysis on SPSS was possible. In addition to replacing ineffective questions, during a pilot study, one may also find a need to add additional probing questions to capture new topics that arose in previous interviews (DeJonckheere &

Vaughn, 2019). However, the researcher recognised that this pilot may have limited ecological validity. This is despite it allowing the researcher to refine the questioning. On arrival in Kenya, the data collection tools were informally piloted with a number of family members.

4.9 Data Collection Procedures

Before engaging in data collection at Thika Level 5 Hospital, the researcher obtained ethical approval from Kenyatta University (Appendix 10). The ethical approval letter was used to acquire a research permit from the National Commission for Science, Technology and Innovation (NACOSTI) (Appendix 11) and research approvals from Kiambu County (Appendix 12) and Thika Level 5 Hospital (Appendix 13) administrations. In preparation for collection of data, the researcher recruited three research assistants who had experience in data collection and possessed a bachelor's degree. The research assistants were trained for five (5) days. Each research assistant practiced sampling of respondents and distribution of questionnaires in an actual setting with 10 participants during training. Training of the research assistants was conducted by the researcher.

The distribution of the questionnaires was achieved through a combination of methods such as email, and or paper form and or internet based. According to Dillman et al. (2014) using a combination of methods helps reduce the coverage error where for example those without internet access may be missed if the only questionnaire administration method is internet based. For the service users with limited internet access especially those from rural areas, paper questionnaires were administered and completed at the diabetes clinic while those with internet access received the JISC online software surveys (supported by the university) via their emails. Administration of paper questionnaires was achieved with the help of the research assistants. Before engaging in the study, respondents were required to go through a consent form for service users (Appendix 3a) with only those who consented being allowed to fill the questionnaires.

Interviews may be conducted in person, online via, for example, Skype, Zoom, Teams or via telephone (Ponto, 2015). Before the start of the interview, the healthcare professionals being interviewed were required to go through a consent

form for healthcare professionals (Appendix 3b) with the interviews proceeding for interviewees who consented. In-person interviews were conducted adhering to all Kenyan government regulation regarding Covid-19 but when not possible, Skype, Zoom, Teams or telephone interviews were arranged according to the risk assessment (Appendix 5). Data collection was through semi-structured individual interviews with the healthcare professionals who met the inclusion criteria. They were asked to read a participant information sheet (Appendix 9) before deciding on participation.

The interviews were face-to-face while adhering to Covid-19 protocols. Approximately, the interviews took 45-60 minutes and were conducted mostly in the common staffroom. In some cases, the interviews were conducted outdoor but within the confines of Thika Level 5 Hospital. There was no non-participation recorded, neither was there any drop-out from the interviews. During the interviews, audio-recording was done using a Sony Digital Voice Recorder Model ICD-PX470. No repeat interviews were done. Further, after transcription, transcripts were not returned to the participants for clarification or correction. Rather, a second transcription expert was used to clarify and proof read the initial transcripts by the researcher and allocate them random numbers for use during qualitative analysis. The entire data collection process took a period of three (3) months.

4.10 Recruitment of Participants into Main Study

Whilst the data collection process was interesting, it was also challenging. I was given an opportunity to introduce myself to the T2DM service users and explain the purpose of the study before service provision began. Individual participants were approached at some point while waiting to be attended to so as not to interfere with the clinic's routine of service provision as queues were long. Questionnaires were then completed at the diabetes comprehensive clinic. The majority of the participants was receptive and was grateful as I offered an opportunity to ask any nutrition related question relating to their T2DM after completing the questionnaire. Only one participant declined to participate in the study as they were coordinating business activities over the phone.

Obtaining participants for the qualitative interviews i.e. healthcare professionals was a bit more challenging as they were very busy serving huge numbers of people on a daily basis. I began making progress when I made appointments for the interviews and helped in any way possible to relieve the workload. A few healthcare professionals really were just not able to help because of the busy work schedule. Some asked about a monetary incentive. Nutritionists in the hospital were very helpful to me as they introduced me to their colleagues in the various departments of the hospital.

4.11 Methods of Data Analysis

4.11.1 Qualitative Data Analysis

Individual interviews sought to understand the perspectives of Kenyan healthcare professionals regarding behaviour change among T2DM service users. Confidentiality was key hence individual interview sessions were conducted in private meeting rooms or empty outdoor waiting areas to ensure privacy. Permission to audio-record the individual interview sessions was sought and those who opted to participate signed a consent form (Appendix 4), prior to the start of the interview. Reflective writing and field notes were taken (prior to meeting study participants, during and after interview sessions) and later triangulated alongside data from the individual interview sessions and questionnaires to obtain a better understanding of the contextual factors and to check for non-verbal expressions of feelings (Mack, 2005).

Using Nvivo, qualitative data was analysed using inductive thematic analysis which began with transcription of the interviews, coding and development of the themes (Riger & Sigurvinsdottir, 2016). Inductive thematic analysis in qualitative data involves the identification, analysis and reporting of themes/patterns (Riger & Sigurvinsdottir, 2016). This research study used the six phases of thematic analysis described by Braun and Clarke (2006);

Phase 1: Familiarising yourself with your data

The researcher familiarised herself with the data during the interviews and during transcription of the interviews data which was carried out after each interview. By doing this, the researcher was able to understand the output of the interviews and

check whether data was answering the research questions. The recordings were listened to several times making a verbatim account of all verbal and non-verbal utterances such as coughs or punctuation that can alter meanings (Braun & Clarke, 2006). The audio-recordings were then transcribed, printed out and read several times searching for meanings and patterns (Braun & Clarke, 2006). Notes were made on the transcripts with ideas for coding (Braun & Clarke, 2006) which were useful in later phases.

Phase 2: Generating initial codes

A code is the most basic element or segment of the raw information or data that can be assessed in a meaningful way regarding the phenomenon (Braun & Clarke, 2006). A code identifies a feature of the data (latent or semantic content) which appears interesting to the data analyst (Braun & Clarke, 2006, 2012). Coding can be performed manually or through a computer programme (Braun & Clarke, 2006; Kiger & Varpio, 2020). In this study, coding was done manually by writing notes on the transcripts and using highlighter pens to identify segments of data and to indicate potential patterns. To demonstrate a code from individual transcripts, data extracts were earmarked with a pen and collated together within each code in a word document. Themes/codes were developed from the dataset to obtain an insight on the perspectives of healthcare professionals on behaviour change (diet and physical activity) among T2DM service users.

Phase 3: Searching for themes

This phase changes the focus of the analysis to the broader level of themes rather than codes and in this study involved the sorting of different codes into possible themes and collating all the relevant coded data extracts within the identified themes. Codes that did not fit into any of the themes were set aside and later discarded. To sort the different codes into themes known as thematic networks, a technique described by Attride-Stirling (2001) was utilised. In thematic analysis, a thematic network is a technique that illustrates structures and depicts themes (Attride-Stirling, 2001). The themes are organised from the lowest order theme (basic theme) which is the most basic theme derived from the textual data, to a middle order theme (organising theme) that organises basic themes into clusters of

similar matters and lastly to a super-ordinate theme (global theme) which are group sets of organising themes which together present a position or argument regarding a certain issue and in analysis is thus the overarching theme (Attride-Stirling, 2001).

Phase 4: Reviewing themes

The themes were reviewed at two levels. First was the re-reading of the extracts from each theme including basic theme instead of the coherent patterns. Second was the consideration of the individual themes in regard to the data sets and research questions. Included within the themes was additional data within themes that had been missed during earlier coding stages. Extracts that did not fit within the identified themes were either moved or discarded accordingly.

Phase 5: Defining and naming themes

Themes were structured in accordance with the aspects of the data they portrayed and their purposes for being included.

Phase 6: Producing the report

This phase involved the narrative write up of the data analysis producing a concise, coherent and logical account of the story within and across themes. Extracts from the transcripts including direct quotations are embedded in the analytic narrative to substantiate basic themes, illustrate the story and provide an argument answering the research question. The findings are presented in Chapter 5.

4.11.2 Quantitative Data Analysis

Quantitative data was collected using questionnaires for service users. Completed questionnaires were transferred into Microsoft Excel then into SPSS version 26.0 for quantitative data analysis. For socio-demographic characteristics, descriptive statistics that produced frequencies and percentages were used except for age which was analysed using measures of central tendency which included mean, mode, median, minimum and maximum age. Quantitative data on knowledge assessment was analysed using descriptive statistics which comprised of frequencies and percentages. Further, knowledge score was computed following the guidelines in Yusof and Hasni (2014) knowledge test score. Knowledge scores for each respondent were summed up. The maximum score expected was 8 while

the minimum score expected was 0. A score of 8 represented the highest possible knowledge score or level of T2DM knowledge while 0 represented the lowest possible knowledge score of T2DM. Three overall knowledge categories were derived. Knowledge scores that were <4 were categorised as poor knowledge; a score of 4-5 was categorised as moderate knowledge while a score ranging 6-8 was categorised as good knowledge. Mean, minimum and maximum scores were also used in knowledge score analysis.

Cross tabulation (with Chi-Square test) was used to establish whether there was any relationship between the demographic characteristics and knowledge level. Analysis of 18 items (Likert scale items) assessing the health belief model constructs comprising of perceived susceptibility, perceived severity/threat/ risk, perceived benefits, cues to action and self-efficacy was achieved using frequencies and percentages.

Further, exploratory factor analysis (EFA) was used to bring items that are intercorrelated together under more general variable(s). This was done for the 18 items assessing the health belief model constructs. Specifically, EFA reduces the dimensionality of the original HBM constructs and enables the researcher to provide an interpretation to the newly formed constructs (referred to as factors) guided by highly correlated items based on the new study sample (context). A clearer view of the HBM model was therefore obtained in the context of Thika Level 5 Hospital.

4.11.2.1 Exploratory Factor Analysis

Many studies are characterised by the fact that numerous items are used in explaining a study's construct. The HBM is not an exception since it consists of different questions in which several sub-tests are studied. Because of the numerous items that are being studied, the research can be complex and incorporate items that are not highly correlated into one subtest. Besides, the HBM as adopted from Woringer et al. (2017) could contain items in a subtest measuring a different aspect.

In such a scenario, exploratory factor analysis (EFA) can be used to bring items that are intercorrelated together under more general variable(s). During EFA, the

starting point is Kaiser-Meyer-Olkin (KMO) sampling adequacy measure (Sharma, 1996) and sphericity test by Bartlett (Gleser, 1966) to test whether items are suitable for EFA. When the value of KMO exceeds 0.5 and the p-value of Bartlett's sphericity test is below .05, then it is adequate to conduct EFA. Then a correlation matrix where intercorrelations between the items of the HBM is presented. Items that have a high correlation with a group of other items while at the same time have a very low correlation with other items outside that group are grouped under one construct, called a factor. This factor forms a new dimension that can be regarded as a classification in the context of the study sample (area). Exploratory factor analysis also generates Eigen values which represent the variance explained by each factor. Each factor that is extracted during EFA has an Eigen value attached to it. Only factors whose Eigen values exceed 1 are considered to be significant in explaining a construct. Cronbach's alpha coefficient is used in assessing the reliability of the different factor loading. High values of Cronbach's alpha coefficient imply high reliability for that factor.

In this study EFA was used to select items that appropriately constituted a scale. Items whose scoring was reverse were recoded to align to the conceptual trend of the scales. Items were selected if they loaded on a single factor with factor loadings exceeding 0.3 or if they loaded highly on a single factor and moderately on another factor. The correlation and the anti-image correlation matrices were examined. The EFA for the perceived risk of heart attack or stroke yielded KMO sampling adequacy measure of 0.859 and sphericity test of Bartlett < .0001. The minimum acceptable value for Kaiser-Meyer-Olkin sampling adequacy is 0.5; if the value is below 0.5 one should not proceed with EFA. Further, for one to proceed with EFA, Bartlett's Sphericity test should be <0.05.

4.12 Ethical Considerations

According to Resnik (2011), research ethics are structures set to govern research involving interaction between researcher and human participants and the way research studies involving humans are designed, managed and conducted. Beyond information/data collection, ethical research is concerned with the participants' and researchers' well-being, dignity, safety and rights which should all be taken into

account during research design, management, conduct and dissemination of findings (Stuart & Barnes, 2005).

4.12.1 Research Approvals and Permits

This research took place in Kenya, therefore, the ethical application and approval (number PKU2300/E1439) for this study was through a host institution in Kenya in this case Kenyatta University (one of the ethical review boards that are accredited by NACOSTI to provide ethical approvals to all research proposals that touch on human subject rights. After obtaining an approval letter of clearance (Appendix 10) to conduct research from Kenyatta University, permission was sought from NACOSTI to conduct research in Kenya which applies to all researchers whether local or international.

The ethics approval from Kenyatta University and the NACOSTI research permit (number NACOSTI/P/21/13047) (Appendix 11) were then presented at the Kiambu County health offices to obtain an clearance letter (reference number KIAMBU/HRDU/21/09/28/RA_WAITHAKA) (Appendix 12) following which a Thika Level 5 Hospital ethics committee sat, reviewed the proposal and granted the final hospital approval (Appendix 13). The researcher then began the actual data collection.

4.12.2 Informed Consent

The researcher together with the research assistants outlined the nature of the study, research objectives and aims to the participants. The process of data collection was also explained. This ensured that the participants were well informed regarding the study so as to make an informed decision on voluntary participation. Respondents were also informed that their participation was voluntary and that there was no any compensation for participating in the study. Informed consent was also sought from the participants. Data was collected to the participants who consented.

4.12.3 Care and Protection of Research Participants and Confidentiality

To ensure protection of the research participants, all government regulations regarding Covid-19 were adhered to i.e. appropriate personal protective equipment

(PPE) such as masks were worn, social distancing was observed, outdoor well-ventilated areas were utilised for interviews. Where not possible, online interviews via Skype, Zoom, Teams were considered.

Decision to take part in or not in this research was respected with no questions asked as participation was voluntary. Anyone was free to withdraw from participation in the study at any time and did not have to explain that decision. Participation or not did not in any way affect the services patients received from the diabetes clinic nor the work of the health care professionals.

To protect the research participants and ensure confidentiality, data files from the online questionnaire survey and all information obtained from the individual interview sessions were kept confidential. Audio-recordings were used to record the individual interview sessions which were later converted into text for transcription and analysis. Permission to audio-record prior to commencing the interviews was sought. Audio files were stored in a University of Chester (UoC) secure computer network. Audio files were converted into text for analysis and will be stored by the University for ten years alongside data files from the online questionnaire survey and to be deleted thereafter as per UoC research ethics and code of practice. No one beside the researcher and supervisor were allowed access to the original recordings and data sets. Information disseminated from this study did not include any personal identifier information.

4.12.4 Data Storage

The questionnaires filled by the respondents were filed to enhance ease of access. For the soft copies of data in Excel, SPSS, and Nvivo a password protected university computer was used for storage. On completion of data analysis, soft copies of data and filled questionnaires were destroyed within the legally required duration as guided by policy for data storage.

CHAPTER FIVE: QUALITATIVE ANALYSIS RESULTS

5.1 Introduction

This Chapter presents the data analysis for the individual interviews collected from healthcare providers at Thika Level 5 Hospital. The interview transcripts were imported into Nvivo 14 for thematic analysis. An inductive approach of coding was adopted guided by six main themes (main codes) identified after a thorough reading of the transcripts. The six themes were:

- i) A background on the interviewees' understanding of behaviour change in the context of T2DM
- ii) Strategic relevance in dealing with behaviour change
- iii) Challenges encountered in behaviour change
- iv) Solutions to the challenges
- v) Barriers to behaviour change
- vi) Factors hindering behaviour change

Responses from the interviewees were first coded into the six main themes after which similar responses in each theme were categorised into sub-themes (sub-codes). This process was repeated until the researcher exhausted all the available responses and no more sub-themes (sub-codes) could be generated.

5.2 Demographic Information of the Participants

The interviews comprised of healthcare professionals working in different departments of Thika Level 5 Hospital. Slightly more than half of the participants (57.5%) were male while the rest (42.5%) were female. The participants were of different qualifications such as nurses (27.5%), medical doctor interns (25.0%), nutritionists (17.5%), clinical officers (10.0%), nurse interns (5.0%), clinical officers' interns (5.0%), nurse students (5.0%), and medical officers (5.0%). From the interviews, it was also evident that the participants worked in different departments such as orthopaedic, surgical wards, nutrition department, paediatric ward, general ward, general clinic, dialysis unit and the diabetes clinic.

5.3 Background on Behaviour Change

This theme assessed the interviewees’ understanding of behaviour change. The respondents were asked to respond to the interview question “What is your understanding of behaviour change in the context of T2DM?” From the interview responses, 28 sources (interviewees) were coded into nine sub-themes which included diet/exercise, medication compliance/diet/exercise, diet/exercise/self-care, dietary habits, holistic change, diet/drugs abuse/medication compliance, diet/drugs abuse/exercise, weight management/diet/exercise, weight management/exercise as in Table 5.1.

Table 5.1: Respondents’ Understanding of Behaviour Change

Theme	Sub-Themes
Understanding of behaviour change	diet/exercise
	medication compliance/diet/exercise
	diet/exercise/self-care
	dietary habits
	holistic change
	diet/drugs abuse/medication compliance
	diet/drugs abuse/exercise
	weight management/diet/exercise
	weight management/exercise

This means that the respondents’ understanding of behaviour change comprised of a collection of several initiatives that should arise from service users so as to enhance the management of T2DM. From the interview responses summary, it is evident that the majority of the interviewees understand behaviour change to comprise of lifestyle conditioning that requires change in diet and involvement in exercises for improved management of T2DM or positive living for T2DM service users. A closer review of the responses revealed the following perception by Participant 008:

“When a patient is newly diagnosed with diabetes, there should be lifestyle change e.g. healthy foods choices and increased physical exercise”

Similarly, Participant 011 added the following on dieting and physical exercises as a concept of behaviour change for T2DM service users:

“Patients with T2DM are supposed to embrace physical exercise and eat healthy as part of management of the condition”

Participant 012 added the following on healthy eating habits and engagement in physical exercise as prerequisites for normal BMI:

“Consumption a healthy diet in terms of the type and proportions and adopting physical exercise to achieve the normal BMI”

Engagement in exercises and healthy diet are necessary so as to maintain sugar levels that are acceptable and manage T2DM better. This is supported by Participant 018 who noted that:

“It encompasses a patient engaging in physical activity and eating a healthy diet to maintain normal/ acceptable blood sugar levels”

Participant 037 reinforces this aspect based on the following opinion on behaviour change:

“T2DM is lifestyle disease that predominantly affects people above 40 years of age, its onset is related to lack of physical exercise and poor eating habits. Embracing physical exercise and eating healthy foods helps in maintaining acceptable blood sugar levels.”

Further, while supporting the importance of healthy diet and physical exercise in controlling levels of blood sugars and delaying complications, Participant 034 added that:

“Behaviour change encompasses diet modification and embracing physical activity in order to control blood sugar levels and delay complications”

Another common sub-theme or concept of behaviour change according to the interviewees added the aspect of medication compliance to diet/exercise. For instance, Participant 006 supported this concept by noting that:

“It involves compliance on medication for T2DM, physical activity and consumption of a Dutch diet (mostly fruits and vegetables)”

Participant 022 in support of healthy diet, physical exercise and medication compliance opined that:

“Behaviour change necessary for management of T2DM include healthy eating habits (changes from eating fast food to whole foods) and exercising. It also involves adherence to medication”

According to Participant 029 observing the required medication, modifying diet and lifestyle based on the demands of T2DM are key to managing T2DM. This is based on the following comment:

“It involves adherence to medication and compliance with diet modifications and lifestyle modifications that are central to management of T2DM”

Service users should be educated on different behaviour change concepts such as healthy diet, involving in physical activities and compliance to required medication so as to control their blood sugar and manage their weight. This is clear from the following statement by Participant 040:

“Upon diagnosis with T2DM, a patient is educated on behaviour change; this includes embracing physical activity, adoption of healthy eating habits and adherence to medication. If a patient changes their behaviour they are able to control their blood sugar levels and for those who are overweight and obese, they are able to lose weight”

Further, the participants perceived behaviour change to include diet/exercise/self-care lifestyles changes that T2DM service users should adopt. Participant 007 supports this aspect of behaviour change due to its importance in avoiding complications in T2DM patients by commenting that:

“It involves changes including; adopting healthy diet, physical exercises under the guidance of a physiotherapist or a nurse, wearing comfortable shoes for foot care, avoiding infections to avoid complications”

To further strengthen this aspect, Participant 016 added that:

“These are behaviours that someone chooses to adopt when diagnosed with T2DM in order to curb complications that may arise as the condition progresses. The areas of behaviour change include eating healthy, exercising and achieving and maintaining a healthy BMI”

This aspect of behaviour change is also supported by Respondent 020 due to its importance in maintaining the required blood sugar levels and body weight. This is notable from the following comment by Participant 020:

“It is important, because diabetes is a disease that affects the endocrine gland and it manifest in form of uncontrolled blood sugar levels. To maintain acceptable blood sugar levels one has to adopt a healthy diet regime, embrace physical exercise and maintain normal weight. Similarly, foot care and hygiene is part of T2DM management. Most T2DM patients are also hypertensive; they have to regulate their salt and water intake”

Participant 031 further adds the concept of avoiding negative behaviour to healthy eating habits and engaging in physical exercise to refer to behaviour change by claiming that:

“Changes made particularly in eating healthy, physical exercise, adequate hydration and regularly monitoring of blood sugar levels. It also includes shunning negative behaviour that is detrimental to health.”

However, some respondents who were interviewed perceived behaviour change from the aspect of changing dietary habits so as to cope with the dietary demands of T2DM, for instance, according to Participant 001:

“T2DM is a life style condition whose management requires changes in eating habits among others as part of management of T2DM.”

Participant 021 further supports diet modification aspect as the only concept of behaviour change by noting that:

“This encompasses changes in eating habits (especially consumption of whole foods). Adoption of healthy feeding habits plays a critical role in management of T2DM.”

Another perception of behaviour change that was also notable from the interviews was the concept of modifications holistic lifestyle overhaul in T2DM service users’ involved ranging from diet, exercise, medication, weight management and other aspects that are external to the service user. For instance, the claim by Participant 017 is in support of this concept of behaviour change from the comments below:

“These are changes in lifestyle made by someone upon being diagnosed with T2DM. Behaviour change may also refer to behaviour change in spouse, partner or family in an attempt to support the adoption of behaviour necessary for better health outcome in the context of T2DM. It also involves ensuring that one adheres to medication and attends clinic as directed”

Further, Participant 024 supports a holistic approach to behaviour change by stating that:

“Being a chronic condition, behaviour change is pivotal for management of T2DM. Behaviour change encompasses eating a healthy diet and physical activity. Support from family and community is critical in enabling positive behaviour change”

5.4 Strategic Relevance in Behaviour Change

The respondents were also required to respond to the interview item “What level of priority do you attach to deal with behaviour change in T2DM?” Under this interview item, the theme “strategic relevance in dealing with behaviour change” was identified to assess whether behaviour change was a priority in the management of T2DM. Two sub-themes were derived from the responses: one, that behaviour change is of utmost priority in T2DM management and two, that behaviour change is dependent on the level of diagnosis. However, the majority of the respondents (36) perceived behaviour change to be of utmost priority and only two indicated that the relevance of behaviour change was dependent on diagnosis level.

Table 5.2: Strategic Relevance in Behaviour Change Sub-Themes

Theme	Sub-Themes
Strategic relevance of behaviour change	Utmost priority
	Dependent on level of diagnosis

Among those who strongly favoured behaviour change as a priority in T2DM management, Participant 004 stated that:

“A higher level, reason being that, if the patient doesn’t adopt positive behaviour it becomes difficult to help the patient manage T2DM”

Further, Participant 006 attached a high priority of behaviour change to the complications that arise as a result of T2DM by stating that:

“Given the high number of complications that I am seeing in the surgical wards, I do think its urgent and of high priority”

For Participant 008, behaviour change is a priority since it supports the treatment offered in hospitals based on the following claim:

“Behaviour change is of high priority, for the T2DM patients to benefit from the care we offer at the hospital level, he/she have to change behaviour detrimental to their health”

According to Participant 011, behaviour change is a priority due to changes in T2DM patients. Participant 011 supports this claim by commenting that:

“It is of high priority; uncontrolled blood sugar levels in T2DM patients have adverse effects on their health and the overall outcome of the condition”

According to Participant 019, behaviour change is of utmost priority since it is user centered. The claim by Participant 019 to supports this is as follows:

“It is of high priority; management of T2DM uses a person centred approach which includes pharmacological, physical exercise and dietary behaviour change. Behaviour change should be accorded a higher priority among the three”

Participant 021, further regards behaviour change as a priority due to added benefits of cost, reduced hospitalisation for service users who have adopted behaviour change, reduced morbidity and complications as per the following statement:

“High priority: It makes it easy to manage the condition, cost effective, less admission incidences, less visits to the hospitals, reduce morbidity and complications”

For other respondents, behaviour change is of high priority as compared to other T2DM management options such as medication since it helps in managing and sustaining sugar levels and required BMI levels among other exposing factors to T2DM. For instance, Participant 023 claimed that:

“Higher precedence than medication; T2DM is caused by insulin resistance when fat stores builds up in the body resulting to insulin resistance (especially in overweight and obesity). Behaviour change including maintaining a healthy BMI, adopting healthy eating habits and quitting negative behaviour like smoking is more effective in maintaining acceptable blood sugar levels compared to anti-diabetic medication alone”

However, majority of the respondents were in favour of behaviour change due to its potential in managing complications and reducing occurrences of complications that are associated with T2DM such as organ failure, comatose among others. For instance, according to Participant 024:

“Since T2DM is a chronic condition that is mostly caused by unhealthy lifestyle, behaviour change is therefore central in its management and prevention of complications including cardiovascular disease, kidney failure and amputation”

In managing occurrence of complications, Participant 025 positioned behaviour change as a high priority and added that:

“High priority; behaviour change is critical for management of T2DM and prevention of complications related to T2DM”

According to Participant 013, behaviour change is of utmost priority to avoid T2DM cases sliding into extreme cases that threaten the life of the patients. Participant 013 claimed that:

“Behaviour change is urgent; behaviour change in T2DM patients is necessary to maintaining blood sugars levels within acceptable range. Hypoglycaemia in T2DM can result to comatose which is a life-threatening situation”

Participant 043 was more specific of the complications that arise from failure by T2DM patients to adopt behaviour change. Thus, for Participant 043, behaviour change is a priority based on the claim that:

“It’s very important, uncontrolled blood sugars results to microvascular and microvascular complications. Behaviour change is critical in controlling blood sugar levels to avoid these complications”

However, 2 participants indicated that priority of action is dependent on the level of T2DM diagnosis. In support of this claim, Participant 015 stated that:

“Priority depends on whether the patient is newly diagnosed; for new patients, priority is given to behaviour change as opposed to medication for better outcome. For patients who are admitted in surgical or medical ward with complications, behaviour change is equally important in order to achieve the best outcome”

Participant 017 also supported this claim by stating that:

“Behaviour change is very important; it’s a matter of urgency for those newly diagnosed to change their eating habits, daily activities and lifestyle in general”

5.5 Challenges Encountered in Behaviour Change

The respondents were also asked to indicate some of the challenges with behaviour change among T2DM service users. This was under the interview question, “What are in your opinion the main challenges with behaviour change among T2DM service users?” Under the theme challenges, the main sub-themes identified

included: facility related challenges, ignorance, information/knowledge related challenges, medication adherence challenges, norms/beliefs/culture, personal characteristics, psychological related challenges, resources related challenges and social support systems (support from family, friends, peers and loved ones). Further, facility related challenges were categorised into awareness campaigns, human personnel, inadequate drugs and management support; while psychological related challenges were further sub-coded (categorised) into denial, peer pressure and stress related challenges.

Table 5.3: Challenges Sub-Themes

Theme	Sub-Themes
Challenges with behaviour change	Facility related-awareness campaigns, human personnel, inadequate drugs, support by management
	Ignorance
	Information/knowledge related challenges
	Medication adherence challenges
	Norms/beliefs/culture
	Personal characteristics
	Psychological related challenges-Denial, stress, peer pressure
	Resources
	Social support systems

5.5.1 Resource Related Challenges

Evident from the interviews is the fact that challenges related to resources availability were linked with behaviour change adoption. The most common resources challenges were related to inadequate financial resources. For instance, Participant 007 cited financial resources inadequacy as a challenge to behaviour change adoption by stating that:

“T2DM patients are unable to honour return dates for follow up due to lack of money for transport, lack of adequate financial resources to buy healthy foods; they end consuming lots carbohydrates which are cheaper and readily available”

Participant 013 claimed the service users’ low socio-economic status as influencing medication adherence by opining that:

“Low socio-economic status; some T2DM patients cannot afford anti-diabetes medication, some take medication weekly instead of daily due to financial constraints”

Financial challenges also influence feeding habits where T2DM service users mostly seek unhealthy diets due to the recommended diet being expensive. This is seen from Participant 016 who stated that:

“...financial constraints due to low social economic status acts as a barrier to them eating healthy, despite their willingness to change their eating habits, they find themselves consuming more carbohydrates based diet since it is cheaper”

Further, respondents cited financial challenges as a hindrance to diet management and seeking medication. For instance, Participant 017 cited that:

“In my opinion, the main challenge encountered by patients when they have been diagnosed, counselled and educated on T2DM is financial constraint. This affects the patient’s ability to eat healthy and access medication”

Participant 031 was direct on the influence of financial resources in terms of poverty on medication and diet adherence by stating that:

“...high poverty levels; not many patients are well off thus not able to afford drugs to control sugar levels in conjunction with diet behaviour modification”

Inadequate financial resources also affected seeking for treatment and check-ups by the service users in addition to diet management as noted by Participant 020 who stated that:

“...cost implications of T2DM emanating from the cost of medication, checkups and the prescribed diet regime. This strains and disrupts family resources which results to unwillingness to effect behaviour change”

Inadequate financial resources also influence behaviour change activities such as exercising as indicated by Participant 025 who was of the opinion that:

“...inadequate resources to support behaviour change especially purchasing healthy foods and exercising”

5.5.2 Information/Knowledge Related Challenges

Another major challenge was information/knowledge related constraints which mainly include lack of sufficient information/knowledge either at the individual level or at the community level. For instance, Participant 001 cites misinformed community by stating that:

“Misinformation about T2DM at the community level which makes it difficult to instill or achieve behaviour change”

For Participant 007, service users (individual level knowledge deficit/inadequacy) do not have sufficient knowledge regarding T2DM thus do not have a clear understanding of behaviour change for T2DM management. This is supported by the following statement:

“Knowledge deficit: T2DM patients are not well informed about the condition and the possible complications which hinders behaviour change from occurring”

Additionally, due to knowledge and information deficit there are misconceptions regarding T2DM by the service users. This is supported by Participant 009 who noted that:

“Coping with diagnosis especially where the newly diagnosed have misconceptions and misinformation about the condition especially those who may have seen other T2DM patients who have undergone amputations or even passed on. Because of the pre-conceived ideas about the disease, behaviour change may be difficult”

Further, possessing information and knowledge on risks of T2DM will enable service users take the right precautions through behaviour change. This is echoed by Participant 012 who was of the opinion that:

“From the patients I have interviewed, lack of right information is the main challenge. It is not well articulated. They don’t know the risks that are involved if the correct precautions are not taken. If we communicate better and give the patients adequate and right information, I believe many of them will take proper precaution and embrace physical exercise and eat healthy”

Users also lack sufficient knowledge on how extreme cases are and therefore do not view how important behaviour change can be in reducing or decelerating complications or extreme cases into setting in. This is echoed by Participant 022 who stated that:

“...lack of adequate knowledge; many patients do not have adequate information on how debilitating diabetic complications can be. They think it can be treated just like any other disease”

There is also information deficit and misconceptions on different management techniques such as the use of traditional medicine which drive service users into adopting other forms of management rather than behaviour change. This is reiterated by Participant 040 who is of the opinion that:

“...lack of adequate information on T2DM, which when coupled with misconceptions especially on treatment options like herbal medicine hinders behaviour change”

5.5.3 Personal Characteristics Challenges

Another notable challenge is related to the service users’ personal traits such as age, education level among other traits. One notable personal characteristic that is a challenge in behaviour change is age which comes with challenges such as failure to engage in physical exercise, not adhering to the required diet amongst others which may derail progress on the management of T2DM. This is the claim by Participant 004 who stated that:

“Depending on the age, those who are of advanced age may not really understand the condition very well or comprehend the impact of negative

behaviour e.g. poor eating habits, not keeping meal timing even when travelling and lack exercise on the progression of T2DM”

In advanced age levels, there is also resistance to change and if change is likely to occur, respondents are likely to be slow in adopting behaviour change. This is supported by the claim of Participant 034 who noted that:

“Unwillingness / resistance to change; majority of the patients who have T2DM are adults. Compliance with instructions depends on the patient’s initiative and willingness to change. If the patient does not comply with recommendations then not much will be achieved in terms of T2DM management”

Another personal challenge is education. Education may be a challenge in the aspect of having low education levels, which may influence behaviour change among T2DM users. This is supported by Participant 021 who specified that:

“Illiteracy: even when taught on how to adopt different lifestyles, they are not able to adapt to that because they lack discipline to follow the recommendations. For example, when taught not to eat sugary foods, some will not adhere to that. Illiteracy affects the capacity of the clients to understand information given at the health facility and implement changes”

Lack of education by the service users makes it difficult for them in understanding information on T2DM management. Participant 029 insists that lack of education is a challenge in behaviour change by stating that:

“...majority of the patients are uneducated which makes it hard for them to understand and assimilate information given, consequently this affects behaviour change. Uneducated patients are less likely to comply with recommendations. T2DM patients who have gone to school or college, have learnt some sciences and have somewhat knowledge of diabetes will understand that T2DM is a serious disease that needs to be addressed”

Another personal characteristic that acts as a challenge to behaviour change is personal behaviours that do not support seeking a healthy lifestyle. This is supported by Participant 022 who echoed that:

“...poor health seeking behaviour; many people do not seek medical attention when they fall sick resulting to late diagnosis, community screening is therefore necessary”

5.5.4 Norms/Beliefs/Culture

Respondents also cited norms, beliefs and culture as a challenge to behaviour change. Behaviour change practices are embedded in day-to-day practices and are therefore influenced by existing norms, culture and beliefs of the service users. The following sentiments by Participant 002 support the fact that norms and culture act as a challenge to behaviour change due to their role in stigmatisation of T2DM service users:

“Behaviour change is deeply rooted in day-to-day practices, norms and culture which makes many T2DM patients fear being seen as different or being stigmatised”

Culture and beliefs of the service users are a challenge due to the myths that are attached to T2DM. This is echoed by Participant 015 who noted that:

“There are a lot of myths and misconceptions about T2DM, some newly diagnosed patients see it as a death sentence and think that even behaviour modification will not help them in any way. They only believe in drugs. Majority of the patients don’t think exercise will help much. They only want the medicine that will help lower the blood sugars. They therefore don’t regard behaviour change highly”

Service users also possess beliefs that mostly emanate from their religion and traditions. This is supported from the response by Participant 016 who stated that:

“...some patients attach themselves to religion. They tend to think that “believing” will take away the illness. They shun treatment and behaviour change in general”

This is further supported by Participant 030 who opined that:

“...religious beliefs and practices that are attached to our communities that people tend to follow more than what clinicians prescribe. These hinder behaviour change”

Norms are a challenge since they instill habits that are hard to eliminate from a person’s life. For instance, Participant 022 supports this by stating that:

“...old habits die hard; some people find it hard to change habits that are part of their lives, for example it is difficult to embrace exercise if one is used to enjoying a ride; similarly, it will require a little bit more effort to switch from fast foods to healthy whole foods which are seemingly ‘boring’”

Some cultural beliefs and practices associate chronic illnesses to witchcraft and curses. This is not an exception to T2DM as stated by Participant 032 who voiced that:

“...cultural practices and beliefs (some patients do not believe that T2DM is a medical condition, they associate it with witchcraft)...”

5.5.5 Facility Related Challenges

From the interview responses, facility related challenges also influenced behaviour change among service users. The most common facility related challenge noted was inadequate human personnel. For instance, Participant 021 noted that:

“...few nutritionist working in health facilities resulting to some patients not accessing their services”

The issue of inadequate human personnel was also noted by Participant 028:

“Most level 3 and 4 facilities do not have nutritionist/ dietitians, therefore most T2DM patients are not seen by a nutritionist until when complications sets in and they have to attend a high level facility. The same goes for other health workers who are key in management of diabetes”

Hospitals are also inadequately stocked with drugs and lack current medication in T2DM treatment, thus making it a challenge for service users to access medication and adhere to T2DM treatment medication. For instance, Participant 031 supports this claim by stating that:

“...inaccessibility to medication particularly new and more effective regimens”

There is also failure by the management to support T2DM initiatives geared towards supporting behaviour change. This mainly takes place through lack of budgetary support for behaviour change related initiatives, for instance for mass education, medication among other activities that may enhance behaviour change. Participant 021 supports this claim by stating that:

“Low budgetary allocation which limits implementation activities that may support behaviour change amongst T2DM”

Further, health facilities do not conduct awareness campaigns thus, service users may not be aware of the T2DM services and activities at the facility. This hinders prevention and early diagnosis of T2DM. The situation is more of curative-based rather than preventive-based management of T2DM. Participant 037 backs this claim through the following statement:

“Lack of mass education and awareness on prevention of T2DM at the community level; preventive measures are not in place. Many patients seek medical attention when they already have complications”

5.5.6 Social Support Related Challenges

Social support systems refer to the support from service users' social network such as family members, friends, colleagues at work or even peers. Social support systems give service users an experience that is multifaceted thus enabling them to remain active whenever they are faced with vulnerabilities. Therefore, lack of social support remains a challenge for behaviour change in T2DM service users. Participant 006 posits lack of support from family members as a challenge by stating that:

“The main challenge is adherence to T2DM medication and in most cases it’s related to negligence by loved ones or family members”

This challenge is also supported by comments from Participant 016 who stated that:

“Fourth, lack of moral support from spouse, partner or family (especially for adults). This reduces the service user capacity of adopting positive behaviour”

Social support networks also act as a reminder on what a patient should do or is supposed to do, thus enhancing behaviour change. Therefore, lack of social support systems means that service users do not have loved ones to remind them on medication. This is supported by the claims emanating from respondent 022 who stated that:

“Non-adherence is also exacerbated by lack of social support systems; when a patient lives alone or doesn’t have anyone to remind them to take medication, they may not adhere”

5.5.7 Ignorance

Another common challenge that emanated from the interviewees was ignorance by the service users to adopt behaviour change activities and lifestyle modifications. For instance, Participant 008 stated that:

“Ignorance, for newly diagnosed T2DM patient there is emphasis on behaviour change concerning what they eat, increased physical exercise and adherence to medication but some of the patients do not take it seriously”

According to the participants, ignorance makes service users disregard the importance of behaviour change in managing T2DM. This is shown in the following statement by Participant 031:

“..ignorance; patients disregard information given at the health facility”

5.5.8 Psychological Related Challenges

Three sub-themes (categories) of psychological related challenges were notable from the interview responses. These included denial, peer pressure and stress related challenges. Denial by T2DM service users makes it difficult for them to

withdraw from behaviours that worsen complications related to T2DM. While supporting denial as a challenge, Participant 016 stated that:

“In my opinion, the main challenge is denial by patients that they have T2DM, they therefore continue with behaviour that is detrimental to their health”

Peer pressure makes patients more vulnerable by exposing them to behaviours and activities of their peers which make the management of a disease problematic. It waters down a person’s principles and stand towards adopting lifestyle modifications in dealing with a disease. This claim is supported by Participant 038 who voiced that:

“Peer pressure; some patients are not principled enough to make independent choices especially when they are in public place or when they are with their peers”

For Participant 014, stress is also a challenge due to the psychological effect that T2DM has on patients. This is based on the following statement:

“High stress levels; being a lifelong condition it takes toll on the psychological health of some patients. This affects behaviour change in terms of taking a healthy diet, exercising and access and adherence to anti-diabetes medication”

5.5.9 Medication Adherence Challenges

The condition that is T2DM does not lead to pain in body organs. This makes service users not to have justified reasons of adhering to medication, making it a challenge in enhancing behaviour change. Further, newly diagnosed patients are not used to daily intake of medications and changing to this new lifestyle becomes a challenge. Participant 022 backs this through the statement:

“...non-adherence to medication; some patients find it hard to adhere to medication since they are not used to taking medication on a long-term basis”

Patients also tend to neglect medication upon stabilisation of blood sugar levels as per the statement by Participant 028:

“...non-adherence to medication and a healthy diet (food choices, portions, timings and adequate hydration) especially when blood sugars stabilise”

Non-adherence to medication is also a challenge as supported by Respondent 029 who stated that:

“Since T2DM is a condition that is not painful, many patients fail to eat healthy, exercise and adhere to medication, a situation that hastens setting in of complications”

5.6 Factors Hindering Behaviour Change

Respondents were required to list different factors affecting behaviour change. Ten (10) sub-themes-regarded as the factors hindering behaviour change by service users-were identified: demographic factors, facility factors, ignorance, inaccessibility to behaviour change enhancers, knowledge/information factors, support systems, norms/culture/beliefs, psychological factors, resource related factors and work-related factors.

Table 5.4: Sub-Themes on Factors Hindering Behaviour Change

Theme	Sub-Themes
Factors hindering behaviour change	Demographic factors
	Facility factors
	Ignorance
	Inaccessibility to behaviour change enhancers
	Knowledge-information related factors
	Support systems
	Norms/culture/beliefs
	Psychological factors
	Resource factors
	Work-related factors

5.6.1 Resource Factors

The most cited factor hindering behaviour change was related to resources availability, with financial related factors being the main resource factor that hinders behaviour change among the service users. This is supported by the following statement from Participant 007:

“...the condition requires substantial financial resources to manage which are not available in most cases”

Respondent 018 reinforces this claim by stating that:

“Low social economic status of most of the T2DM service users; they therefore face the challenge of accessing medication and as a result they fail to take their medication as prescribed”

Further Participant 034 notes the following in reference to financial constraints rising from reliance on income sources that are not stable and well-paying such as agriculture:

“...high poverty levels; most of the T2DM patients rely on agriculture which does not pay off well compared to some years back. Due to financial constraints they cannot afford to eat a healthy diet and buy medication”

Further, Participant 038 noted that inadequate financial resources hinder behaviour change from the following statement:

“...lack of finances; some patients lack money to purchase drugs, testing kits, money for purchasing healthy foods”

Participant 042 noted declining financial status especially due to CoronaVirus Disease of 2019 (Covid-19) effects as a factor hindering behaviour change by stating that:

“...limited finances especially due impact of Covid-19 (many jobs were lost)”

However, Participant 020 had a holistic view of resources and included other forms of resources such as time and information based on the comment:

“Lack resources including information, time, money and support system”

5.6.2 Facility Factors

Facility related factors such as insufficient personnel, lack of necessary equipment, lack of medicines, and location of the hospitals amongst others were also cited to hinder behaviour change among the service users. Hospitals may have insufficient

personnel thus hindering service delivery among the users. For instance, according to Participant 007:

"...long queues in the hospitals which means that clinicians don't have adequate time with T2DM patients to address all their needs which impact negatively on behaviour change"

Participant 012 in support of insufficient health personnel added that:

"...lack of enough personnel to attend to T2DM patients and especially to those with complications"

Hospitals may also be under-equipped or under-stocked with medication thus influencing behaviour change modifications. This is notable from Participant 018 who stated that:

"...lack of access to medication especially when the medication is changed and the patients do not know where they can be bought"

Another facility factor as pointed out by Participant 021 is proximity of the health facility to the service users. This is supported by the statement:

"Long distance to health facilities making it difficult for patients to access to health care..."

This is further supported by Participant 022 who noted that:

"Patients who live in remote areas are unable to access specialised care; this results to inconsistency in hospital visits"

Facilities are also not well linked, making users delink some of the behaviour change services from the health system. Participant 021 while supporting this claim added that:

"...poor referral and linkage system in health facilities where some clinicians are not well trained in referral and linkage system and especially in referring T2DM patients to nutritionists"

Hospitals also lack follow-up programmes, awareness campaigns and frequent screening camps that help in sustaining an active behaviour change among different service users. For instance, Participant 030 stated that:

“Absence of clinical follow-up and outreach programmes that can be used to educate patients on behaviour change and address any challenges that they may be facing”

There is also failure by the management to support behaviour change initiatives; for instance by not allocating resources to awareness campaigns. This is seconded by Participant 037 who stated that:

“...lack of financial allocation to public health activities; there are health workers such as nurses and public health officers that are trained in public health. If they are facilitated, they can educate the community on T2DM. Secondly, the health sector does not prioritise community based preventive measures”

5.6.3 Knowledge-Information Factors

Knowledge and information supply service users with the required skills and know-how regarding the management process. For instance, Participant 004's position is that:

“Lack of in-depth understanding of the condition and its holistic management”

To strengthen this factor, Participant 009 stated that:

“Inadequate knowledge on T2DM, where the T2DM patient is not provided with adequate or right information at admission or at diagnosis”

5.6.4 Support Systems

Another factor that was notable from the interview responses was support systems to the service users. Support systems mainly emanate from the social circle of the service users such as family members and friends. According to Participant 001 who supports the social support system as a factor:

“Lack of support systems to enable patient to transit from negative to positive behaviour that eases the management of the condition”

Support systems also come with age, where older patients in most cases live alone with their close family members having gone out to seek for jobs while their spouses may also be suffering from chronic illnesses, some might have passed away. This makes the support network inefficient, thus hindering behaviour change. Participant 006 in support of this claimed that:

“...age and support system; older patients mostly suffer from negligence especially when their spouse has passed on while younger patients have better support systems and therefore more likely to accommodate behaviour change”

Participant 032 commented on the following regarding support by family members as a factor hindering behaviour change:

“Lack support system from family members; family members play a critical role in supporting a patient in adopting healthy eating habits and embracing physical exercise. Lack of such support hinders behaviour change among T2DM patients”

According Participant 034, support system hindering behaviour change also include lack of support groups for T2DM patients in addition to lack of family and peer support as noted in the following statement:

“...lack of family support since most of the patients live alone (their children have already moved out). Three, lack of peer support groups; support groups are critical in encouraging behaviour change”.

5.6.5 Demographic Factors

Demographic factors also hinder behaviour change. Demographic factors are those factors that describe the service users such as their education level, socio-economic status, religion, age, family structure among other characteristics. Participant 008 commented on the following regarding the effect of education of the service users on behaviour change:

“Low level of education affects their understanding and conceptualisation of a healthy diet for example different food groups and amount of foods that are recommended as part of a healthy diet”

Participant 015 listed internal and external demographic factors as factors hindering behaviour change by stating the following:

“It depends on individuals based on the type of work they are engaged in or an individual doesn’t want to embrace positive change, their age (some smokers feel they have been smoking too long to quit), they feel they are beyond repair...”

Age comes with other effects that influence behaviour change among T2DM patients. For instance, a comment by Participant 026 noted that:

“Dementia particularly among elderly T2DM patients which makes them forget to take healthy foods and medication. This makes it hard to maintain acceptable blood sugar levels”

5.6.6 Work-Related Factors

Some jobs make it difficult for patients to adhere to a treatment regimen. For instance, some jobs demand for longer working hours while others expose individuals to lifestyles that may worsen an illness or lead to more complications. According to Participant 002:

“Work related- for example it’s a challenge for a long distance driver to adopt good dietary practices”

Participant 003 commented the following on work-related factors, especially work environment:

“Sometimes lifestyles are tied to work environment for example tea and lunch breaks which may not be in favour of desired schedules for behaviour change in T2DM patients”

Participant 012 pointed to the effect of a job on patients getting time to engage in behaviour change by stating that:

“They are too busy earning a living to find time to exercise”

5.6.7 Ignorance

Ignorance was also a cited factor that the interviewees listed as a hindrance to behaviour change. For instance, Participant 024 stated that:

“...ignorance; many T2DM patients do not follow the prescribed diet regimen, they take excess portions especially of carbohydrates”

Due to ignorance, service users revert to conventional activities that expose them to T2DM related complications while some users are hesitant to change their normal routine activities to accommodate activities that enhance behaviour change.

This is reiterated by Participant 028 who stated that:

“...ignorance; some patients go back to ‘old habits’ when their sugars stabilise. Fourth, unwillingness to change, some patients are not willing to change their behaviour”

5.6.8 Norms, Culture and Beliefs

Some norms, cultural practices and beliefs influence the actions by people in rejecting standard management activities in favour of self-proclaimed remedies and consultation from unqualified or quack practitioners. Therefore, health-seeking practices and behaviours are shaped by one’s norms, culture and beliefs. For Participant 007:

“Cultural beliefs where some T2DM patients believe that the condition is caused by witchcraft; this hinders behaviour change”

Cultural practices also influence dietary behaviours and social activities that are tied to behaviour change in T2DM management. This is reiterated by Participant 029 who stated that:

“First, eating habits vary with race; many Africans eat food that is high in glycaemic index, for example Ugali is staple food for many Kenyans. Secondly, alcohol abuse is rampant. Alcohol has empty calories which strains the pancreas and in the long run contributes to increased cases of T2DM.”

Religious and cultural beliefs were also found to hinder behaviour change. This is the view by Participant 036 on religious and cultural beliefs:

“Religious beliefs and customs that hinder behaviour change”

5.6.9 Inaccessibility to Behaviour Change Facilitation Items

Some behaviour change enhancers are unavailable to the service users. Such is the case for exercising facilities, medication, healthy foods and education platforms amongst others that service users cannot access. According to Participant 001:

“Lack of access to healthy foods, inability to engage in physical activity and low social economic status”

Foods recommended for T2DM patients are considered expensive and therefore inaccessible to patients with inadequate financial resources. This is supported by Participant 024 who claimed that:

“...inaccessibility to healthy foods especially vegetables and fruits for patients whose socio-economic status is low”

Service users residing in urban areas are faced with this challenge as per the claim by Participant 025:

“...lack of facilities to exercise especially for patients who live in urban areas (specifically in those living in high rise buildings) and sedentary lifestyle for instance riding in a car instead of taking a walk”

5.6.10 Psychological Factors

Psychological factors were also identified from the interview responses. Specifically, denial was the most common psychological factor as noted by Participant 036:

“Denial; some patients may be in denial that they have diabetes which delays their behaviour change towards T2DM demands”

5.7 Solutions for Prevention of T2DM

Another major theme from the thematic analysis of the interview data was solutions for T2DM prevention. In this theme, the following sub-themes were

identified: primary targets to prevent T2DM, primary targets to promote behaviour change, actions engaged in T2DM management, multi-sectorial approaches and actions by other sectors.

5.7.1 Primary Targets to Prevent T2DM

The categories identified in this sub-theme included: mass education; awareness campaigns and advocacy; screening and monitoring; and lifestyle modifications and habits change.

Table 5.5: Solutions for T2DM Prevention and Management

Sub-Theme	Categories
Primary targets to prevent T2DM	Lifestyle modifications and behaviour change
	Mass education, awareness campaigns and advocacy
	Screening and monitoring

5.7.1.1 Mass Education, Campaigns and Advocacy

Mass education, campaigns and advocacy were the main primary targets identified by the majority of the respondents. According to Participant 001:

“First, the community lacks information on how to consume healthy diets. There is need for mass education / advocacy on consumption of healthy diets at the community level as emphasis on prevention and as a form of management for those already diagnosed with T2DM”

Advocacy was supported by Participant 002 who stated that:

“Everybody; no one is immune to diabetes from young to the old. Emphasis on behaviour change will help everyone embrace healthy behaviour which would otherwise seem unacceptable or weird such as jogging or running on roadside paths in the morning. Adequate sensitisation is critical for behaviour change”

Advocacy on preventive measures should start from early ages, as early as school going ages as per the statement by Participant 006 who stated that:

“Because most of the T2DM patients are middle aged, it is advisable to start advocacy and education on healthy foods and exercise at young ages as early as primary school children”

Participant 008 commented the following regarding education on nutrition:

“Mass education on healthy diet and against intake of processed foods is required in the community”

On mass education and awareness campaigns, Participant 012 indicated the following:

“Disseminate information to as many people as possible to prevent new cases and help people recognise symptoms early enough”

Participant 015 added the following on mass awareness campaigns:

“The main target is conducting mass awareness on effects sedentary lifestyle at all levels including at primary schools’ levels”

For Participant 017 mass education should target behaviour change aspects such as healthy diets and physical exercise based on the following statement:

“In my opinion, mass education on healthy eating habits and physical exercise should be the primary target to prevent T2DM in Kenya”

Participant 019 noted that mass education, campaigns and advocacy should target those at risk by stating:

“Health education to the high risks groups including those with family history of diabetes, those who are obese and overweight and the elderly. This will have a big impact in prevention of T2DM in Kenya”

Based on the fact that almost everyone is at risk, Participant 020 had the following input regarding mass education, advocacy and campaigns:

“The entire public, we have seen a departure from the early notion that T2DM is a condition of the rich. It’s now known that the condition develops over time and it’s common among those who are obese, overweight and those who live

a sedentary lifestyle. Mass education is necessary to enlighten the community on the importance of prevention through physical activity, healthy eating and regular screening”

Mass education, advocacy and awareness campaigns should be enhanced through community events and activities such as games and team building events. For instance, Participant 022 claimed that:

“Events like football and marathons should be organised at the community level to encourage physical fitness; promote organic based small scale farming methods for household consumption to encourage healthy eating habits at the community level”

Mass education should not only focus on diet management but educating the masses on quitting unhealthy behaviours such as drugs abuse. This was noted from Participant 023 who stated that:

“Mass education on healthy lifestyle specifically on healthy cooking methods and feeding habits and quitting unhealthy habits like smoking (smoking is quite rampant)”

Awareness campaigns, education and advocacy on prevention of T2DM should target even school-going children. This will ensure that they lead a lifestyle that does not expose them to T2DM. This is backed by Participant 024 who stated that:

“Introduction of healthy lifestyle behaviour education in the school curriculum from lower primary”

Mass education, advocacy and campaigns should mainly focus on those at risk and school going children depending on the comments by Participant 033:

“First, early mass education on maintaining healthy lifestyle (particularly in schools). Second, people at high risk of having T2DM should be targeted for education by the health sector”

Mass campaigns, education and advocacy should be conducted in other community meetings and initiatives so as to raise awareness levels thus enhancing prevention of T2DM. Participant 037 stated that:

“Mass health education and screening at the community level in barazas’, churches and generally at the community level. Education on prevention of T2DM especially on healthy eating habits is critical”

Mass education and campaigns should also focus on controlling and managing psychological factors which are known causes of T2DM in addition to diet management. This was uncovered from the comments by Participant 042 who commented that:

“Mass education on importance of healthy eating habits. Second, education on stress management (unmanaged stress is one of the causes of diabetes) and signs of diabetes”.

5.7.1.2 Screening and Monitoring

Regular screening and monitoring helps in early detection of diabetic cases and diagnosis of even of those at risk, thus helping in prevention of T2DM. This was also agreed by the respondents in the interviews. For instance, Participant 009 indicated that:

“Screening at the community level and early intervention for new and pre-diabetic cases”

According to Participant 022, screening should be for everyone especially those visiting medical facilities. This is from the comment below:

“Mass screening at every opportunity; everyone seeking medical attention in health facilities should be screened for diabetes”

According to Participant 030, mass screening should target those at high risk based on the following comment:

“Individuals at high risk, particularly those who are genetically predisposed, overweight, obesity, alcoholics, those living sedentary lifestyle and those with comorbidities should be screened regularly”

Through the following comment, Participant 039 supports mass screening due to its benefits such as early diagnosis thus early intervention measures:

“Mass screening in the community to capture undiagnosed cases early; strengthen the role of community health workers so that they become a link between the hospital and the community and creation of support groups at the community level”

5.7.1.3 Lifestyle Modifications and Habits Change

Another primary target to prevent T2DM was lifestyle modifications and habits change to incorporate habits and practices that improve T2DM management. For instance, Participant 003 stated that:

“In my opinion sound nutrition habits and lifestyle modification is key in prevention of T2DM in Kenya. Generally, our diet is more carbohydrates based and to make it worse alcohol consumption is on increase”

Behaviour change through lifestyle modification and change of habits was also supported by the following response from Participant 007:

“Adoption of healthy diets and emphasis on adherence to medication for T2DM patients to avoid quick progression of the condition. Additionally, physical exercise and follow-up of T2DM patients”

5.8 Primary Targets to Promote Behaviour Change among T2DM Service Users

Under the interview question “What are in your opinion the primary targets to promote behaviour change in T2DM in Kenya?” The following sub-themes (categories) were identified from the interview responses: emphasis on behaviour change and diet changes, financial and other forms of support, grassroot level services, information dispensation/education and awareness, monitoring/screening and follow-ups, support groups, and training of personnel.

Table 5.6: Primary Targets to Promote Behaviour Change

Sub-Theme	Categories
Primary targets to promote behaviour change	Emphasis on behaviour change and diet changes
	Financial and other forms of support
	Grassroot level services
	Information dispensation/education & awareness
	Monitoring/screening & follow-ups
	Support groups
	Training of personnel

5.8.1 Information Dispensation, Education and Awareness

The most prominent primary target in promoting behaviour change among T2DM users is information dispensation, education and awareness as disclosed by 24 sources (respondents). Information, education and awareness campaigns should not just target the patients but should have a holistic approach that targets the entire community including the service users' support system. According to Participant 004:

“Don’t just target the patient; target the whole family (including the care giver for elderly T2DM patients) and the community at large on advocacy and education on management of T2DM. Reason being almost everyone is affected”

According to Participant 009, education should guide the service users on what is required in managing T2DM through the following statement:

“Health education; when you give the T2DM patients the right information they understand the condition well, routine tests, possible complications and how the DM medication works. This promotes positive behaviour change”

Awareness campaigns and education targeting T2DM patients is likely to make them adopt routines that enhance the management of the condition as outlined by Participant 011 as follows:

“We need to convince T2DM patients to adopt positive behaviour change through campaigns and education forums at the community level. Once they understand, they are likely to change their behaviour”

Information, education and awareness campaigns should also be prioritised by those at risk so as to enlighten them on predisposing factors and health management activities towards T2DM in such a way, they will be in a position to adopt behaviours that do not expose them to T2DM. This is supported by Participant 014 who stated that:

“Mass awareness, for those who have a family history of diabetes. They should be educated on those risk factors that predispose them to DM including eating healthy and maintain the right weight for their height”

Education, awareness campaigns and information dispensation also changes the perception of T2DM as a death sentence to one that can be properly managed through behaviour change. This is reinforced by the comment from Participant 018 by stating that:

“...there is a need to change the perception of T2DM from that of killer disease to that of a manageable condition”

Education, awareness campaigns and information dispensation equips the service user with the know-how to manage complications by making appropriate changes in their routine behaviour. For example, the following response by Participant 026 confirms this:

“Educating the patient on a healthy diet by a nutritionist, giving adequate information to the patient especially on the likely complications if they fail to make the necessary behaviour change”

This is also confirmed by Respondent 028 who added that:

“...ensure that patients have adequate information on T2DM, knowledge is power and it can propel behaviour change among T2DM patients. When they

have adequate information they become ambassadors of healthy eating and physical exercise in the community”

To promote behaviour change, the primary target should be awareness campaigns and education through forums that bring people together such as communal activities and gatherings. Participant 038 stated that:

“...organising seminars or education forums where patients are empowered with information on management of T2DM”

Mass media such as television programmes and other forms of media, for instance social media, should also be a priority in information dispensation, education and raising awareness as per the statement by Participant 043 who opined that:

“Use of mass media especially TVs to educate masses on T2DM, commercial breaks should be used to educate people on T2DM”

5.8.2 Support Groups

Formation of support groups was also prominent among the respondents as a primary target to promote behaviour change among the service users. For instance, Participant 001 reiterated that:

“...creating support systems among the T2DM patients e.g. support groups to encourage behaviour change”

Support groups should incorporate everyone involved in the life of a patient. This means that all those interacting with the patient are prepared to accommodate any changes that the patient intends to make in his/her life. This is as per Participant 020 who noted that:

“In my opinion, everyone involved in the patient’ life should be targeted from spouse, parents, family and house help. This builds a support system that reinforces patients’ attempts to change their behaviour. When the family is involved, they are able to accommodate the needs of the patient (especially the food) during family gatherings”

Support groups also enable the service users learn from those who have already experienced a situation and also make them understand what their peers are doing. This encourages them in the process of behaviour change, as the service users understand that they are not alone and have peers to go through the process of behaviour change together. Participant 028 noted that:

“...encourage the patients to join support groups; when patients come to the hospital they think they are the only ones who have the condition, but upon joining their peers in support groups they get to know others with similar condition, who encourage them as they change their behaviour”

This is also added by Participant 037 who indicated that:

“...forming peer support groups where patients can share and learn from each other. Patients can also see first-hand their peers who are undergoing dialysis or have been amputated. This will possibly encourage behaviour change”

5.8.3 Emphasis on Routine Behaviour and Diet Changes

The respondents also consider emphasis on routine behaviour and diet changes. Some of routine behaviours that the respondents preferred to be adopted as a priority in enhancing behaviour change include engaging in exercises and modifying monotonous lifestyles that expose individuals to T2DM and its complications. Participant 002 emphasis on this is noticed from the response:

“Cycling, use community spaces such as fields for recreation and physical activity, promotion of healthy diets rich in vegetables and whole foods”

Similar response is noted from Participant 006 who indicated that:

“Dietary intervention and exercise; psychotherapy support is critical for older T2DM patients to support their psychological health in order to achieve behavioural change; at their age some don't care whether they lose their limbs through amputation or not given the poor social support system most of them have”

While emphasising on diet changes and encouraging people to engage in exercises, Participant 025 insisted that:

“Emphasis on eating a healthy diet (low in fat, avoid consumption of simple sugars, high in vegetables), engaging in physical exercise and mandatory screening for everyone above 45 years of age. Encourage physical exercise from early ages particularly in primary schools and maintain that momentum even in adulthood”

5.8.4 Financial and other Forms of Support

The respondents also noted that priority should also be on supporting service users in different ways such as through financial support, moral support, material support and other forms of support. According to Participant 007 support should be in form of:

“...financial support and nutrition supplementation where possible should be provided to T2DM patients”

Participant 018 was of the opinion that T2DM service users should be supported with glucose monitoring equipment to help them screen their sugar levels while at home rather than having to always visit health clinics. This was notable from the following statement:

“T2DM patients should be issued with glucometers to help them monitor the trend of their blood sugar levels at home, this will possibly help them curb T2DM complications”

Patients should also be supported psychologically so that they do not suffer from psychosocial effects such as stress and depression. In support of this claim, Participant 021 noted that:

“Psychosocial support is also critical because stress is a trigger factor for T2DM”

Support may also be in form of ensuring that services offered in public facilities are affordable and accessible by the service users. For instance, Participant 035 was of the opinion that:

“Offering free diabetic services to T2DM service users”

5.8.5 Monitoring, Screening and Follow-Ups

Another notable primary target in promoting behaviour change as noted from the interviews was monitoring, screening and follow-ups. Screening helps in early diagnosis and identification of those at risk, while monitoring and follow-ups help in ensuring that those with T2DM are following the required medication and comply with the management plan for T2DM. Participant 007 supported follow-ups based on the following comment:

“Well planned follow up of T2DM patients to monitor compliance on medication, diet and exercise”

In support of monitoring, Participant 029 stated that:

“Close monitoring and supervision; this requires concerted efforts between the family and health professionals”

On the other hand, Participant 032 was in support of screening to help in early diagnosis through the following response:

“Early diagnosis through mass testing in diabetic campaigns should also be carried out”

5.8.6 Grassroot Level Services

Services towards T2DM management should be taken closer to the people to heighten their utilisation and efficiency. This can be achieved by establishing clinics in dispensaries and through mobile clinics. Participant 034 stated the following to support this aspect:

“...health services should be taken closer to grassroot levels, for example in dispensaries, so as to reach patients especially those residing in rural areas”

5.8.7 Training of Healthcare Workers

Healthcare workers should be trained on enhancing behaviour change and on high quality management of T2DM. According to Participant 034:

“...front line healthcare workers should have training in T2DM management; mentoring programmes should be encouraged to pass skills to other health workers”

5.9 Actions that Healthcare Professionals are engaged in T2DM Management

The respondents were required to indicate what actions they are engaged in regarding T2DM management. Under this sub-theme, the following actions were identified: counselling, education/awareness & information sharing, extreme cases management, general routine management, medication and general consultancy, nutrition management, screening and monitoring.

Table 5.7: Primary Targets to Promote Behaviour Change

Sub-Theme	Actions
Primary targets to promote behaviour change	Counselling
	Education, awareness and information
	Extreme cases management
	General routine management
	Medication and general consultancy
	Nutrition management
	Screening and monitoring

5.9.1 Education, Awareness and Information Sharing

The participants indicated that they are involved in educating the people, awareness campaigns and information sharing. Participant 002 was involved in:

“Education on importance of healthy diets in treatment of T2DM”

Participant 003 indicated that:

“I also emphasise on healthy eating habits. Besides this, I always encourage them to be advocates of healthy eating to others”

While the involvement of Participant 009 on education was as follows:

“I educate them on their condition at that point and emphasise on adherence on medication, clinic return dates and routine tests”

For Participant 016, involvement is in terms of awareness and information sharing as shown in the following comment:

“...encourage the patients to join support groups for psychosocial support where through patient to patient sharing of experiences they can accept their diagnosis and adopt positive behaviour; I discourage the use of herbal medicine since their efficacy and interactions have not been well documented; involvement of partner, spouse or parent to ensure they offer the necessary support to the patient in terms of provision of healthy diet, honouring clinic visit dates, adherence to medication, blood sugar monitoring and moral support in general”

On the other hand, Participant 019 performs information sharing and awareness as indicated in the following claim:

“I have been in the front line carrying out public sensitisation on T2DM, I am motivated to go beyond the call of duty since I have a close relative who has T2DM. In the wake of Covid-19 we created a platform on Zoom where we hold meetings with T2DM patients. We disseminate information on T2DM and any misconceptions are cleared”

5.9.2 Extreme Cases Management

It was also notable from the interviews that the respondents also engaged in extreme cases management so as to stabilise the current condition. For example, Participant 004 indicated that:

“At my level I interact with T2DM patients when complications have set in; when they are coming for debridement or amputation. I always try to intervene at the first contact with T2DM patients”

Participant 006 added that:

“Most the T2DM patients that I come into contact with have DM complication already. I therefore manage the complication through debridement and or amputation”

For Participant 009, extreme cases management occurs through surgical procedures and prevention of further complications by management of sugar levels to acceptable ranges as not in the following opinion:

“In the surgical ward, we come into contact with T2DM patients when they present with complications that require a surgical procedure or care like diabetic foot and abscess. Most of our actions are therefore geared towards preventing further complications and to ensure that their sugar levels remain within the acceptable range”

For Participant 018:

“...I attend to T2DM patients, most of them present with hyperglycemia; some are in compliant with anti-diabetes medication; some have insulin resistance due to lack of adherence. I stabilise their blood sugars levels, treat other comorbidities and encourage them to adhere to medication”

The interviews also depicted that health care practitioners also engage in managing other infections that suppress T2DM management. These are the actions by Participant 020:

“At the level of my practice I deal with patients with complications, the common one being diabetic foot ulcers requiring surgery and amputation. I also attend to T2DM patients who present with other infections associated with immune-suppression in diabetes. Even as we do the surgery, we educate them on foot care and early health seeking behaviour”

These are the actions of Participant 028 in the Renal Unit in managing other conditions associated with T2DM:

“As a nutritionist working in renal unit, I meet many patients when they already have complications (end stage renal disease). At this point due to

physiological changes many patients do have problem with controlling their blood sugar levels”

The actions of Respondent 030 in extreme cases management included:

“I receive patients who need emergency care and who already have complications such as ketoacidosis, hyperglycemia, gangrene and peripheral neuropathy. Priority at this stage is given to stabilising the patient”

5.9.3 General Routine Management

The condition that is T2DM comes with effects that require routine management such as stabilising of sugar levels, wound care, blood sugar control and monitoring and preparation of meal plans among other routine activities in T2DM management. For instance, Participant 007 is involved in:

“...managing DM wounds which result from complications as well as treating other comorbidities”

According to Participant 013, general routine management also involves blood sugar monitoring and medication adjustment as shown in the following statement:

“I attend to T2DM patients at the diabetic clinic where I monitor the blood sugar levels to see if the medication is working (T2DM are encouraged to keep daily blood sugar level records), I adjust the dosage accordingly”

Routine management also includes counseling in addition to blood sugar monitoring and diet management. This is supported by Participant 016 in the following claim:

“I control the blood sugar levels, for all T2DM patients, I monitor their blood sugar levels regularly; I link them with nutritionist for nutrition counselling and provision of supplemental foods...”

General routine also involve coordination with other departments to manage conditions that emanate from T2DM. According to Respondent 021:

“I review patients and order the necessary investigation after which I make a diagnosis. Ailments that require attention of other clinics like ophthalmology

and ear, nose and throat (ENT) are referred to these clinics within the hospital. I consult other clinicians and doctors whenever I have a challenge that I cannot handle. Patients are encouraged to monitor their blood sugar levels at home and record them in a note book for evaluation of trends”

5.9.4 Medication and General Consultancy on T2DM

Respondents also indicated that they are engaged in administration of medication and general consultancy on T2DM. For instance, Participant 003 indicated that:

“As a clinician, I mainly prescribe medication to T2DM patients and advise them on how to take the medication”

This is also the action by Participant 007 who added that:

“As a nurse I am involved administration of T2DM medication to control the sugar levels”

Participant 015 was of the opinion that:

“As a medical officer, I am engaged in the curative aspect of T2DM management”

For Participant 017, the action surpasses medication from the following statement:

“I also administer prescribed medication to patients. I also refer them to the nutritionist or to the doctor; I then follow up on the progress of the patient”

5.9.5 Counselling

The respondents are also involved in counselling the T2DM patients. This is patent from the remarks by Participant 001 who pointed that:

“...counselling both individually and in groups”

According to Participant 024:

“I work in gynecology ward where I deal mostly with T2DM and gestational diabetes. I counsel the patients”

Participant 033 counselling is conducted on diet adherence as evident in the following opinion:

"...nutrition counselling is important since it enables patients to change their daily diet intake towards the diet required for T2DM patients"

5.9.6 Nutrition Management

A portion of the respondents also indicated that they are involved in nutrition management. This was most notable from those working as nutritionists. For instance, Participant 001 commented that:

"...as a nutritionist I conduct nutrition assessment including dietary and biochemical (mainly monitoring sugars levels)"

Participant 001 further added that:

"I also develop individual meal plans for T2DM patients"

Participant 002 on nutrition management stated that:

"Develop meal plans for T2DM and monitoring nutrition indicators in T2DM. I am working on a software that would assist patients in different localities with different medical conditions to adopt health eating habits"

5.9.7 Screening and Monitoring

The healthcare givers are also involved in screening and monitoring of T2DM based on the following response by Participant 012:

"I volunteer in medical camps that screen for diabetes and related complications"

And Participant 037:

"...every year we conduct free screening for blood pressure and blood sugar levels during the World Kidney Day"

5.10 Actions that Could Contribute to a Multi-Sectorial Collaboration

The respondents were also required to indicate the actions that would contribute to a multi-sectorial collaboration to encourage and support behaviour change among

T2DM service users. The multi-sectorial approaches noted included medical camps/screening and monitoring, community and social work, establishment of extra and devolved care units, integrated information and support management systems for holistic care, mass education and information sharing, policy making, research and specialised centres, training of lower cadre health care workers.

Table 5.8: Actions that could Contribute to a Multi-Sectorial Collaboration

Sub-Theme	Actions
Multi-sectorial approaches	Camps, screening and monitoring
	Community and social work
	Establishment of extra and devolved care units
	Integrated information and support management systems for holistic care
	Mass education and information sharing
	Policy making
	Research and specialized centers
	Training of lower cadre health care workers

5.10.1 Integrated Information and Support Management Systems for Holistic Care

Respondents supported a collaborated approach in information and support management systems for all the stakeholders involved in T2DM management. This is witnessed from Participant 002 also supported this approach from the statement:

“There is need for health care workers to work as a team in management of patients with T2DM to achieve holistic care”

Further, Participant 007 indicated that:

“A holistic approach in service delivery to T2DM patients instead of the current fragmented approach to care to effectively achieve behavioural change”

For Participant 008:

“The nurses liaise with other staff like the lab technicians, nutritionists and the physiotherapist department as they are key team members in encouraging behaviour change among T2DM patients”

The holistic approach that Participant 009 felt should be adopted is:

“My contribution comes in when I notice a patient is stressed or is not adhering to diet regime, I refer to a psychologist or the nutritionist depending on the concern. I continually keep the doctor informed on the condition of the T2DM patient. At discharge I involve the family especially the primary caretaker on ensuring adherence to medication, diet and physical exercise”

Participant 013 indicated involvement and incorporation of other departments engaged in managing T2DM from the statement:

“Other departments that are key in behaviour change among T2DM patients include physiotherapy where they assist them to come up with a physical exercise schedule. Patients could probably reach the health workers on phone in case they experience anything out the ordinary”

A multidisciplinary approach is also supported by Participant 018 who indicated that:

“I would like see a multidisciplinary patient centered approach towards patients care. Additionally, before a patient is discharged from inpatient care, I envision a situation where they should be counselled on physical exercise and healthy diet; they should also be followed up more often”

This was further emphasised by Participant 028 through the following statement:

“I would like to see a multidisciplinary approach in management of T2DM; I have come across patients who have progressed to renal failure even after being seen by a diabetologist for a long time. Most of them have no idea of a healthy diet. All the team players play a pivotal role in the management of T2DM, this helps the patient make the necessary changes”

5.10.2 Mass Education and Information Sharing

Interview responses also supported a multi-sectorial approach in mass education and information sharing. For instance, Participant 016 was of the opinion that:

“...enlightening the public on behaviour change through social media; mass education on behaviour change at the grassroots; the education sector should be used as a channel for disseminating information on behaviour change”

Participant 034 emphasises even community involvement in mass education from the statement:

“I would like to see a scenario where we exploit all the available avenues to educate and empower everyone on T2DM. Such avenues; chief’s barazas, funerals, churches and schools”

Participant 038 commented the following regarding collaboration in education and information sharing:

“I wish there were regular meetings where patients are given more information on T2DM by a multi-disciplinary medical team. Additionally, I would like to see creation of diabetic support groups”

5.10.3 Medical Camps, Screening and Monitoring

Participants also preferred collaboration and multi-sectorial approach in medical camps, screening and monitoring. Participant 003 indicated that:

“We can do medical camps to facilitate mass testing, health talks and probably early diagnosis at the community level”

Participant 004 suggested screening and monitoring to target those at risk from the comment:

“I have noted that majority of the T2DM patients who are admitted for debridement or amputation do not attend clinic in TL5H. I thought we may need sit together as health workers and look at the localities when most of T2DM patients with complications are coming from and purposefully target those areas with advocacy and education messages on behaviour change to arrest the situation”

According to Participant 021:

“I would wish to organise regular medical camps so that we can screen as many people as possible. Through these camps we will be able diagnose T2DM and intervene early while those at a higher risk of having T2DM will be followed closely. Those who are unable to access health services will have a chance to be screened for various conditions. Various cadres of health workers key for management of T2DM will be involved in the camps”

According to Participant 035:

“I would like to participate in regular medical camps at the community level where patients get health checks. This can be achieved through greater collaboration between the government and the private sector where medical camps are held once a month at the community level”

5.10.4 Establishment of Extra Devolved Care Units

Interview responses also called for a multi-sectorial approach in establishing of extra care units closer to the community. This is seen from Participant 011 who stated that:

“Given a chance I would like to advocate for more diabetic comprehensive management and prevention centres”

The same is seen from Participant 036 who indicated that:

“I would like to participate in programmes developed from the grassroot level to the national level that advocate for better management of T2DM”

Participant 041 indicated that:

“I would like to see the establishment of more diabetic clinics at the community level to make care more accessible”

5.10.5 Community and Social Work

A multi-sectorial approach was also supported in community and social work initiatives regarding T2DM management. For instance, Participant 014 noted that:

“Since the prevalence of DM in Kenya is high, I would like to see social workers assigned to T2DM patients just like we have many social workers that are assigned to retroviral disease (RVD) patients”

The same is also noted from Participant 025 who stated that:

“Given a chance I would like to start support groups for T2DM patients at the community level and use them as a platform for more health education on T2DM, developing individualised diet plan and physical exercise plans”

5.10.6 Policy Making

Responses from the interviews also indicated that a multi-sectorial approach is needed in policy making so as to come up with policies aimed at promoting behaviour change for T2DM service users. For example, Participant 016 stated that:

“Policies should be designed to address issues hindering behaviour change for T2DM patients...”

5.10.7 Training of Lower Cadre Health Professionals

The findings from the interviews also favoured training of health professionals in the lower ranks so as to equip them with necessary skills on T2DM management. For example, Participant 020 stated that:

“I can also educate healthcare givers at the lower level on identification, management and referral of foot care conditions among the T2DM patients”

Participant 026 added that:

“I would like see continuous medical education forums where all the cadres come together to learn and discuss management of T2DM. This will improve services given to T2DM patients”

5.10.8 Research and Specialised Centres

Participant 029 stated the following in support of a multi-sectorial approach in establishing research and specialised care centres:

“Apart from research, I would like to see a specialised centre dedicated for management of T2DM. Patients can thus access right and timely medical attention, this will delay complications”

5.11 Actions by other Sectors/Departments/Organisations/Associations and People that Encourage and Support Behaviour Change among T2DM Service Users

Respondents were also required to indicate actions by other stakeholders that would encourage and support behaviour change among T2DM service users. Notable actions by other stakeholders included counselling, education/awareness and advocacy, facilities and specialised employees, multidisciplinary engagement, support through subsidies and finances, and wellness clinics.

Table 5.9: Actions by others that Encourage and Support Behaviour Change among T2DM Service Users

Sub-Theme	Actions
Actions by other stakeholders	Counselling
	Education, awareness and advocacy
	Establishment of facilities and specialised employees
	Multidisciplinary engagement
	Support through subsidies and finances
	Wellness clinics

5.11.1 Multi-Disciplinary Engagement

The interviews were in support of a multidisciplinary engagement by other actors. For instance, Participant 007 supported inclusion of other stakeholders such as the media, national hospital funds and Diabetic Association in a multidisciplinary approach to encourage and support behaviour change by stating that:

“For example, NHIF, should have a better benefits package for T2DM patients, the sports ministry should have specific programme of physical exercise for T2DM patients, the media should play the critical role of mass education and advocacy, Diabetic Association is key for psychosocial management as well as greater coordination, pharmacist should give the right information to T2DM patients on medication and control of blood sugar”

For Participant 008:

“I would like to see a scenario where we work together as a team which includes hospital administration to ensure that T2DM patients get the prescribed diet regime (this reinforces behaviour change when they are discharged), for the physiotherapist; they should be there to help them implement a physical exercise plan. Additionally, the T2DM patients should be involved to ensure that they are at centre of care”

This is also the insight provided by Participant 015:

“I think we need to bring on board a nutritionist and a counsellor after diagnosis of a patient with diabetes. A clinician or a medical doctor have minimal contact time with the T2DM patients which calls for follow up counselling from a counsellor and a nutritionist”

And further supported by Participant 028:

“I would like to see involvement of all disciplines/cadres that are key in management of T2DM including community health workers who play a critical role in the follow up of patients at the community level”

Participant 023 was more specific on the multidisciplinary approach that should be followed:

“At policy making level, I would like see products like cigarettes and alcohol having a huge banner notice showing their effects on health clearly to deter people from using them. Within health facilities, I would like to see a multidisciplinary approach to T2DM patients’ management and prevention to those who are not diabetic. Also I would like to see targeted testing to those at high risk of being diabetic. Clear and deliberate follow up on T2DM patients especially in the outpatient clinics, for instance after discharged to the outpatient diabetic clinic they should be reviewed by a nutritionist on every visit. The government should therefore ensure that nutritionists are available in all facilities and more so in all diabetic clinics”

Participant 030 supports collaboration with the national government by stating that:

“Greater collaboration with the private sector particularly non-governmental organisation in provision of free or affordable medication and health care in general”

For activities at the community level, a multidisciplinary approach is also required following the comment by Participant 037:

“I would like to see multi-disciplinary collaboration on management of diabetes especially at the community level. Planning by a multi-disciplinary team is critical for success of such activities”

A multidisciplinary approach based on public-private/non-governmental partnerships was also mentioned by Participant 039:

“I would like to see more collaboration between the government, the private organisations and NGOs in ensuring the medication and regular tests are available and affordable”

5.11.2 Support through Subsidies and Finances

Different forms of support such as subsidies were also noted as other actions by other stakeholders. For instance, Participant 014 indicated the following on subsidies:

“I would like to see the prices of anti-diabetes medication subsidised if not fee-exempted in the government facilities to enhance access of medication for everyone”

According to Participant 039:

“...the patients who are very poor should be supported financially (some patients have nothing to eat)”

There is also support from government as indicated by Participant 030:

“The government should increase funding for chronic diseases and the political class should pass requisite legislation to support management and behaviour change for T2DM”

There is also support to health facilities as noted from Participant 032:

“I would like to see more equipment availed for management of T2DM; for example, more glucometers (currently a ward with a bed capacity of 30 patients has only 1 glucometer machine)”

Participant 035 had the following input regarding actions by other stakeholders:

“Other partners should help in subsidising the cost of medication or even make them cost free. Patients that are poor should be supported financially”

5.11.3 Education, Awareness and Advocacy

Other stakeholders should also be involved in education, awareness and advocacy.

For instance, based on Participant 003:

“Besides, education on healthy eating habits should be conducted in all departments”

Participant 004 added that:

“More advocacy and education at all levels, from the churches to the community to schools, emphasis on behaviour change to reduce the cases and slow progression for T2DM. Advocacy and education similar to that of HIV/AIDs”

5.11.4 Facilities and Specialised Employees

Facilities and specialised employees would be helpful in the management of T2DM.

This would mean T2DM service users seeking treatment in facilities specialising in the management and treatment of the condition. For illustration, Participant 019 indicated that:

“I would like to see creation of specialised clinics for T2DM; most government hospitals do not have a diabetic sub-specialist like a diabetologist, T2DM

patients are seen in medical clinics. An ideal situation requires that a specialised clinic for T2DM should have a diabetologist”

Participant 032 opinion was that introduction of specialised facilities and employees would translate to increased number of healthcare professionals focusing on helping patients manage T2DM. This was evident from the following statement:

“Specialised facilities should be introduced which would help increase the numbers of health workers involved in managing T2DM”

5.11.5 Wellness Clinics

The following comment by Participant 002 emphasises on wellness clinics:

“Currently there is a lot emphasis on adherence to medication. It would also be good to consider having wellness clinic as a part of treatment in the hospital; this will help to monitor changes in bio-markers as a result of physical activity”

This is further reinforced by Participant 013 who stated that:

“I would like to see more diabetic clinics even in the far areas (mobile clinics would be more practical here) to increase access to care for T2DM patients in these areas”

5.11.6 Counselling

Participant 011 supported counselling by commenting that:

“I have noted that behaviour change is hindered mostly by psychological factors. It is therefore important to incorporate the counselling or psychiatry department in management of T2DM in order to achieve behaviour change”

5.12 Barriers to Behaviour Change in T2DM

Another theme identified from the interviews was barriers. Respondents were asked the interview question “What are in your opinion the potential barriers to effective action regarding behaviour change in T2DM by your sector / department/ hospital’s/ country’s guidelines and policies?” The sub-themes identified in this case included: facility barriers, funding and support, health care provider barriers,

information/knowledge and awareness, non-adherence to medication, personal barriers, policy barriers, psychological barriers, socio-economic/financial barriers.

Table 5.10: Barriers to Behaviour Change in T2DM

Theme	Sub-Themes
Barriers	Facility-related barriers
	Funding and support
	Health care provider barriers
	Information, knowledge & awareness
	Non-adherence to medication
	Personal barriers
	Policy barriers
	Psychological barriers
	Socio-economic/financial barriers

5.12.1 Facility-Related Barriers

The most common facility-related barrier identified from the interviews was inadequate staff. For instance, due to shortage of staff, Participant 007 indicated that:

“I am overstretched in my workplace (shortage of staff) which undermines the care I deliver to T2DM patients and to patients with other conditions”

Participant 011 added the following on staff and medication shortages:

“There is a shortage of medical doctors; sometimes I am overwhelmed when the T2DM patients are many. Access to medication is a problem; sometimes it takes over 24hours for a T2DM patient to get insulin”

Participant 015 noted inadequacy of specialised staff from the following statement:

“Lack of diabetologists in most health facilities; lack of diabetic clinics in remote areas which hinders access to health care”

This is also the same case from Participant 021 who stated that:

“Few counsellors in the hospitals make the counselling services inaccessible especially for those T2DM patients who suffer from stress. Some patients travel long distance to access care which strains them financially; as a result sometimes they miss their appointments”

Participant 028 indicated the following on shortages of nutritionists:

“First, in my opinion, nutritionists /dietitians are very few. The government needs to employ more nutritionists; they will be very key in preventive measures especially at the community level”

There is also the issue of disintegrated services. This means that different services required for T2DM management are offered in different localities/departments but within the same hospital. This can lead to issues such as miscommunication, reduced coordination among other issues. For instance, Participant 002 indicated:

“Fragmentation in care offered to T2DM patients by healthcare workers”

Participant 009 supports disintegration where a diabetes clinic would operate somewhat autonomously based on the following statement:

“Lack of communication amongst the health team...”

Participant 012 supports disintegration from the following statement:

“I believe the major challenge is lack of clear protocols in management of T2DM patients by all the sectors; this hinders better outcomes. Different hospitals have different and uncoordinated protocols. Every hospital should have clear, well written and understood protocol from first visits to continued checks up. This will enable us to identify challenges early enough and also ease referral system”

There is also the barrier related to inadequate supplies such as medication and other items deployed in T2DM management. For instance, Participant 009 stated that:

“...lack of supplies in the hospital (patients have to purchase from chemists)”

There is also the barrier of proximity of the hospital making users travel long distances and sometimes not seek care. Participant 015 stated the following:

“...due to long distance from their homes to the health facilities, many patients are lost to follow up with time (for example some patients come from as a far as Murang’a)”

There is also low staff morale due to issues related to poor incentive programmes offered by the hospital. According to Participant 034:

“...lack incentives; health workers are not incentivised to go an extra mile especially when it comes to follow up of T2DM patients in the community”

This is also the argument by Participant 035 stated that:

“Additionally, health care providers attending to T2DM patients should be incentivised as a motivation for them to work harder”

5.12.2 Socio-Economic Barriers/Financial Barriers

Socio-economic barriers were also identified from the interviews. According to This is also the argument by Participant 001:

“...poor social economics status hinders access to medication and healthy foods”

According Participant 013:

“...low socio economic status which affects the patients’ ability to buy the anti-diabetic medication (sometimes patients take a combination of three drugs)”

The barrier of finance was also identified by Participant 015:

“...the cost of oral hypoglycaemic treatment is high for most of the patients (many patients feel they cannot afford approximately Ksh. 3,000 that is required for treatment monthly)...”

Participant 016 observes the financial barrier based on the following comment:

“...financial constraints which hinder behaviour change: medication and blood monitoring equipment (like glucometer and strips) should be made more affordable and accessible to the patients to enable them monitor blood sugar at home”

The statement by Participant 017 gives an insight that financial challenges are a barrier to behaviour change:

“Financial constraint: some patients cannot afford prescribed medication which is exacerbated by most health covers not catering for most anti-diabetic medication, this makes a diagnosis with T2DM to seem like it’s the end of life”

And further suggested by Participant 022:

“Financial constraints; behaviour change and management of T2DM requires financial resources which in many cases are not available given the low social economic status of most patients”

Participant 024 added that:

“High cost of medication; insulin for example is expensive which further puts more financial strain on T2DM patients and their families. Additionally, healthy food choices are more costly; carbohydrate foods are cheaper compared to fruits and vegetables. T2DM patients are encouraged to consume more vegetables.”

There is also the barrier due to high cost of services in the facility that most users cannot afford as per the response by Participant 025:

“High cost of managing T2DM specifically the cost of services offered in health facilities, cost of medication and cost of healthy foods. This impoverishes poor families and affects behaviour change”

5.12.3 Policy Barriers

From the interview responses, policy barriers were also identified. For instance, Participant 002 related policy barriers to guidelines by stating that:

“...the national guidelines are very shallow, there is need for detailed guidelines in management of T2DM for example which diets give best results for T2DM patients”

Participant 006 associated policy barriers with the government ministries in terms of having in place guidelines to support behaviour change. This is shown in the statement:

“In terms of guidelines and policy the other line ministries including Ministry of Sports and Education should encourage younger people to exercise more and eat healthy. At the country level there is need to regulate foods prices to make sure that healthy foods are cheaper and more accessible than junk foods”

There is also policy barriers associated with the hospital/facility as indicated by Participant 003:

“...systemic policies or hospital policies are not friendly especially when funds are required to support activities that would support behaviour change for T2DM patients, sometimes issues regarding requisition for funds is politicised”

Policy barriers may also be associated with poor implementation of the existing policies. This is supported by Participant 020 who stated that:

“Guidelines and policies are available. The problem lies in the emphasis on curative services. As we enhance curative services (e.g. dialysis services) we should invest more resources in preventative measures to avoid the current resources being overburdened/ overrun in future”

There are also no policies on incorporating behaviour change and T2DM management in the education curriculum as per the statement by Participant 023:

“Lack of concerted and deliberate efforts geared towards prevention of T2DM at all levels and departments; for instance, education on healthy lifestyle should be incorporated in the current competency based curriculum (CBC) education curriculum in an attempt of ensuring that healthy behaviour is inculcated in populations’ life from an early age”

Governance policies, for instance, fighting against corruption, taxation issues may also be an issue based on Participant 029:

“Corruption; there are very many pharmaceutical companies manufacturing anti-diabetic medication but the cost of the medication remains unaffordable for majority of the patients (Is the government charging very high taxes to these companies / importers at the expense of patients?)”

There is also policy deficit in manpower training, research and capacity development. This is supported by the following comment from Participant 029:

“Lack of enough professionals to treat diabetes, the government should bridge the training gap. There is need to develop Kenyan guidelines informed by research, addressing the needs of the Kenyan population”

There are also policy barriers on what the national health insurance should cover as per the statement by Participant 040:

“NHIF cover does not cater for all cost incurred in their treatment particularly medication and major costs like HBA1c”

5.12.4 Information, Knowledge and Awareness

According to Participant 017 there is information barrier in T2DM management:

“From the nursing and health sector, I feel that the patients are not given adequate information and support to assist them in achieving behaviour change”

Participant 017 commented the following on awareness as a barrier:

“Lack of awareness at the community level to ensure that the community has adequate information on T2DM from prevention, signs and symptoms, management and behaviour change”

On knowledge as a barrier, Participant 018 acknowledged that:

“Inadequate knowledge on T2DM by patients is one of the major barriers affecting behaviour change”

There are also no policies on public education and awareness according to Participant 019:

“Additionally, there is lack of public education and sensitisation”

This is added by Participant 022:

“Lack of adequate information on T2DM by patients; health education during clinic visits will equip them with information”

5.12.5 Personal Barriers

The interviewees were also aware of personal barriers. According to Participant 021:

“Language barrier: when a patient cannot understand the national or local language, the health worker may end up mismanaging the patient”

For Participant 025:

“Illiteracy; patients who are illiterate may not understand instruction and information given to them at health facilities which affects behaviour change negatively”

5.12.6 Healthcare Provider Barriers

There are also barriers that are associated with healthcare professionals. According to Participant 021 noted that:

“Inadequate training of health workers: when health workers are not equipped with the right information they mismanage patients and may even exacerbate the condition”

This is also reinforced by Participant 034:

“Inadequate training; many health workers are not trained on management of T2DM; negative attitude by health workers, this hinders development of rapport and in turn behaviour change...”

5.12.7 Psychological Barriers

According to Participant 001:

“...some patients are in denial, they attribute T2DM to evil spirits. This makes it difficult to put in place a management plan since such a plan requires first and foremost acceptance that the condition exists”

On the other hand, Participant 009 stated that:

“...lack of goodwill from the patients especially when they haven’t accepted that they have the condition”

5.12.8 Funding and Support

Participant 004 opined the following on funding and support as a barrier to T2DM management:

“Limited funding for advocacy and education on behaviour change as part of management of T2DM”

5.12.9 Non-Adherence to Medication

On non-adherence to medication as a barrier too T2DM management, Participant 001 stated that:

“...non-adherence: some T2DM patients do not take their medication as prescribed, they do not adhere to prescribed diet regimens”

5.13 Conclusion of the Qualitative Findings

The qualitative data analysis reveals that healthcare professionals’ understanding of behaviour change comprises of lifestyle conditioning that requires changes in diet and involvement in exercises for improved T2DM management or positive living for T2DM service users. Other notable aspects of behaviour change from the qualitative analysis included compliance to medication, avoidance of drugs abuse and weight management. Further, the qualitative analysis demonstrates that the majority of the healthcare professionals are of the opinion that behaviour change is of utmost priority. Among the challenges encountered in behaviour change include facility related challenges (such as awareness campaigns, human personnel, inadequate drugs and management support), ignorance, information/knowledge related challenges, medication adherence challenges, norms/beliefs/culture, personal characteristics, psychological related challenges (such as denial, peer pressure and

stress related challenges), resources related challenges and social support systems (support from family, friends, peers and loved ones). The qualitative analysis further reveals factors hindering behaviour change to comprise of demographic factors, facility factors, ignorance, inaccessibility to behaviour change enhancers, knowledge/information factors, support systems, norms/culture/beliefs, psychological factors, resource related factors and work-related factors.

From the qualitative analysis, solutions for T2DM prevention included primary targets to prevent T2DM, primary targets to promote behaviour change, actions engaged in T2DM management, multi-sectorial approaches and actions by other sectors. Primary targets to prevent T2DM mass education; awareness campaigns and advocacy; screening and monitoring; and lifestyle modifications and habits change. The primary targets to promote behaviour change included emphasis on behaviour change and diet changes, financial and other forms of support, grassroot level services, information dispensation/education and awareness, monitoring/screening and follow-ups, support groups, and training of personnel. Healthcare professionals should engage in T2DM management through counselling, education/awareness & information sharing, extreme cases management, general routine management, medication and general consultancy, nutrition management, screening and monitoring. The multi-sectorial approaches noted included medical camps/screening and monitoring, community and social work, establishment of extra and devolved care units, integrated information and support management systems for holistic care, mass education and information sharing, policy making, research and specialised centres, training of lower cadre health care workers. Actions by other stakeholders that would encourage and support behaviour change among T2DM service users included counselling, education/awareness and advocacy, facilities and specialised employees, multidisciplinary engagement, support through subsidies and finances, and wellness clinics.

Qualitative analysis revealed that there are barriers to behaviour change in T2DM comprising of facility barriers, funding and support, health care provider barriers, information/knowledge and awareness, non-adherence to medication, personal barriers, policy barriers, psychological barriers, socio-economic/financial barriers.

CHAPTER SIX: QUANTITATIVE ANALYSIS RESULTS

6.1 Introduction

This Chapter presents the findings from the quantitative analysis of this study using SPSS version 26. This addresses the first research aim which was to examine potential for behaviour change based on the health belief model constructs among Kenyan T2DM service users attending the Thika Level 5 Hospital diabetes clinic. Quantitative data were collected through a questionnaire (Appendix 1) parallel to qualitative data collection through the convergent design of mixed methods studies, analysed separately and the findings integrated to address all the research study aims.

6.2 General Information

The mean age of the respondents was 56 years (median=57 years and mode=58 years), with the youngest respondent being 34 years and the oldest being 70 years. From the responses, 63.0% (221) of the respondents were female and 37.0% (130) were male. The findings also show that 55.8% (196) of the respondents had primary school level as their highest education level, 30.2% (106) had pursued up to high school as their highest education level, 12.8% (45) had college education and 1.1% (4) had university education. The majority of the respondents, 70.1% (246) had three or more children; 26.5% (93) had two children, 3.1% (11) had one child and 0.3% (1) had no children. It is evident that most family units as shown by 67.5% (237) of the respondents comprised of mother, father and children (nuclear set-up); 20.5% (72) of the respondents indicated that their family units comprised of mother and children, 10.8% (38) indicated that their family units comprised of grand-parents and children, 0.9% (3) comprised of father and children and 0.3% (1) comprised of extended families with mother, father, children, grand-parents, aunts, uncles and cousins. The poverty index of percent of population living on \$1.90 (KES 190) per day or less was utilised (The World Bank Annual Report 2021). Based on the results, 55.0% (193) of the respondents indicated that they spent a lot above \$1.90 (KES 190) in their household per day, 33.0% (116) spent a little above \$1.90 (KES 190) per day in their households, 9.4% (33) spent about \$1.90 (KES 190) per day in their households, 1.7% (6) spent a little below \$1.90 (KES 190) per day, 0.6% (2) spent a lot below \$1.90 (KES 190) per day and 0.3% (1) did not know their

monetary household consumption per day. It is shown by the findings that 57.0% (200) of the participants resided in rural areas, 40.2% (141) resided in recognised urban area while 2.8% (10) in an informal urban area.

Table 6.1: Socio-Demographic Characteristics

Characteristic of the Respondent		Mean/Mode/Median	Frequency	Percent (%)
Age (years)		Mean=56 years (min=34 years, max=70 years); median=57 years; Mode=58 years	-	-
Gender	Female		221	63.0%
	Male		130	37.0%
Education level	University		4	1.1%
	College		45	12.8%
	High school		106	30.2%
	Primary school		196	55.8%
Number of children	Three or more		246	70.1%
	Two		93	26.5%
	One		11	3.1%
	None		1	0.3%
Which of the following describes your family unit?	Mother, father, children, grand-parents, aunts, uncles, cousins		1	0.3%
	Grand-parents and children		38	10.8%
	Step-parent and children		0	0.0%
	Mother and children		72	20.5%
	Father and children		3	0.9%
	Mother, father and children		237	67.5%
How far above or below KES 190 does your household live on in a day?	Don't know		1	0.3%
	A lot below that		2	0.6%
	A little below		6	1.7%
	About the same		33	9.4%
	A little above		116	33.0%
	A lot above that		193	55.0%
Place of residence	Recognised urban area		141	40.2%
	Rural area		200	57.0%
	Informal urban area		10	2.8%

6.3 Knowledge Assessment on T2DM

A brief T2DM knowledge test (Appendix 1) as developed by Woringer *et al.* (2017) was employed to assess the service users' knowledge level regarding their T2DM status. The test comprised of eight questions that the service users were required

to indicate whether True (T) or false (F). Each correct answer was given a score of 1; while a score of 0 was given to a wrong answer or one where the service users indicated they did not know.

Based on the results, 96.9% of the respondents were correct on the knowledge statement "In T2DM, one of the main causes of heart attack and stroke is stress"; 98.0% were correct on the knowledge statement "In T2DM, walking and gardening are considered types of exercise that can lower the risk of having a heart attack and stroke"; 99.1% were correct on the knowledge statement "In T2DM, moderately intense activity 2 ½ hours a week will reduce your chances of having a heart attack or stroke". Further, the findings demonstrated that 97.7% of the participants were correct in their responses on the knowledge statement "People who have T2DM are at higher risk of having a heart attack or stroke"; 99.4% indicated a correct response on the statement "In T2DM, managing your stress levels will help you manage your blood pressure"; 55.6% indicated a correct response on the statement "Drinking high levels of alcohol can increase your cholesterol and triglyceride levels". On the knowledge statement "HDL refers to 'good' cholesterol and LDL refers to 'bad' cholesterol" 94.9% of the participants' response was correct. Lastly, the statement "A family history of heart disease is not a risk factor for T2DM related high blood pressure" had 32.6% of the participants respond with a correct response. These values indicate that knowledge is not the factor holding back adoption of healthy T2DM behaviour as most of the values indicate a strong knowledge base.

Table 6.2: Knowledge Assessment Scores

	Incorrect	Correct
In T2DM, one of the main causes of heart attack or stroke is stress	11 (3.1%)	340 (96.9%)
In T2DM, walking and gardening are considered types of exercise that can lower the risk of having a heart attack or stroke.	7 (2.0%)	344 (98.0%)
In T2DM, moderately intense activity 2 ½ hours a week will reduce your chances of having a heart attack or stroke.	3 (0.9%)	348 (99.1%)
People who have T2DM are at higher risk of having a heart attack or stroke.	8 (2.3%)	342 (97.7%)
In T2DM, managing your stress levels will help you manage your blood pressure.	2 (0.6%)	349 (99.4%)
Drinking high levels of alcohol can increase your cholesterol and triglyceride levels.	156 (44.4%)	195 (55.6%)
HDL refers to 'good' cholesterol and LDL refers to 'bad' cholesterol.	18 (5.1%)	333 (94.9%)
A family history of heart disease is not a risk factor for T2DM related high blood pressure	236 (67.4%)	114 (32.6%)

A knowledge test score adopted from Yusof and Hasni (2014) ranging from 0 to 8 was developed by summing the scores for each service user. A score of 8 represented the highest possible knowledge score or level of T2DM knowledge while 0 represented the lowest possible knowledge score of T2DM. Knowledge scores that were <4 were categorised as poor knowledge; a score of 4-5 was categorised as moderate knowledge while a score ranging 6-8 was categorised as good knowledge. The findings as indicated in the table below showed that (frequency=334, percent=95.2% of the respondents had good knowledge level on T2DM; 4.0% (frequency=14) had moderate knowledge while 0.9% (frequency=3) had poor knowledge level.

Table 6.3: Overall Knowledge Score

	Frequency	Percent (%)
Poor Knowledge	3	.9
Moderate Knowledge	14	4.0
Good Knowledge	334	95.2
Total	351	100.0

A breakdown of the individual scores in the knowledge statements showed that 59.5% of the participants had a total score of 7; 24.2% scored a total of 6; 11.4% scored a total of 8; 2.3% had a total score of 5; 1.7% had a total score of 4; 0.6% had a total score of 3 while 0.3% had a total knowledge score of 2.

Table 6.4: Breakdown of Individual Knowledge Scores

		Frequency	Percent (%)
Score	2	1	.3
	3	2	.6
	4	6	1.7
	5	8	2.3
	6	85	24.2
	7	209	59.5
	8	40	11.4
	Total	351	100.0

The descriptive statistics indicated a mean knowledge score of 6.74, with the median score being 7 and the mode being 7. The minimum knowledge score was 2 while the maximum score was 8. Based on the mean and the median scores, the overall T2DM knowledge can be said to be good.

6.4 Relationship between Socio-Demographic Characteristics and Knowledge Level

Cross tabulation (with Chi-Square test) was used to establish whether there was any relationship between the demographic characteristics and knowledge level. Based on the findings, all the p-values were greater than .05 i.e. gender (.261), education level (.089), poverty index (.540) and place of residence (.547), an indication that knowledge level had no relationship with demographic characteristics.

6.5 Perceived Risk of Heart Attack/Stroke

The respondents were also presented with some Likert scale statements on perceived risks of heart attack/stroke (Appendix 1) adopted from Woringer *et al.* (2017). From the responses, 58.7% (206) of the participants disagreed that “Due to my T2DM, I feel I will suffer from a heart attack or stroke in the near future”; 34.8% (122) agreed, 5.7% (20) strongly disagreed while 0.9% (3) strongly agreed. The findings also show that 59.0% (207) of the respondents disagreed that “Due to my T2DM, it is likely that I will suffer a heart attack or stroke sometime during my life”;

34.8% (122) agreed, 5.4% (19) strongly disagreed and 0.9% (3) strongly agreed. From the table, 59.4% (208) disagreed, 34.9% (122) agreed, 5.1% (18) strongly disagreed and 0.6% strongly agreed that “Due to my T2DM, it is likely that I will have a heart attack or stroke sometime during my life”. Also evident from the table is that 59.4% (208), 34.6% (121), 5.4% (19) and 0.6% (2) of the respondents disagreed, agreed, strongly disagreed and strongly agreed respectively that “Due to my T2DM, there is a good chance I will experience a heart attack or stroke in the next ten years”. The results also indicate that 85.8% (301) of the respondents disagreed that “Due to my T2DM, I am not worried that I might have a heart attack or stroke”; 10.8% (38) agreed, 2.3% (8) strongly disagreed and 1.1% (4) strongly agreed. Lastly, 58.1% (204), 35.6% (125), 5.7% (20) and 0.6% (2) of the respondents disagreed, agreed, strongly disagreed and strongly agreed respectively that “Due to my T2DM, my chances of suffering from a heart attack or stroke in the next ten years are great”.

Table 6.5: Likert Scale Responses on Perceived Risks

	Strongly Agree	Agree	Disagree	Strongly Disagree
Due to my T2DM, I feel I will suffer from a heart attack or stroke in the near future	3 (0.9%)	122 (34.8%)	206 (58.7%)	20 (5.7%)
Due to my T2DM, it is likely that I will suffer a heart attack or stroke sometime during my life	3 (0.9%)	122 (34.8%)	207 (59.0%)	19 (5.4%)
Due to my T2DM, it is likely that I will have a heart attack or stroke sometime during my life	2 (0.6%)	122 (34.9%)	208 (59.4%)	18 (5.1%)
Due to my T2DM, there is a good chance I will experience a heart attack or stroke in the next ten years	2 (0.6%)	121 (34.6%)	208 (59.4%)	19 (5.4%)
Due to my T2DM, I am not worried that I might have a heart attack or stroke	4 (1.1%)	38 (10.8%)	301 (85.8%)	8 (2.3%)
Due to my T2DM, my chances of suffering from a heart attack or stroke in the next ten years are great	2 (0.6%)	125 (35.6%)	204 (58.1%)	20 (5.7%)
Due to my T2DM, it is likely I will have a heart attack or stroke because of my past and/or present behaviours	3 (0.9%)	120 (34.2%)	204 (58.1%)	24 (6.8%)
Due to my T2DM, I am concerned about the likelihood of having a heart attack or stroke in the near future	3 (0.9%)	307 (87.5%)	35 (10.0%)	6 (1.7%)

6.6 Exploratory Factor Analysis

6.6.1 Exploratory Factor Analysis Explained

Many studies are characterised by the fact that numerous items are used in explaining a study's construct. The HBM is not an exception since it consists of different questions in which several sub-tests are studied. Because of the numerous items that are being studied, the research can be complex and incorporate items that are not highly correlated into one subtest. Besides, the HBM as adopted from Woringer et al. (2017) could contain items in a subtest measuring a different aspect.

In such a scenario, exploratory factor analysis (EFA) can be used to bring items that are intercorrelated together under more general variable(s). Specifically, EFA reduces the dimensionality of the original HBM constructs and enables the researcher to provide an interpretation to the newly formed constructs (referred to as factors) guided by highly correlated items based on the new study sample (context). A clearer view of the HBM model was therefore obtained in the context of Thika Level 5 Hospital.

During EFA, the starting point is Kaiser-Meyer-Olkin (KMO) sampling adequacy measure (Sharma, 1996) and sphericity test by Bartlett (Gleser, 1966) to test whether items are suitable for EFA. When the value of KMO exceeds 0.5 and the p-value of Bartlett's sphericity test is below .05, then it is adequate to conduct EFA. Then a correlation matrix where intercorrelations between the items of the HBM is presented. Items that have a high correlation with a group of other items while at the same time have a very low correlation with other items outside that group are grouped under one construct, called a factor. This factor forms a new dimension that can be regarded as a classification in the context of the study sample (area). Exploratory factor analysis also generates Eigen values which represent the variance explained by each factor. Each factor that is extracted during EFA has an Eigen value attached to it. Only factors whose Eigen values exceed 1 are considered to be significant in explaining a construct. Cronbach's alpha coefficient is used in assessing the reliability of the different factor loading. High values of Cronbach's alpha coefficient imply high reliability for that factor.

6.6.2 Exploratory Factor Analysis in this Study

Exploratory Factor Analysis was used to select items that appropriately constituted a scale. Items whose scoring was reverse were recoded to align to the conceptual trend of the scales. Items were selected if they loaded on a single factor with factor loadings exceeding 0.3 or if they loaded highly on a single factor and moderately on another factor. The correlation and the anti-image correlation matrices were examined. The EFA for the perceived risk of heart attack or stroke yielded KMO sampling adequacy measure of 0.859 and sphericity test of Bartlett < .0001. The minimum acceptable value for Kaiser-Meyer-Olkin sampling adequacy is 0.5; if the value is below 0.5 one should not proceed with EFA. Further, for one to proceed with EFA, Bartlett's Sphericity test should be <0.05. This meant that the items on perceived risk of heart attack or stroke were appropriate for EFA.

Table 6.6: Bartlett's Sphericity Test and KMO Sampling Adequacy Measure for Perceived Risk of Heart Attack or Stroke

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.859
Bartlett's Test of Sphericity	Approx. Chi-Square	5832.626
	Df	28
	Sig.	.000

The total variance explained helps determine the number of components (factors) explaining a construct. In this case, the column for total initial Eigen values is utilised and only components whose Eigen values exceed 1 are considered to explain a construct. In our case, EFA determined two underlying sub-dimensions of perceived risk explaining 86.6% of the variance in perceived risk.

Table 6.7: Total Variance of Perceived Risk Explained by the Two Underlying Sub-Dimensions

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.790	72.379	72.379	5.718	71.475	71.475	5.717	71.463	71.463
2	1.136	14.206	86.585	.387	4.842	76.317	.388	4.854	76.317
3	.745	9.317	95.901						
4	.230	2.879	98.780						
5	.053	.666	99.447						
6	.034	.423	99.870						
7	.007	.094	99.964						
8	.003	.036	100.000						

Extraction Method: Principal Axis Factoring.

The first sub-dimension comprised of six items. This factor was renamed as susceptibility to heart attack or stroke. The items are also called loadings in EFA and the values represent the correlation of each item with the factor. Based on the values in Table 6.8, the items had a very high positive correlation with the factor and therefore can be adopted to explain that factor.

Table 6.8: Items for Susceptibility to Heart Attack or Stroke

	Factor 1 Loadings
Due to my T2DM, I feel I will suffer from a heart attack or stroke in the near future.	.976
Due to my T2DM, it is likely that I will suffer a heart attack or stroke sometime during my life.	.994
Due to my T2DM, it is likely that I will have a heart attack or stroke sometime during my life.	.992
Due to my T2DM, there is a good chance I will experience a heart attack or stroke in the next ten years.	.996
Due to my T2DM, my chances of suffering from a heart attack or stroke in the next ten years are great.	.977
Due to my T2DM, it is likely I will have a heart attack or stroke because of my past and/or present behaviours.	.860

Extraction Method: Principal Axis Factoring.
 Rotation Method: Varimax with Kaiser Normalisation.
 a. Rotation converged in 3 iterations.

The Cronbach alpha coefficient for the six items aggregated was 0.988. The sub-dimension was therefore highly reliable. This means that this factor (susceptibility to heart attack or stroke construct of the HBM) can be adopted in Thika Level 5 Hospital to explain likelihood of behaviour change in T2DM.

Table 6.9: Cronbach Alpha for Susceptibility to Heart Attack or Stroke

Cronbach's Alpha	No. of Items
.988	6

The second sub-dimension comprised of two items. This factor was renamed as threat of heart attack or stroke.

Table 6.10: Items for Threat of Heart Attack or Stroke

	Factor 2 Loading	
Due to my T2DM, I am not worried that I might have a heart attack or stroke.	.158	.489
Due to my T2DM, I am not concerned about the likelihood of having a heart attack or stroke in the near future.	-.285	.384
Extraction Method: Principal Axis Factoring. Rotation Method: Varimax with Kaiser Normalisation. a. Rotation converged in 3 iterations.		

The Cronbach Alpha for the second sub-dimension (threat of heart attack or stroke) was 0.252; a very low reliability. This means that this factor should not be adopted in Thika Level 5 Hospital to explain likelihood of behaviour change in T2DM.

Table 6.11: Cronbach Alpha for Threat of Heart Attack or Stroke

Cronbach's Alpha	No. of Items
.252	2

On perceived benefits and intentions to change, the results of Kaiser-Meyer-Olkin sampling adequacy (.844>.5) and Bartlett's test of sphericity p-value<.00001) indicated that the items were adequate for exploratory factor analysis. A visual analysis of the anti-image matrices yielded figures close to zero further confirming adequacy of exploratory factor analysis for the items.

Table 6.12: Bartlett's Test of Sphericity and KMO Sampling Adequacy Measure for Perceived Benefits and Intentions to Change

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.844
Bartlett's Test of Sphericity	Approx. Chi-Square	1358.387
	Df	21
	Sig.	.000

The exploratory factor analysis for perceived benefits and intentions to change determined two sub-dimensions. Only the two factors with Total Eigen values exceeding 1 are considered as significant in explaining a construct. The two sub-dimensions are explaining 74.75% of variance.

Table 6.13: Total Variance of Perceived Benefits Explained by the Two Factors

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.180	59.718	59.718	4.180	59.718	59.718	2.862	40.889	40.889
2	1.052	15.032	74.750	1.052	15.032	74.750	2.370	33.862	74.750
3	.556	7.948	82.699						
4	.408	5.824	88.523						
5	.331	4.727	93.250						
6	.250	3.568	96.819						
7	.223	3.181	100.000						
Extraction Method: Principal Component Analysis.									

The first dimension comprised of four items and was renamed as intention to exercise. The items had a high positive correlation with the sub-dimension (factor) and were therefore adopted.

Table 6.14: Item Loadings for Intention to Exercise

	Factor 1 Loadings
Due to my T2DM, I am thinking about exercising at least 2 ½ hours a week.	.758
Due to my T2DM, I intend to or want to exercise at least 2 ½ hours a week.	.809
I am confident that I can maintain a healthy weight by exercising at least 2 ½ hours a week within the next 2 months.	.860
Even though I am type 2 diabetic, I am not thinking about exercising for 2 ½ hours a week.	.552
Extraction Method: Principal Axis Factoring. Rotation Method: Varimax with Kaiser Normalisation. a. Rotation converged in 3 iterations.	

This sub-dimension had a high reliability (Cronbach alpha coefficient=.861). This means that this factor (intention to exercise construct of the HBM) can be adopted in Thika Level 5 Hospital to explain likelihood of behaviour change in T2DM.

Table 6.15: Cronbach Alpha for Intention to Exercise

Cronbach's Alpha	No. of Items
.861	4

The second sub-dimension had three items and was renamed as perceived benefits of exercise and healthy eating. The items had a strong positive correlation with the factor (perceived benefits of exercise and healthy eating).

Table 6.16: Items for Perceived Benefits of Exercise and Healthy Eating

	Factor 2 Loading
When I exercise for at least 2 ½ hours a week I am doing something good for the health of my heart and for management of my T2DM in general.	.606
When I eat at least 5 portions of fruits and vegetables a day I am doing something good for the health of my heart and for the management of my T2DM.	.929
As I am type two diabetic, increasing my exercise to at least 2 ½ hours a week will decrease my chances of having a heart attack or stroke.	.635
Extraction Method: Principal Axis Factoring. Rotation Method: Varimax with Kaiser Normalisation. a. Rotation converged in 3 iterations.	

The Cronbach Alpha coefficient for this sub-dimension was .814; thus high reliability. This means that this factor (perceived benefits of exercise and healthy eating construct of the HBM) can be adopted in Thika Level 5 Hospital to explain likelihood of behaviour change in T2DM.

Table 6.17: Cronbach Alpha for Perceived Benefits of Exercise and Healthy Eating

Cronbach's Alpha	No. of Items
.814	3

On healthy eating intentions, the items were adequate for EFA; Kaiser-Meyer-Olkin = 0.647 and Bartlett's test of sphericity p-value < .0001. The Kaiser-Meyer-Olkin value exceeds .5 while Bartlett's test of sphericity value < .05 which confirms adequacy for exploratory factor analysis.

Table 6.18: Bartlett's Test of Sphericity for Healthy Eating Intentions

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.647
Bartlett's Test of Sphericity	Approx. Chi-Square	726.302
	Df	3
	Sig.	.000

Only one factor had total initial Eigen values exceeding 1. Therefore, the items loaded into one factor explaining 78.8% of the variation.

Table 6.19: Total Variance of Healthy Eating Intentions Explained by the Factor

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.364	78.785	78.785	2.364	78.785	78.785
2	.541	18.037	96.822			
3	.095	3.178	100.000			
Extraction Method: Principal Component Analysis.						

Three items loaded into this factor. Therefore healthy eating intention was retained. In this case, the factor was renamed as cues to actions (equivalent to the HBM). The three items that loaded into this factor (cues to actions) had strong positive correlation with the factor with correlation coefficient values of .948, .954 and .588 and were therefore adopted for the factor.

Table 6.20: Items Loading on Cues to Action

	Factor Loading
I am confident that I can eat at least 5 portions of fruits and vegetables a day.	.948
Since I am type 2 diabetic, I am thinking about eating at least 5 portions of fruits and vegetables a day.	.954
Even though I am type 2 diabetic, I am not thinking about eating at least 5 portions of fruits and vegetables a day.	.588
Extraction Method: Principal Axis Factoring. a. 1 factors extracted. 8 iterations required.	

The healthy eating intention (cues to action) had high reliability; Cronbach Alpha = .841. This means that this factor (cues to action construct of the HBM) can be adopted in Thika Level 5 Hospital to explain likelihood of behaviour change in T2DM.

Table 6.21: Cronbach Alpha Reliability for Cues to Action

Cronbach's Alpha	No. of Items
.841	3

The data was split into two halves to validate if similar loadings would be evident. This was necessary to avoid problems in estimations and drawing conclusions. The two halves of the data set demonstrated factor loading was similar with very close values of communalities, Eigen values (variance explained) and Cronbach Alpha coefficient.

Conclusion

Therefore, it can be concluded that, through EFA, the ABCD risk questionnaire adopted from Worringer *et al.* (2017) generated into four constructs of the HBM:

susceptibility to heart attack or stroke, intention to exercise, perceived benefits of exercise and healthy eating and healthy eating intentions (likened to cues to action). One construct (threat of heart attack or stroke) was excluded due to its low reliability. It can therefore be concluded that behaviour change among Kenyan T2DM service users in Thika Level 5 Hospital is based on four constructs: susceptibility to heart attack or stroke; intention to exercise; perceived benefits of exercise and healthy eating; and healthy eating intentions (cues to action).

The implication of these findings for health practitioners is that rather than adopting an all pharmacological treatment approach towards T2DM management, they should adopt a mixed approach with emphasis on behaviour change. Health practitioners should emphasise on the patients adoption of self-care behaviours as guided by the HBM in terms of intention to exercise, perceived benefits of exercise, susceptibility to heart attack or stroke, healthy eating and healthy eating intentions.

CHAPTER SEVEN: DISCUSSION AND CONCLUSION

7.1 General Discussion

The first objective of the study examined behaviour change based on the HBM constructs among Kenyan T2DM service users attending TL5H diabetes clinic. From the interviews, it was evident that participants were collectively in favour of holistic behaviour change such as healthy eating intentions, diet compliance, engaging in exercise, adherence to medication, self-care practices such as weight management and avoidance of drugs abuse. The quantitative component adopted the ABCD risk questionnaire from Worringer et al. (2017). Through exploratory factor analysis, the questionnaire items generated into five constructs of the HBM: susceptibility to heart attack or stroke; intention to exercise; perceived benefits of exercise and healthy eating; healthy eating intentions (likened to cues to action); and threat of heart attack or stroke. However, one construct (threat of heart attack or stroke) was excluded due to its low reliability. Reviews of the qualitative and quantitative findings demonstrate concurrence in terms of participants' perceptions on behaviour change. Healthy eating intentions and diet compliance/healthy eating were common both in the qualitative and quantitative study. Under the qualitative study, engaging in exercise code was detailed and highlighted on the benefits of exercising for T2DM patients; this was also demonstrated in the quantitative findings. Adherence to medication and self-care practices were also evident from the qualitative findings. The aim was to minimise complications likened to susceptibility to heart attack or stroke in T2DM patients under the quantitative results. Therefore, it can be concluded that behaviour change among Kenyan T2DM service users attending Thika Level 5 Hospital diabetes clinic is based on four constructs of HBM: susceptibility to heart attack or stroke; intention to exercise; perceived benefits of exercise and healthy eating; and healthy eating intentions (likened to cues to action).

In this study, the healthcare professionals perceived that adherence to medication and self-care practices helped minimize complications in T2DM patients. This was likened by responses from in T2DM service users in Thika Level 5 Hospital who felt that they were more susceptible to heart attack or stroke due to their underlying

T2DM condition. The findings agree with previous research conducted in Kenya which stated that perceived susceptibility may push a patient to adopt positive behaviours. For instance, Kigatiira (2020) adopted the HBM in studying fear appeals' efficacy on adopting preventive measures towards Covid-19 among boda boda riders in Kenya's Nairobi County. Just like in the current study, the motor bike riders agreed being at risk of Covid-19 contraction if they did not follow the preventive measures promoted by the government. Further, the study demonstrated the riders being more susceptible to Covid-19 due to the status of their day-to-day activities. Further, Ngugi et al. (2012) demonstrated that women who lived in Kenya's rural area perceived the rich to be more susceptible to cervical cancer based on the fact that the food they ate was "more funny" as compared to themselves who consumed natural and fresh foods from the farms. Susceptibility of rural women to breast cancer was found to be higher as compared to urban women due to a big information gap between the two groups; rural women had very little information about breast cancer and hence were more susceptible.

The constructs of intention to exercise and perceived benefits of exercise and healthy eating were common under the qualitative and quantitative findings and fell under the category of perceived benefits under the HBM outlined in Abood et al. (2003) and Bishop et al. (2015). Under these constructs, the service users should change their behaviours due to their T2DM condition so that they live a healthy life and do something that is positive in managing their T2DM conditions. These findings are in agreement with other researchers in Kenya such as Kisiangani et al. (2018) who perceived the benefits of breast cancer screening comprising of early detection, management and treatment at reduced cost. Further, early detection of breast cancer led to healthy living habits that increased survival chances. Ngugi et al. (2012) study however established that some women perceived no benefits of early breast cancer screening by citing that no cure was available and that cancer patients eventually succumbed from the disease.

The study found that behaviour change in service users attending the diabetes clinic was also defined through the construct of healthy eating intentions. Based on the HBM, this construct is likened to cues to action that trigger positive behaviour

adoption. By having T2DM, the service users are prompted to adopt positive healthy eating behaviours. The findings in this construct agree with Ngugi et al. (2012) who found that women were prompted to seek healthy breast cancer intentions such as taking up screening services as a result of knowledge of close people (such as a family member or friend) who had cervical cancer, advice from friends who had undertaken cancer screening and recommendations by doctors.

The second objective explored the factors that affected the management of T2DM among the service users attending Thika Level 5 Hospital diabetes clinic. This objective was achieved through qualitative data analysis of interview responses. Among the factors identified by the interviewees to affect T2DM management included resource related factors; information/knowledge factors; personal characteristics; norms/beliefs/culture; health facility related factors; social support; ignorance; psychological; and medication adherence. The resource related factors that affected T2DM management included financial resources specifically inadequate funds to cater for medication, healthy eating and transport to the clinics. High poverty levels meant that the service users are not able to purchase diabetes management medication; to adhere to healthy eating habits that are deemed expensive; to engage in exercises and to afford transport to the diabetes clinic that is far from their home. These results are in agreement with Bekele et al. (2020) who demonstrated that the cost of care for T2DM in Africa is high thus unaffordable to a large portion of the population. Bekele et al. (2020) and Masaba and Mmusi-Phetoe (2020) added that low income diminishes access to medical care and drugs. It was also noted by Masaba and Mmusi-Phetoe (2020) that T2DM requires special diet; such recommended healthy foods are expensive and thus unaffordable to low income earners. Research conducted in Asia, for instance by Nor et al. (2019) and Rashma et al. (2021) also found financial barriers to affect T2DM management. Further, Vanstone et al. (2017) conducted a systematic review in the western nations, specifically Canada, USA, Australia, New Zealand and Europe and found poverty to result in non-adherence to recommended healthy foods making T2DM management difficult.

Information or knowledge factors related to constraints related to insufficient information or knowledge by individual service users and the community. Deficit in knowledge or information in addition to misinformation about T2DM affects its management among the service users. According to Alsairafi et al. (2016) and Bekele et al. (2020) lack of knowledge and understanding of T2DM, its management and possible complications that could result from uncontrolled blood glucose is a major barrier in T2DM management all over the globe.

The personal factors that affected T2DM management included age, education and poor behaviours. Service users in advanced age were more affected in poor T2DM management and poorly adhered to management guidelines related to T2DM. In service users with advanced age, resistance towards behaviour change was highly likely thus resulting to poor management of T2DM. Further, service users with advanced age were more likely to be slow in adopting behaviour change. Low education level (illiteracy) affected T2DM management by affecting the service users' ability to understand information given at the diabetes clinic on T2DM management. There was also poor health seeking behaviour at individual level that does not support seeking a healthy lifestyle towards T2DM management. Ignorance with regard to behaviour change adoption by service users was also found to affect T2DM management.

Norms, beliefs and culture were also found to affect T2DM management by leading to myths and misconceptions about the disease. They also affected T2DM management since practices towards behaviour change are embedded in societal norms, beliefs and culture. This supports the findings by Majeed-Ariss et al. (2015) who established that religious and spiritual beliefs may promote or hinder behaviour change towards T2DM management. Alsairafi et al. (2016) conducted a study in the Middle East where Islam is widely practiced and health practices are based on Islamic religious beliefs. For example, fatalism is common leading to the belief that Allah pre-determines and controls events leaving people with not much to do to determine their destinies. For example, based on Islam, death occurs due to the plan of Allah. This makes it challenging for patients of T2DM to take the condition seriously and consider it urgent to manage the disease. In a review

conducted in the UK by Patel et al. (2017), Muslim women faced challenges in adhering to physical activities due to limiting gym outfits and unavailability of gender specific gyms where they would exercise comfortably.

Facility related factors such as inadequate human personnel; insufficient drugs and lack of current medication, lack of support by management, and lack of awareness campaigns by the facilities were found to affect T2DM management. The study further found that social support systems such as support from family members, friends, and colleagues at work or even peers affected T2DM management. The findings concur with reviews conducted in Africa, Asia, Europe, USA that cite lack of family support as a barrier to the management of T2DM (Gupta et al. 2019; Majeed-Ariss et al. 2015; Masaba & Mmusi-Phetoe, 2020; Nor et al. 2019; Reshma et al. 2021; Sohal et al. 2015; Strom & Egede, 2012; Vanstone et al. 2017). In addition, Vanstone et al. (2017) noted that T2DM requires specific changes in diet among other practices that may be challenging to adopt in a household because of family habits and preferences that may already be in existence.

The study also found that psychological factors comprising of denial, peer pressure and stress affected T2DM management. Denial by T2DM service users made it difficult for withdrawal from certain behaviours, while peer pressure made the patients more vulnerable by exposing them to irresponsible behaviours and activities of their peers. High levels of stress affected the patients' psychological well-being which had a negative effect on T2DM management. Medical adherence factors that affected T2DM management were based on the fact that the condition is not painful hence challenging medication adherence. Further, daily intake of T2DM medication was a lifestyle that was problematic for most service users to adhere to.

The third objective explored T2DM management processes in the Kenyan healthcare system among T2DM service users attending the Thika Level 5 Hospital diabetes clinic. This objective was achieved through the solutions section under the interviews conducted (qualitative section) with key respondents. Among the processes identified included primary targets to prevent T2DM, primary targets to promote behaviour change, actions engaged in T2DM management, multi-sectorial

approaches and actions by other sectors. The primary targets towards T2DM prevention included modifications of lifestyles and enhancing behaviour change by service users, mass education, campaigns and advocacy, screening and monitoring. The primary targets towards promoting behaviour change were categorised into emphasis on behaviour and diet changes, financial and other forms of support, grassroots level services, information dispensation/education and awareness, monitoring/screening and follow-ups, support groups and training of personnel. Healthcare professionals engage in actions such as counselling, education, awareness and information dispensation, extreme cases management, general routine management, medication and general consultancy, nutrition management, screening and monitoring.

The multi-sectorial approaches noted included medical camps/screening and monitoring, community and social work, establishment of extra and devolved care units, integrated information and support management systems for holistic care, mass education and information sharing, policy making, research and specialised centres, training of lower cadre health care workers. Notable actions by other stakeholders included counselling, education/awareness and advocacy, facilities and specialised employees, multidisciplinary engagement, support through subsidies and finances, and wellness clinics.

These findings are in agreement with Shiroya et al. (2019) who noted Kenya's efforts towards reforming and improving diabetes care. The aim of any strategy or processes adopted should be to prevent or delay diabetes development, minimise complications associated with diabetes, improve life quality and prevent premature mortality. Shiroya et al. (2019) noted that emphasis of any process or strategy adopted should involve interventions that target obesity, unhealthy diet, physical inactivity, capacity building, mobilisation of resources, policies towards diabetes management, legislation and regulations and monitoring and evaluation. The processes and strategies identified in this study align with Kenya's Ministry of Health National Strategy for Prevention and Control of non-communicable diseases (NCDs) 2015-2020 and 2021/22-2025/26 that emphasised the need for an integrated approach in addressing NCDs, their associated risk factors while at the

same time advocating for NCDs' integration into prevailing primary health care (PHC) platforms.

The fourth and last objective of the study was to make practical recommendations/suggestions that could be applied within the Kenyan system. According to the findings, the HBM is an appropriate predictor of behaviour change among T2DM service users. Specifically, the four constructs: susceptibility to heart attack or stroke; intention to exercise; perceived benefits of exercise and healthy eating; and healthy eating intentions (likened to cues to action) explained lack of behaviour change among T2DM service users. The study also found existence of factors such as resource related factors, information/knowledge factors, personal characteristics, norms/beliefs/culture, health facility related factors, social support, ignorance, psychological and medication adherence influencing T2DM management. This means that behaviour change is perceived differently among T2DM service users.

To enhance patients' change in behaviour, how they perceive the disease and their self-care practices tailored messages should be disseminated. Health awareness messages and counselling for T2DM patients should utilise the HBM constructs to come up with effective interventions for promoting behaviour change. The HBM advocates for messages to be tailored so as to effectively address complications (perceived susceptibility and severity) associated with T2DM, perceived barriers, perceived benefits, and self-efficacy for behaviour change to be effective. A "one size fits all" approach is not recommended when coming up with interventions towards behaviour change.

In terms of the factors that affected T2DM management, three main categories are identifiable from the findings: predisposing factors such as knowledge and cultural beliefs; enabling factors such as resource availability; and reinforcing factors such as the presence of a social support system. Policy makers and practitioners need to consider these factors when coming up with policies and interventions towards promoting the management of T2DM. It would be prudent for the interventions to consider these factors at an individual level for optimal management of the disease.

The management process of T2DM involved primary targets to prevent T2DM, primary targets to promote behaviour change, actions engaged in T2DM management, multi-sectorial approaches and actions by other sectors. This means that different stakeholders such as government and non-government bodies, medical practitioners, media, community, caregivers and patients should be engaged towards the management of the disease and offering support to the service users. Offering support to the service users may promote behaviour change because once their belief in self (perceived self-efficacy as per HBM) to adopt and maintain recommended behaviours is enhanced then better health outcomes might be achieved. The strategy in this case should support the establishment of multi-sectorial teams even at the grassroots level and build their capacity. For the case of the existing multi-sectorial teams, they should be strengthened through resources. This will ensure a harmonized prevention and response to T2DM at all levels.

Leadership and governance should be strengthened at the national and regional levels towards the management of T2DM. These will be necessary in offering the direction to be taken towards the management of the disease. At the national level, a national steering committee should be established and strengthened through resources. The capacity of the regional steering committees should be enhanced to ensure that programmes towards T2DM prevention and management initiated at the national level are integrated to the regional or county governments.

The government, both national and county governments should make available funds to subsidise cost of diabetes care or even make it free of charge just like in the case of HIV/AIDS to ensure care is accessible to all despite socio-economic status as the cost of care including medication are quite high. This means that national and regional governments should go beyond what is provided for in the national and regional governments' budgets and lobby for more donor funding towards improving diabetes care and management in the country. The national government should ensure inclusion of diabetes education in the education curriculum such that knowledge and appropriate dietary and physical activity habits are instilled in children from a young age. Knowledge of the threat (perceived threat as per the HBM) of T2DM occurrence from a young age may enhance adoption and

maintenance of healthy dietary intake and regular physical activity into adulthood. County wellness centres should be established by the county governments where cost for utilising programmes towards managing diabetes, for example gyms, should be subsidised for persons with diabetes. This would eliminate some of the HBM perceived barriers relating to non-compliance to physical activity recommendations in T2DM.

At the hospital level, there should be routine medical camps where all those attending the hospitals should be screened for diabetes. This way, those at risk may be cautioned on practices to reduce risk and educated such that they are aware of their risk to T2DM (perceived susceptibility as per HBM). The medical camps may also help identify those who are diabetic and unaware in good time so that they may begin management. The hospitals' administration should ensure presence of a diabetes clinic within the hospital that is equipped with all necessary staffing and equipment as diabetes patients require close routine monitoring and follow up which giving this same attention would be difficult or not possible at normal outpatient clinics due to patient traffic.

At the community level, promotion and education towards healthy dietary lifestyles should be strengthened. This should include areas such as workplaces, schools and at village levels where media campaigns that support behaviour change across the population should be promoted. Messages that promote healthy living such as exercising, healthy diets, pollutants reduction and reduced drug use should be disseminated. The promotion of the perceived benefits (as per the HBM) of exercising and healthy diets in managing T2DM may encourage adoption and maintenance of these among T2DM patients. Advocacy by the non-governmental bodies should focus on insisting for the inclusion of comprehensive T2DM management content in the competency based curriculum (CBC) before its full implementation in Kenya's basic education curricula. Gym owners should make the premises all accommodating such that no one feels unwelcome or discriminated against due to any reason which would encourage physical activity to those wish to utilise gyms for weight management.

At the individual level, people should be encouraged to develop a knowledge seeking culture so as to keep abreast with current knowledge on T2DM i.e. prevention and management. People should be self-aware and know that a family history of T2DM may imply that one person may be more susceptible (perceived susceptibility as per HBM) to T2DM than others and therefore take precaution with dietary intake and physical activity. People should check their belief and be able to discern so as to avoid dietary practices that may pre-dispose them to T2DM or interfere with their management of T2DM.

7.2 Conclusion

Based on the findings from the study, several conclusions can be deduced. The first conclusion is that behaviour change among T2DM service users is based on susceptibility to complications such as heart attack or stroke, intention to exercise, perceived benefits of exercise and health eating and healthy eating intentions (likened to cues to action). Perceived susceptibility pushes patients to adopt behaviours that are positive thus following the appropriate preventive and self-care measures such as adherence to medication, weight management and complying with recommended healthy diet. Intentions to exercise, perceived benefits of exercise and healthy eating are categorised as perceived benefits. In this case, it can be concluded that patients intend to change their behaviours due to the benefits that accompany the change such as living a healthy life. The construct of health eating intentions is likened to cues to action which prompt patients to seek healthy intentions such as screening services due to knowledge of close family members with similar illnesses, seeking advice from other people who have been screened and seeking advice from health professionals on how to manage their conditions after screening. Type 2 diabetes mellitus is a condition where behaviour change can minimise the risk or delay complications related to the condition. Tasks that should be undertaken in behaviour change should come as a package after diagnosis and should be integrated into daily life activities and developed as behaviours to enable patients manage the disease, slow progression and lead to reduction of complications. Generally, the study supports the use of HBM in understanding behaviour change among T2DM service users.

Complexity of T2DM management is evident from the study owing to the myriad of factors affecting its management. Different factors affecting T2DM management include resource related factors, information/knowledge factors, personal characteristics, norms, beliefs, culture, health facility related factors, social support, ignorance, psychological and medication adherence. Resource related factors affecting T2DM management include financial challenges to cater for the high cost of medication, diet and logistics to the clinics. Therefore, financial challenges present a barrier to T2DM patients thus making it difficult for them to adhere to the treatment plan. Information or knowledge factors relate to the information gap by the patients and the community towards understanding a disease, its management and possible complications that may arise due to poor management. Personal factors such as age, education and poor behaviour affect T2DM management. Patients whose age is advanced tend to resist behaviour change and are also slow in adopting the required behaviour change leading to poor management of a condition. Low levels of education affect T2DM management since the service users' ability to grasp information regarding T2DM management is affected. Norms, beliefs and culture affect T2DM management by resulting to myths and misconceptions regarding the disease and its management. Further, they affect T2DM management since behaviour change practices are entrenched in norms, beliefs and culture. Facility related factors concern the health facility operations and comprise of inadequate healthcare personnel, insufficient diabetes drugs, lack of current medication, and lack of support by the management and failure by the facilities to conduct awareness campaigns. The social support system factors affecting T2DM management include lack of support by family members, friends, colleagues at workplace and peers. The habits and preferences of the social support system around a patient may not be in support of specific changes that the patient requires towards T2DM management. The psychological factors affecting T2DM management comprise of denial pressure and stress. Denial makes it difficult for patients to withdraw from behaviours that expose them to T2DM, peer pressure makes the patients more vulnerable by exposing them to behaviours and activities that are irresponsible while high stress levels affect the patients' psychological well-being that negatively affects T2DM management. Medical adherence affects T2DM

management owing to the fact that T2DM is not painful thus may not prompt the patient to strictly adhere to the prescribed medication. Moreover, the daily intake of medication is a new lifestyle that is difficult for the patient to adopt.

Processes of T2DM management are multifaceted and should include primary targets to prevent T2DM, primary targets towards promoting behaviour change, actions engaged in the management of T2DM, multi-sectorial approaches and actions by other sectors. Primary targets towards T2DM management such as mass education, modifications of lifestyles and enhancing of behaviour change by the patients, screening, campaigns and advocacy and monitoring should be adopted. The primary targets towards promoting behaviour change such as emphasis on behaviour and diet changes, financial and other forms of support, grassroots level services, information dispensation/education and awareness, monitoring & screening, follow-ups, support groups and training of personnel if adopted will help in T2DM management. Actions engaged in T2DM management mainly touch the healthcare professionals who should engage in actions such as counselling, education, awareness and information dispensation, extreme cases management, general routine management, medication and general consultancy, nutrition management, screening and monitoring. In terms of multi-sectorial approaches, medical camps, screening and monitoring, community and social work, construction of extra healthcare units at the grassroots level, integrated information and support management systems for holistic care, mass education, information sharing, policy making, research and specialised centres, and training of health care workers in the lower cadre of the health system are recommended for better T2DM management. Other stakeholders should come in and help towards the management of T2DM through actions such as counselling, education, awareness and advocacy, facilities construction, multidisciplinary engagement, establishment of wellness clinics and supporting through subsidies and finances. Management of T2DM should therefore provide opportunity for informed decision-making, solving of problems and continued and active collaboration among stakeholders. This will help result in improved quality of care and clinical outcomes.

The study also concludes that various recommendations can be applied within the Kenyan systems towards T2DM management. First, the HBM can be appropriately adopted towards predicting behaviour change among T2DM service users. Secondly, behaviour change is perceived differently among service users and healthcare professionals. Therefore tailored messages should be delivered to different categories of patients so as to enhance behaviour change. Further, the study also concludes that policy makers in the Kenyan health system should consider predisposing factors, reinforcing factors and enabling factors towards T2DM management policy making. Since T2DM management involves different targets, the Kenyan health system should engage different stakeholders towards T2DM management such as government and non-government bodies, medical practitioners, media, community, caregivers and patients. Leadership and governance both at the national and county levels should be strengthened so as to enhance their capacity in offering direction towards T2DM management. Government at the national and county levels should avail funds to subsidise the cost towards T2DM management. At the hospital level, routine medical screening for T2DM for all patients attending the health facilities will be helpful so as to caution those at risk while diagnosing those already affected in good time so as to initiate early management. At the community level, there should be strengthened promotion and education towards healthy lifestyles such as diet and medication adherence. Different areas at the community level such as schools, places of work and village levels should be targeted so as to reach a wider scope of the community. At the individual level, people should be encouraged to develop a knowledge seeking culture so as to keep abreast with current knowledge on T2DM i.e. prevention and management.

7.3 Recommendations

The findings of the study emphasise that T2DM service users perceive behaviour change differently. The study therefore recommends that messages towards behaviour change should be tailored based on the target audience. Health awareness messages, campaigns, advocacy and counselling should not adopt a “one size fits all” so as to capture the different demographics among the service users.

The study also found that behaviour change can be predicted through the HBM. Further, the study found that there are different factors affecting T2DM management. This means that healthcare professionals and those in policy making roles should be trained on different aspects that affect the management of T2DM. This will equip them with the required skills to handle the patients from different backgrounds. Training will also help the professional in crafting multi-faceted approaches such as campaigns and messages for different groups in the society. Healthcare professionals should also be trained to understand the diverse cultures, norms and beliefs existing at the community levels which affect T2DM management so as to incorporate them during the management of the disease.

The study also found that primary targets towards T2DM prevention vary. It is therefore recommended that approaches towards T2DM management should adopt a multi-sectorial aspect. This means that different stakeholders comprising of healthcare professionals, government and non-government organisations, media, caregivers, patients and the community should be engaged in T2DM management. Policy makers comprising of the government and non-government bodies should focus on policy making and designing interventions then leaving appropriate sectors to champion the interventions and implement the policies. This will enhance a harmonised prevention and response to T2DM at all levels. This will also ensure that programmes towards T2DM prevention and management initiated at the top levels are integrated in all lower levels.

Cost of T2DM management such as cost of medication, diet and exercise was found to be a barrier towards effective T2DM management. Policies should be developed to support service users access affordable medication, diet and other forms of management such as exercise. One way that this can be achieved is through subsidy programmes by the government at the national and county levels. Funds should be availed to subsidise the cost of medication and enhance availability of healthy diets and exercise equipment.

The study also found health facilities lack follow-up programmes, awareness campaigns and frequent screening camps that help in sustaining an active behaviour change among different service users. This may result from late diagnosis

and an information gap among the service users. As a result, the study recommends that health facilities should conduct routine screening medical camps. Further, the health facilities should be empowered through provision of resources that should be channeled towards campaigns, awareness and advocacy.

Information and knowledge factors at the community level were also found to affect T2DM management. Therefore, there should be education programmes that sensitise the community on the importance of T2DM management. Such programmes should target different community levels and sensitise the community members on different activities that they should adopt to enhance behaviour change geared towards T2DM management.

7.4 Anticipated Study Contribution

7.4.1 Contribution to Policy

The findings in this study suggest that policy makers should develop T2DM policies that would govern T2DM management in hospitals. The policies should support T2DM management according to the national guidelines. T2DM management staff should be adequately supported in their roles to optimise care. Policies should also support routine audits to practice and results of audits used to improve areas noted for improvement.

7.4.2 Contribution to Knowledge

This work provides insights for what needs to be done to support behaviour change among T2DM service users. This study has identified important barriers and facilitators of behaviour change among T2DM service users in Kenya and also explored the opportunities that can be utilised for improved T2DM management.

The findings imply that behaviour change as outlined by the HBM can be adopted as a non-pharmacological approach towards T2DM management. T2DM patients continue to demonstrate risk factors comprising of stroke and heart attack. It is therefore important for policy makers in government to come up with educational strategies that put into consideration the patients' health beliefs so as to promote self-care practices in T2DM, physical exercise and healthy diet as fundamental towards the management of the illness.

7.5 Limitations of the Study

The PhD study programme began almost as soon as the Covid-19 pandemic was beginning along with the lockdowns and travel limitations. This delayed the actual data collection phase but also allowed adequate time to complete the bulk of the literature review as travel restrictions continued to be eased globally. To mitigate against further delay, the researcher adhered to Covid-19 protocols while interacting with the participants during data collection.

Thika Level 5 Hospital being a public county hospital means that the various clinics are most of the times very busy thus getting the various healthcare professionals for interviews was challenging as I began the interviews. Appointments were scheduled at the time of convenience of the healthcare professionals and as a result the interviews were successfully completed. This also helped the researcher the study's targets in terms of sample size since it minimised the participants from withdrawing from the study due to their busy schedule.

Some healthcare professionals seemed convinced that my study had to be funded and kept asking for payment/incentive for participation in the interviews. However, the researcher informed them participation in the study was voluntary and no form of compensation or award would be given

The study was anchored on behaviour change. In some situations, T2DM patients perceived this study to comprise of an assessment of their character in management of the disease. As a result some feared participation. However, this was mitigated by assuring the respondents of their confidentiality and privacy and that the study was only intended to achieve the listed objectives. Respondents were assured that the information they disclosed would not be divulged to third parties.

LIST OF REFERENCES

- Abd El Kader, A. I., Ibrahim, M. E., Mohamed, H. S., & Osman, B. M. (2023). Diabetes distress and self-care activities among patients with diabetes type II: a correlation study. *SAGE Open Nursing, 9*, 23779608231189944.
- Abood, D. A., Black, D. R., & Feral, D. (2003). Nutrition education worksite intervention for university staff: Application of the health belief model. *Journal of Nutrition Education and Behaviour, 35*(5), 260-267. [https://dx.doi:10.1016/S1499-4046\(06\)60057-2](https://dx.doi:10.1016/S1499-4046(06)60057-2)
- Aboud, F. E., & Singla, D. R. (2012). Challenges to changing health behaviours in developing countries: a critical overview. *Social Science & Medicine, 75*(4), 589-594.
- Abraham, C., Sheeran, P., Norman, P., Conner, M., Vries, N. d., & Otten, W. (1999). When good intentions are not enough: modeling postdecisional cognitive correlates of condom use. *Journal of Applied Social Psychology, 29*(12), 2591-2612. <https://doi.org/10.1111/j.1559-1816.1999.tb00127.x>
- Adamjee, E., & de Dieu Harerimana, J. (2022). Estimating the economic burden of diabetes mellitus in Kenya: A cost of illness study. *European Scientific Journal Social Sciences, 18*(22), 104-118.
- Adams, J., & White, M. (2003). Are activity promotion interventions based on the transtheoretical Model effective? A critical review. *British Journal of Sports Medicine, 37*(2), 106-114. <https://dx.doi:10.1136/bjism.37.2.106>
- Affleck, W., & Pelto, G. (2012). Caregivers' responses to an intervention to improve young child feeding behaviours in rural Bangladesh: a mixed method study of the facilitators and barriers to change. *Social Science & Medicine, 75*(4), 651-658.
- Agrawal, S., & Agrawal, P. K. (2016). Association between body mass index and prevalence of multimorbidity in low-and middle-income countries: a cross-sectional study. *International Journal of Medicine and Public Health, 6*(2), 73.
- Ajzen, I. (1988). Attitudes, personality, and behaviour. *Dorsey Press*. <https://psycnet.apa.org/record/1989-97547-000>
- Ajzen, I. (1991). The theory of planned behaviour. *Organizational behaviour and human decision processes, 50*(2), 179-211. [https://doi.org/10.1016/0749-5978\(91\)90020](https://doi.org/10.1016/0749-5978(91)90020)
- Ajzen, I. (2001). Nature and operation of attitudes. *Annual Review of Psychology, 52*(1), 27-58. <https://doi.org/10.1146/annurev.psych.52.1.27>

- Albikawi, Z. F., & Abuadas, M. (2015). Diabetes self-care management behaviours among Jordanian type two diabetes patients. *American International Journal of Contemporary Research*, 5(3), 87-95.
- Aleksejūnienė, J., & Brukienė, V. (2012). Oral hygiene education in adolescence based on the precaution adoption process model. *Community Dental Health*, 29(3), 248-251. https://doi:10.1922/CDH_2749Aleksejūnienė04
- Alhuseen, O. A., Ismail, N. A., Hasan, L., & Embarak, F. (2023). A comprehensive review of modern methods to improve diabetes self-care management systems. *International Journal of Advanced Computer Science and Applications*, (9).
- Almutairi, N., Hosseinzadeh, H., & Gopaldasani, V. (2020). The effectiveness of patient activation intervention on type 2 diabetes mellitus glycemic control and self-management behaviors: a systematic review of RCTs. *Primary Care Diabetes*, 14(1), 12-20.
- Almutairi, N., Gopaldasani, V., & Hosseinzadeh, H. (2024). Relationship between patient activation and type 2 diabetes Mellitus Self-management and clinical outcomes in Saudi Arabian primary care setting. *American Journal of Health Promotion*, 38(6), 767-777.
- Al-Sahouri, A., Merrell, J., & Snelgrove, S. (2019). Barriers to good glycemic control levels and adherence to diabetes management plan in adults with Type-2 diabetes in Jordan: a literature review. *Patient Preference and Adherence*, 675-693.
- Alsairafi, Z. K., Taylor, K. M. G., Smith, F. J., & Alattar, A. T. (2016). Patients' management of type 2 diabetes in Middle Eastern countries: review of studies. *Patient preference and adherence*, 1051-1062.
- Alsayed, A. O., Ismail, N. A., Hasan, L., Syed, A. H., Embarak, F., & Da'u, A. (2023). A systematic literature review for understanding the effectiveness of advanced techniques in diabetes self-care management. *Alexandria Engineering Journal*, 79, 274-295.
- American Dietetic Association (2009). Diagnosis and classification of diabetes mellitus. *Diabetes Care*, 32(Supplement 1), S62-S67. <https://doi:10.2337/dc09-S062>
- Ampofo, E. O., Kwakye, I. N., Ampofo, E. O., & Aidoo, E. (2022). Role of Family Support, Spirituality and Self-efficacy in Type 2 Diabetes Self-care in Greater Accra Region, Ghana. *Journal of Education, Society and Behavioural Science*, 35(7), 27-39.

- Armitage, C. J., & Arden, M. A. (2002). Exploring discontinuity patterns in the transtheoretical model: An application of the theory of planned behaviour. *British Journal of Health Psychology*, 7(1), 89-103. <https://doi.org/10.1348/135910702169385>
- Armitage, C. J., & Conner, M. (2001). Efficacy of the theory of planned behaviour: A meta-analytic review. *British Journal of Social Psychology*, 40(4), 471-499. <https://doi.org/10.1348/014466601164939>
- Arnold, B. F., & Colford Jr, J. M. (2007). Treating water with chlorine at point-of-use to improve water quality and reduce child diarrhea in developing countries: a systematic review and meta-analysis. *The American Journal of Tropical Medicine and Hygiene*, 76(2), 354-364.
- Asiki, G., Shao, S., Wainana, C., Khayeka-Wandabwa, C., Haregu, T. N., Juma, P. A., Mohammed, S., Wambui, D., Gong, E., Yan, L. L., & Kyobutangi, C. (2018). Policy environment for prevention, control and management of cardiovascular diseases in primary health care in Kenya. *BMC Health Services Research*, 18(1), 344. <https://doi.org/10.1186/s12913-018-3152-4>
- Atkins, L., Francis, J., Islam, R., O'Connor, D., Patey, A., Ivers, N., ... & Michie, S. (2017). A guide to using the Theoretical Domains Framework of behaviour change to investigate implementation problems. *Implementation science*, 12, 1-18.
- Azevedo, M., & Alla, S. (2008). Diabetes in Sub-saharan Africa: Kenya, Mali, Mozambique, Nigeria, South Africa and Zambia. *International Journal of Diabetes in Developing Countries*, 28(4), 101. <https://doi.org/10.4103/0973-3930.45268>
- Backman, R., Foy, R., Michael, B. D., Defres, S., Kneen, R., & Solomon, T. (2015). The development of an intervention to promote adherence to national guidelines for suspected viral encephalitis. *Implementation Science*, 10, 1-12.
- Baker, S. A., Morrison, D. M., Carter, W. B., & Verdon, M. S. (1996). Using the theory of reasoned action (TRA) to understand the decision to use condoms in an STD clinic population. *Health Education Quarterly*, 23(4), 528-542. <https://doi.org/10.1177/109019819602300411>
- Bandura, A. (1977). Self-efficacy: toward a unifying theory of behavioural change. *Psychological Review*, 84(2), 191. <https://doi.org/10.1037/0033-295X.84.2.191>
- Bandura, A. (1986). Social foundations of thought and action: a social cognitive theory. <https://psycnet.apa.org/record/1985-98423-000>

- Batalha, A. P. D. B., Ponciano, I. C., Chaves, G., Felício, D. C., Britto, R. R., & da Silva, L. P. (2021). Behavior change interventions in patients with type 2 diabetes: a systematic review of the effects on self-management and A1c. *Journal of Diabetes & Metabolic Disorders*, 1-22.
- Bauman, A., & Phongsavan, P. (1999). Epidemiology of substance use in adolescence: prevalence, trends and policy implications. *Drug and Alcohol Dependence*, 55(3), 187-207.
- Beck, J., Greenwood, D. A., Blanton, L., Bollinger, S. T., Butcher, M. K., Condon, J. E., ... & Wang, J. (2017). 2017 national standards for diabetes self-management education and support. *Diabetes Educator*, 43(5), 449-464.
- Becker, E. A., & Gibson, C. C. (1998). Fishbein and Ajzen's theory of reasoned action: Accurate prediction of behavioural intentions for enrolling in distance education courses. *Adult Education Quarterly*, 49(1), 43-55. <https://doi.org/10.1177/074171369804900105>
- Bekele, H., Asefa, A., Getachew, B., & Belete, A. M. (2020). Barriers and strategies to lifestyle and dietary pattern interventions for prevention and management of TYPE-2 diabetes in Africa, systematic review. *Journal of Diabetes Research*, 2020(1), 7948712.
- Berkman, N. D., Sheridan, S. L., Donahue, K. E., Halpern, D. J., & Crotty, K. (2011). Low health literacy and health outcomes: an updated systematic review. *Annals of Internal Medicine*, 155(2), 97-107.
- Bhupathiraju, S. N., Tobias, D. K., Malik, V. S., Pan, A., Hruby, A., Manson, J. E., Willet, W. C., & Hu, F. B. (2014). Glycemic index, glycemic load, and risk of T2DM: results from 3 large US cohorts and an updated meta-analysis. *The American Journal of Clinical Nutrition*, 100(1), 218-232. <https://doi.org/10.3945/ajcn.113.079533>
- Bishop, A. C., Baker, G. R., Boyle, T. A., & MacKinnon, N. J. (2015). Using the health belief model to explain patient involvement in patient safety. *Health Expectations*, 18(6), 3019-3033. <https://dx.doi:10.1111/hex.12286>
- Black, R. E., Allen, L. H., Bhutta, Z. A., Caulfield, L. E., De Onis, M., Ezzati, M., . . . Group, C. U. S. (2008). Maternal and child undernutrition: global and regional exposures and health consequences. *The Lancet*, 371(9608), 243-260.
- Blalock, S. J., DeVellis, R. F., Giorgino, K. B., DeVellis, B. M., Gold, D. T., Dooley, M. A., Anderson, J. J., and Smith, S. L. (1996). Osteoporosis prevention in premenopausal women: Using a stage model approach to examine the

predictors of behaviour. *Health Psychology*, 15(2), 84.
<https://doi.org/10.1037//0278-6133.15.2.84>

Borrelli, B., McQuaid, E. L., Becker, B., Hammond, K., Papandonatos, G., Fritz, G., & Abrams, D. (2002). Motivating parents of kids with asthma to quit smoking: the PAQS project. *Health Education Research*, 17(5), 659-669.
<https://doi.org/10.1093/her/17.5.659>

Borsari, B., & Carey, K. B. (2001). Peer influences on college drinking: A review of the research. *Journal of Substance Abuse*, 13(4), 391-424.

Bowman, C. H., & Fishbein, M. (1978). Understanding public reaction to energy proposals: An application of the Fishbein Model 1. *Journal of Applied Social Psychology*, 8(4), 319-340. <https://doi.org/10.1111/j.1559-1816.1978.tb00787.x>

Bridle, C., Riemsma, R. P., Pattenden, J., Sowden, A. J., Mather, L., Watt, I. S., & Walker, A. (2005). Systematic review of the effectiveness of health behaviour interventions based on the transtheoretical model. *Psychology & Health*, 20(3), 283-301.
<https://dx.doi:http://dx.doi.org/10.1080/08870440512331333997>

Briscoe, C., & Aboud, F. (2012). Behaviour change communication targeting four health behaviours in developing countries: a review of change techniques. *Social Science & Medicine*, 75(4), 612-621.

Brunner, L. S. (2010). Brunner & Suddarth's textbook of medical-surgical nursing (Vol. 1): Lippincott Williams & Wilkins.
https://books.google.co.ke/books/about/Handbook_for_Brunner_and_Suddarth_s_Text.html?id=ZFYpJO2GPmUC&redir_esc=y

Bubeck, P., Wouter Botzen, W. J., Laudan, J., Aerts, J. C., & Thieken, A. H. (2018). Insights into flood-coping appraisals of protection motivation theory: Empirical evidence from Germany and France. *Risk Analysis*, 38(6), 1239-1257. <https://doi.org/10.1111/risa.12938>

Buchanan, T., Magee, C. A., & Kelly, P. J. (2020). Smokers who do not quit: Can the precaution adoption process model help identify hard-core smokers? *Journal of Smoking Cessation*, 15(1), 6-13.
<https://doi.org/10.1017/jsc.2019.20>

Burton, R. J. (2004). Reconceptualising the 'behavioural approach' in agricultural studies: a socio-psychological perspective. *Journal of Rural Studies*, 20(3), 359-371. <https://doi.org/10.1016/j.jrurstud.2003.12.001>

- Bussières, A. E., Patey, A. M., Francis, J. J., Sales, A. E., Grimshaw, J. M., & Canada PRIme Plus Team. (2012). Identifying factors likely to influence compliance with diagnostic imaging guideline recommendations for spine disorders among chiropractors in North America: a focus group study using the Theoretical Domains Framework. *Implementation Science, 7*, 1-11.
- Cane, J., Richardson, M., Johnston, M., Ladha, R., & Michie, S. (2015). From lists of behaviour change techniques (BCT s) to structured hierarchies: comparison of two methods of developing a hierarchy of BCT s. *British Journal of Health Psychology, 20*(1), 130-150.
- Caudwell, K. M., Mullan, B. A., & Hagger, M. S. (2015). Combining motivational and volitional approaches to reducing excessive alcohol consumption in pre-drinkers: a theory-based intervention protocol. *BMC Public Health, 16*, 1-12.
- Chan, D. C., Wu, A. M., & Hung, E. P. (2010). Invulnerability and the intention to drink and drive: An application of the theory of planned behaviour. *Accident Analysis & Prevention, 42*(6), 1549-1555. <https://doi.org/10.1016/j.aap.2010.03.011>
- Chang, M. K. (1998). Predicting unethical behaviour: a comparison of the theory of reasoned action and the theory of planned behaviour. *Journal of Business Ethics, 17*(16), 1825-1834. <https://doi.org/10.1023/A:1005721401993>
- Chang, S. A. (2012). Smoking and T2DM mellitus. *Diabetes & Metabolism Journal, 36*(6), 399-403. <https://doi.org/10.4093/dmj.2012.36.6.399>
- Chatterjee, S., Khunti, K., & Davies, M. J. (2017). T2DM. *The Lancet, 389*(10085), 2239-2251. [https://doi.org/10.1016/S0140-6736\(17\)30058-2](https://doi.org/10.1016/S0140-6736(17)30058-2)
- Clayton, R. R., Cattarello, A. M., & Johnstone, B. M. (1996). The effectiveness of Drug Abuse Resistance Education (Project DARE): 5-year follow-up results. *Preventive Medicine, 25*(3), 307-318.
- Clemow, L., Costanza, M. E., Haddad, W. P., Luckmann, R., White, M. J., Klaus, D., & Stoddard, A. M. (2000). Underutilizers of mammography screening today: characteristics of women planning, undecided about, and not planning a mammogram. *Annals of Behavioural Medicine, 22*(1), 80-88. <https://doi.org/10.1007/BF02895171>
- Coates, T. J., Richter, L., & Caceres, C. (2008). Behavioural strategies to reduce HIV transmission: how to make them work better. *The Lancet, 372*(9639), 669-684. [https://doi.org/10.1016/S0140-6736\(08\)60886-7](https://doi.org/10.1016/S0140-6736(08)60886-7)

- Comte, A. (1975). *Auguste Comte and positivism: The essential writings*. Transaction Publishers.
- Conner, M., & Armitage, C. J. (1998). Extending the theory of planned behaviour: A review and avenues for further research. *Journal of Applied Social Psychology, 28*(15), 1429-1464. <https://doi.org/10.1111/j.1559-1816.1998.tb01685.x>
- Conner, M., Norman, P., & Bell, R. (2002). The theory of planned behaviour and healthy eating. *Health Psychology, 21*(2), 194. <http://dx.doi.org/10.1037/0278-6133.21.2.194>
- Cook, A. J., Kerr, G. N., & Moore, K. (2002). Attitudes and intentions towards purchasing GM food. *Journal of Economic Psychology, 23*(5), 557-572. [https://doi.org/10.1016/S0167-4870\(02\)00117-4](https://doi.org/10.1016/S0167-4870(02)00117-4)
- Costanza, M. E., Luckmann, R., Stoddard, A. M., White, M. J., Stark, J. R., Avrunin, J. S., Rosal, M. C., & Clemow, L. (2007). Using tailored telephone counseling to accelerate the adoption of colorectal cancer screening. *Cancer Detection and Prevention, 31*(3), 191-198. <https://doi.org/10.1016/j.cdp.2007.04.008>
- Cradock, K. A., ÓLaighin, G., Finucane, F. M., Gainforth, H. L., Quinlan, L. R., & Ginis, K. A. M. (2017). Behaviour change techniques targeting both diet and physical activity in type 2 diabetes: A systematic review and meta-analysis. *International Journal of Behavioral Nutrition and Physical Activity, 14*, 1-17.
- Cresswell, J. W. (2014). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. Sage Publications.
- Creswell, J. W. (2021). *A concise introduction to mixed methods research*. SAGE publications.
- Creswell, J. W., & Clark, V. L. P. (2017). *Designing and conducting mixed methods research*. Sage publications.
- Creswell, J. W., Clark, V. L. P., Gutmann, M. L., & Hanson, W. E. (2003). Advanced mixed. *Handbook of mixed methods in social & behavioral research, 209*, 209-240.
- Curtis, V., & Cairncross, S. (2003). Effect of washing hands with soap on diarrhoea risk in the community: a systematic review. *The Lancet Infectious Diseases, 3*(5), 275-281.

- Daddario, D. K. (2007). A review of the use of the health belief model for weight management. *Medsurg Nursing*, 16(6), 363. <https://pubmed.ncbi.nlm.nih.gov/18390255/>
- Dahlhausen, F., Zinner, M., Bieske, L., Ehlers, J. P., Boehme, P., & Fehring, L. (2022). There's an app for that, but nobody's using it: insights on improving patient access and adherence to digital therapeutics in Germany. *Digital Health*, 8, 20552076221104672.
- Davies, M. J., Baer, D. J., Judd, J. T., Brown, E. D., Campbell, W. S., & Taylor, P. R. (2002). Effects of moderate alcohol intake on fasting insulin and glucose concentrations and insulin sensitivity in postmenopausal women: a randomized controlled trial. *JAMA*, 287(19), 2559-2562. <https://doi.org/10.1001/jama.287.19.2559>
- De Vet, E., De Nooijer, J., De Vries, N. K., & Brug, J. (2007). Comparing stage of change and behavioural intention to understand fruit intake. *Health Education Research*, 22(4), 599-608. <https://doi.org/10.1093/her/cyl121>
- Deli, G., Bosnyak, E., Pusch, G., Komoly, S., & Feher, G. (2013). Diabetic neuropathies: diagnosis and management. *Neuroendocrinology*, 98(4), 267-280. <https://doi.org/10.1159/000358728>
- Díz-Loving, R., & Villagrán-Vázquez, G. (1999). The theory of reasoned action applied to condom use and request of condom use in Mexican government workers. *Applied Psychology*, 48(2), 139-151. <https://doi.org/10.1111/j.1464-0597.1999.tb00054.x>
- Doupis, J., Festas, G., Tsilivigos, C., Efthymiou, V., & Kokkinos, A. (2020). Smartphone-based technology in diabetes management. *Diabetes Therapy*, 11(3), 607-619.
- Dunn, K. I., Mohr, P., Wilson, C. J., & Wittert, G. A. (2011). Determinants of fast-food consumption. An application of the theory of planned behaviour. *Appetite*, 57(2), 349-357. <https://doi.org/10.1016/j.appet.2011.06.004>
- Eagly, A. H., & Chaiken, S. (1993). *The psychology of attitudes*: Harcourt Brace Jovanovich College Publishers. <https://psycnet.apa.org/record/1992-98849-000>
- Edwards, W. (1954). The theory of decision making. *Psychological Bulletin*, 51(4), 380. <https://doi.org/10.1037/h0053870>

- El-Busaidy, H., Dawood, M., Kasay, A., Mwamlole, C., Koraya, N., & Parpia, H. (2014). How serious is the impact of type II diabetes in rural Kenya? <http://erepository.uonbi.ac.ke/handle/11295/72263>
- Engle, P. L., Black, M. M., Behrman, J. R., De Mello, M. C., Gertler, P. J., Kapiriri, L., Martorell, R., & Young, M. E. (2007). Strategies to avoid the loss of developmental potential in more than 200 million children in the developing world. *The Lancet*, 369(9557), 229-242.
- Estlin, A. F., Ahern, A. L., Griffin, S. J., & Strelitz, J. (2021). Modification of cardiovascular disease risk by health behaviour change following type 2 diabetes diagnosis. *Diabetic Medicine*, 38(10), e14646.
- Fahrenwald, N. L., & Walker, S. N. (2003). Application of the transtheoretical model of behaviour change to the physical activity behaviour of WIC mothers. *Public Health Nursing*, 20(4), 307-317. <https://dx.doi.org/10.1046/j.1525-1446.2003.20408.x>
- Fiebelkorn, A. P., Person, B., Quick, R. E., Vindigni, S. M., Jhung, M., Bowen, A., & Riley, P. L. (2012). Systematic review of behaviour change research on point-of-use water treatment interventions in countries categorized as low-to medium-development on the human development index. *Social Science & Medicine*, 75(4), 622-633.
- Fielding, K. S., McDonald, R., & Louis, W. R. (2008). Theory of planned behaviour, identity and intentions to engage in environmental activism. *Journal of Environmental Psychology*, 28(4), 318-326. <https://doi.org/10.1016/j.jenvp.2008.03.003>
- Fishbein, M., & Ajzen, I. (1975). *Intention and Behaviour: An introduction to theory and research*. <https://people.umass.edu/aizen/f&a1975.html>
- Fishbein, M., Chan, D. K. S., O'reilly, K., Schnell, D., Wood, R., Beeker, C., & Cohn, D. (1992). Attitudinal and normative factors as determinants of gay men's intentions to perform AIDS-related sexual behaviours: a multisite analysis. *Journal of Applied Social Psychology*, 22(13), 999-1011. <https://doi.org/10.1111/j.1559-1816.1992.tb00938.x>
- Floyd, D. L., Prentice-Dunn, S., & Rogers, R. W. (2000). A meta-analysis of research on protection motivation theory. *Journal of Applied Social Psychology*, 30(2), 407-429. <https://doi.org/10.1111/j.1559-1816.2000.tb02323.x>
- Forward, S. E. (2009). The theory of planned behaviour: The role of descriptive norms and past behaviour in the prediction of drivers' intentions to violate.

Transportation Research Part F: Traffic Psychology and Behaviour, 12(3), 198-207. <https://doi.org/10.1016/j.trf.2008.12.002>

- Fruin, D. J., Pratt, C., & Owen, N. (1992). Protection Motivation Theory and Adolescents' Perceptions of Exercise 1. *Journal of Applied Social Psychology*, 22(1), 55-69. <https://doi.org/10.1111/j.1559-1816.1992.tb01521.x>
- Gakobo, T. W., Jere, M. G., & Griffith, C. (2016). An application of the theory of planned behaviour to predict intention to consume African indigenous foods in Kenya. *British Food Journal*. <https://doi.org/10.1108/BFJ-10-2015-0344>
- Gatumo, M., Gacheri, S., Sayed, A. R., & Scheibe, A. (2018). Women's knowledge and attitudes related to cervical cancer and cervical cancer screening in Isiolo and Tharaka Nithi counties, Kenya: a cross-sectional study. *BMC Cancer*, 18, 1-9.
- Gillmore, M. R., Archibald, M. E., Morrison, D. M., Wilsdon, A., Wells, E. A., Hoppe, M. J., Nahom, D., & Murowchick, E. (2002). Teen sexual behaviour: Applicability of the theory of reasoned action. *Journal of Marriage and Family*, 64(4), 885-897. <https://doi.org/10.1111/j.1741-3737.2002.00885.x>
- Glanz, K., & Bishop, D. B. (2010). The role of behavioural science theory in development and implementation of public health interventions. *Annual Review of Public Health*, 31, 399-418. <https://doi.org/10.1146/annurev.publhealth.012809.103604>
- Godin, G., & Kok, G. (1996). The theory of planned behaviour: a review of its applications to health-related behaviours. *American Journal of Health Promotion*, 11(2), 87-98. <https://doi.org/10.4278/0890-1171-11.2.87>
- Goldenhar, L. M., & Connell, C. M. (1993). Understanding and predicting recycling behaviour: An application of the theory of reasoned action. *Journal of Environmental Systems*, 22, 91-91. https://triggered.clockss.org/ServeContent?url=http://baywood.stanford.clockss.org%2FBWES%2FBAWOOD_BWES_22_1%2F92KUNXLTXC32RHD6.pdf
- Goodwin, C. M. F. (2021). *Keys to Understanding and Serving College Students with Chronic Illnesses*. St. John's University (New York).
- Gostin, L. O., Arno, P. S., & Brandt, A. M. (1997). FDA regulation of tobacco advertising and youth smoking: historical, social, and constitutional perspectives. *JAMA*, 277(5), 410-418.
- Goyal, R., & Jialal, I. (2018). *Diabetes mellitus type 2*. <https://europepmc.org/article/nbk/nbk513253#impact>

- Gray, S. P., & Jandeleit-Dahm, K. (2014). The pathobiology of diabetic vascular complications—cardiovascular and kidney disease. *Journal of Molecular Medicine*, *92*(5), 441-452. <https://doi.org/10.1007/s00109-014-1146-1>
- Guariguata, L., Whiting, D. R., Hambleton, I., Beagley, J., Linnenkamp, U., & Shaw, J. E. (2014). Global estimates of diabetes prevalence for 2013 and projections for 2035. *Diabetes Research and Clinical Practice*, *103*(2), 137-149.
- Hackett, R. A., Moore, C., Steptoe, A., & Lassale, C. (2018). Health behaviour changes after type 2 diabetes diagnosis: Findings from the English Longitudinal Study of Ageing. *Scientific Reports*, *8*(1), 16938.
- Hall, P. A., Fong, G. T., Epp, L. J., & Elias, L. J. (2008). Executive function moderates the intention-behaviour link for physical activity and dietary behaviour. *Psychology & Health*, *23*(3), 309-326. <https://doi.org/10.1080/14768320701212099>
- Hallett, J., Howat, P. M., Maycock, B. R., McManus, A., Kypri, K., & Dhaliwal, S. S. (2012). Undergraduate student drinking and related harms at an Australian university: web-based survey of a large random sample. *BMC Public Health*, *12*, 1-8.
- Halton, T. L., Liu, S., Manson, J. E., & Hu, F. B. (2008). Low-carbohydrate-diet score and risk of T2DM in women. *The American Journal of Clinical Nutrition*, *87*(2), 339-346. <https://doi.org/10.1093/ajcn/87.2.339>
- Hamilton, M. T., Hamilton, D. G., & Zderic, T. W. (2014). Sedentary behavior as a mediator of type 2 diabetes. *Diabetes and Physical Activity*, *60*, 11-26.
- Hamzekolayee, Q. B., Sahbaeiroy, F., & Zare, M. (2018). Design and psychometric of smoking cessation instrument according to precaution adoption process model in patients hospitalized in hospitals affiliated to Medical University of Babol, Iran, during 2017. *Asian Journal of Pharmaceutics*, *12*(1), S356-S363. <https://doi.org/10.22377/ajp.v12i01.2084>
- Hawkins, J. D., Catalano, R. F., & Miller, J. Y. (1992). Risk and protective factors for alcohol and other drug problems in adolescence and early adulthood: implications for substance abuse prevention. *Psychological Bulletin*, *112*(1), 64.
- He, J., Wan, L., & Luo, B. (2019). Intentions and influencing factors regarding natural childbirth among urban pregnant women in China, based on the theory of reasoned action and structural equation modeling. *Journal of International Medical Research*, *47*(9), 4482-4491. <https://doi.org/10.1177/0300060519862089>

- Hearn, J. H., Bryson, K., Barsauskaite, L., & Bullo, S. (2024). A COM-B and Theoretical Domains Framework mapping of the barriers and facilitators to effective communication and help-seeking among people with, or seeking a diagnosis of, endometriosis. *Journal of Health Communication, 29*(3), 174-186.
- Heidelbaugh, J. J. (2015). *Primary Care Ophthalmology, An Issue of Primary Care: Clinics in Office Practice 42-3, E-Book* (Vol. 42): Elsevier Health Sciences. [https://doi.org/10.1016/S0095-4543\(15\)00065-2](https://doi.org/10.1016/S0095-4543(15)00065-2)
- Heiss, V., & Petosa, R. (2014). Correlates of physical activity among adults with type 2 diabetes: a systematic literature review. *American Journal of Health Education, 45*(5), 278-287.
- Hennink, M., Hutter, I., & Bailey, A. (2020). *Qualitative Research Methods*. Sage.
- Henshaw, E. J., & Freedman-Doan, C. R. (2009). Conceptualizing mental health care utilization using the health belief model. *Clinical Psychology: Science and Practice, 16*(4), 420-439. <https://doi.org/10.1111/j.1468-2850.2009.01181.x>
- Hovland, C. I., Janis, I. L., & Kelley, H. H. (1953). Communication and persuasion. <https://psycnet.apa.org/record/1954-05952-000>
- Hu, F. B., Van Dam, R., & Liu, S. (2001). Diet and risk of type II diabetes: the role of types of fat and carbohydrate. *Diabetologia, 44*(7), 805-817. <https://doi.org/10.1007/s001250100547>
- Huda, T. M. N., Unicomb, L., Johnston, R. B., Halder, A. K., Sharker, M. A. Y., & Luby, S. P. (2012). Interim evaluation of a large scale sanitation, hygiene and water improvement programme on childhood diarrhea and respiratory disease in rural Bangladesh. *Social Science & Medicine, 75*(4), 604-611.
- Hussain, S., & Chowdhury, T. A. (2019). The impact of comorbidities on the pharmacological management of T2DM mellitus. *Drugs, 79*(3), 231-242. <https://doi.org/10.1007/s40265-019-1061-4>
- Hussein, S. A., Kithuka, P., Otieno, G., Yoos, A., Kaugi, R., & Njeru, C. (2021). Management of diabetes mellitus at the household level using community health strategy in Embu County, Kenya. *The Pan African Medical Journal, 39*. <https://doi.org/10.11604/pamj.2021.39.35.27753>
- International Diabetes Federation. (2011). *Diabetes Atlas 2011*. Fifth Edition. <https://diabetesatlas.org/atlas/fifth-edition/>
- International Diabetes Federation. (2013a). *Annual Report*. <https://idf.org/?s=annual+reports>

- International Diabetes Federation. (2015). *Diabetes Atlas 2015*. Seventh edition. <https://diabetesatlas.org/atlas/seventh-edition/>
- International Diabetes Federation. (2016). *Cost-effective solutions for the prevention of T2DM*. Brussels, Belgium. <https://idf.org/about-diabetes/resources/?idf-category=epidemiology>
- International Diabetes Federation. (2017). *Diabetes Atlas 2017*- Eighth edition. <https://diabetesatlas.org/atlas/eighth-edition/>
- International Diabetes Federation. (2021). *Diabetes Atlas 2021*- Tenth edition. <https://diabetesatlas.org/atlas/tenth-edition/>
- Issaka, A., Paradies, Y., & Stevenson, C. (2018). Modifiable and emerging risk factors for T2DM in Africa: a systematic review and meta-analysis protocol. *Systematic Reviews*, 7(1), 1-10. <https://doi.org/10.1186/s13643-018-0801-y>
- Iversen, H. (2004). Risk-taking attitudes and risky driving behaviour. *Transportation Research Part F: Traffic Psychology and Behaviour*, 7(3), 135-150. <https://doi.org/10.1016/j.trf.2003.11.003>
- Jaarsma, T., Cameron, J., Riegel, B., & Stromberg, A. (2017). Factors related to self-care in heart failure patients according to the middle-range theory of self-care of chronic illness: a literature update. *Current Heart Failure Reports*, 14, 71-77.
- Jaccard, J. J., & Davidson, A. R. (1972). Toward an understanding of family planning behaviours: an initial investigation. *Journal of Applied Social Psychology*, 2(3), 228-235. <https://doi.org/10.1111/j.1559-1816.1972.tb01274.x>
- Jain, S. K., Kahlon, G., Morehead, L., Dhawan, R., Lieblong, B., Stapleton, T., Caldito, G., Hoeldtke, R., Levine, S. N., & Bass III, P. F. (2012). Effect of chromium dinicocysteinate supplementation on circulating levels of insulin, TNF- α , oxidative stress, and insulin resistance in type 2 diabetic subjects: Randomized, double-blind, placebo-controlled study. *Molecular Nutrition & Food Research*, 56(8), 1333-1341. <https://doi.org/10.1002/mnfr.201100719>
- James, D. C. S., Pobe, J. W., Oxidine, D., Brown, L., & Joshi, G. (2012). Using the health belief model to develop culturally appropriate weight-management materials for African-American women. *Journal of the Academy of Nutrition and Dietetics*, 112(5), 664-670. <https://dx.doi:10.1016/j.jand.2012.02.003>
- Jassempour, K., Shirazi, K. K., Fararoei, M., Shams, M., & Shirazi, A. R. (2014). The impact of educational intervention for providing disaster survival kit: Applying precaution adoption process model. *International Journal of*

Disaster Risk Reduction, 10, 374-380.
<https://doi.org/10.1016/j.ijdrr.2014.10.012>

- Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed methods research: A research paradigm whose time has come. *Educational Researcher*, 33(7), 14-26.
- Jones, C. J., Smith, H. E., Frew, A. J., Toit, G. D., Mukhopadhyay, S., & Llewellyn, C. D. (2014). Explaining adherence to self-care behaviours amongst adolescents with food allergy: A comparison of the health belief model and the common sense self-regulation model. *British Journal of Health Psychology*, 19(1), 65-82. <https://dx.doi:10.1111/bjhp.12033>
- Jones, G., Steketee, R. W., Black, R. E., Bhutta, Z. A., Morris, S. S. (2003). How many child deaths can we prevent this year? *The Lancet*, 362(9377), 65-71.
- Jones, P. (1989). Understanding paper recycling in an institutionally supportive setting: An application of the theory of reasoned action. *Journal of Environmental Systems*, 19(4), 307-321.
[https://triggered.clockss.org/ServeContent?url=http://baywood.stanford.clockss.org%2FBWES%2FBAWOOD BWES 19 4%2F8KX29XQMRP38CLPP.pdf](https://triggered.clockss.org/ServeContent?url=http://baywood.stanford.clockss.org%2FBWES%2FBAWOOD%2FBWES%2F19%2F4%2F8KX29XQMRP38CLPP.pdf)
- Kaiser, F. G. (2006). A moral extension of the theory of planned behaviour: Norms and anticipated feelings of regret in conservationism. *Personality and Individual Differences*, 41(1), 71-81.
<https://doi.org/10.1016/j.paid.2005.11.028>
- Kalaria, T., Ko, Y. L., & Issuree, K. K. J. (2021). Literature review: Drug and alcohol-induced hypoglycaemia. *Journal of Laboratory and Precision Medicine*, 6.
- Kangendo, C., & Gitonga, A. (2017). Factors influencing adherence to antiretroviral therapy among youth in Meru County based on case of Meru Teaching and Referral Hospital. *International Academic Journal of Health, Medicine and Nursing*, 1, 32-53.
- Kankeu, H. T., Saksena, P., Xu, K., & Evans, D. B. (2013). The financial burden from non-communicable diseases in low-and middle-income countries: a literature review. *Health Research Policy and Systems*, 11(1), 1-12.
<https://doi.org/10.1186/1478-4505-11-31>
- Karthik, R. C., Radhakrishnan, A., Vikram, A., Arumugam, B., & Jagadeesh, S. (2020). Self-care practices among type II diabetics in rural area of Kancheepuram district, Tamil Nadu. *Journal of Family Medicine and Primary Care*, 9(6), 2912-2918.

- Katirayi, L., Akuno, J., Kulukulu, B., & Masaba, R. (2021). "When you have a high life, and you like sex, you will be afraid": a qualitative evaluation of adolescents' decision to test for HIV in Zambia and Kenya using the health belief model. *BMC Public Health*, *21*, 1-11.
- Kelly, T., Unwin, D., & Finucane, F. (2020). Low-Carbohydrate diets in the management of obesity and type 2 diabetes: a review from clinicians using the approach in practice. *International Journal of Environmental Research and Public Health*, *17*(7), 2557.
- Kenya National Guidelines for Management of Diabetes Mellitus (2010). First Edition. By Ministry of Public Health and Sanitation. <https://ncdak.org/wp-content/uploads/2021/08/National-Clinic-Guidelines-for-Management-of-Diabetes-Melitus-Complete.pdf>
- Kigatiira, K. K. (2020). Efficacy of fear appeals on adoption of COVID-19 preventive measures: a case of boda boda riders in Nairobi county, Kenya. *International Journal of Research- Granthaalayah*, *8*(6), 219-228.
- Kinuthia, J., Ronen, K., Unger, J. A., Jiang, W., Matemo, D., Perrier, T., ... & John-Stewart, G. (2021). SMS messaging to improve retention and viral suppression in prevention of mother-to-child HIV transmission (PMTCT) programs in Kenya: A 3-arm randomized clinical trial. *PLoS Medicine*, *18*(5), e1003650.
- Kioko, M. T., & Pertet, A. M. (2017). Factors contributing to antiretroviral drug adherence among adults living with HIV or AIDS in a Kenyan rural community. *African Journal of Primary Health Care and Family Medicine*, *9*(1), 1-7.
- Kisiangani, J., Baliddawa, J., Marinda, P., Mabeya, H., Choge, J. K., Adino, E. O., & Khayeka-Wandabwa, C. (2018). Determinants of breast cancer early detection for cues to expanded control and care: the lived experiences among women from Western Kenya. *BMC Women's Health*, *18*, 1-9.
- Koppes, L. L., Dekker, J. M., Hendriks, H. F., Bouter, L. M., & Heine, R. J. (2005). Moderate alcohol consumption lowers the risk of T2DM: a meta-analysis of prospective observational studies. *Diabetes Care*, *28*(3), 719-725. <https://doi.org/10.2337/diacare.28.3.719>
- Koyio, L. N., Kikwilu, E., Mulder, J., & Frencken, J. E. (2013). Attitudes, subjective norms, and intention to perform routine oral examination for oropharyngeal candidiasis as perceived by primary health-care providers in Nairobi Province. *Journal of Public Health Dentistry*, *73*(2), 127-134.

- Kunkes, T. (2022). *Making Patient Context Concrete: Design of an Interface to Support Collection of Contextual Information from Patients with Type 2 Diabetes* (Doctoral Dissertation, State University of New York at Buffalo).
- Largo-Wight, E., Bian, H., & Lange, L. (2012). An empirical test of an expanded version of the theory of planned behavior in predicting recycling behavior on campus. *American Journal of Health Education*, *43*(2), 66-73.
- Lennon, C. A., Huedo-Medina, T. B., Gerwien, D. P., & Johnson, B. T. (2012). A role for depression in sexual risk reduction for women? A meta-analysis of HIV prevention trials with depression outcomes. *Social Science & Medicine*, *75*(4), 688-698. <https://doi.org/10.1016/j.socscimed.2012.01.016>
- LeRoith, D., Taylor, S. I., & Olefsky, J. M. (2004). *Diabetes mellitus: a fundamental and clinical text*: Lippincott, Williams & Wilkins. <https://www.wolterskluwer.com/en/solutions/ovid/diabetes-mellitus-a-fundamental-and-clinical-text-3260>
- Ley, S. H., Hamdy, O., Mohan, V., & Hu, F. B. (2014). Prevention and management of T2DM: dietary components and nutritional strategies. *The Lancet*, *383*(9933), 1999-2007. [https://doi.org/10.1016/S0140-6736\(14\)60613-9](https://doi.org/10.1016/S0140-6736(14)60613-9)
- Liao, C., Chen, J.-L., & Yen, D. C. (2007). Theory of planning behaviour (TPB) and customer satisfaction in the continued use of e-service: An integrated model. *Computers in Human Behaviour*, *23*(6), 2804-2822. <https://doi.org/10.1016/j.chb.2006.05.006>
- Liñán, F., & Chen, Y. W. (2009). Development and cross-cultural application of a specific instrument to measure entrepreneurial intentions. *Entrepreneurship Theory and Practice*, *33*(3), 593-617. <https://doi.org/10.1111/j.1540-6520.2009.00318.x>
- Lopes, A., Roque, F., Morgado, S., Dinis, C., Herdeiro, M. T., & Morgado, M. (2021). Behavioral sciences in the optimization of pharmacological and non-pharmacological therapy for type 2 diabetes. *Behavioral Sciences*, *11*(11), 153.
- Lu, Y., Shin, Y., Gitau, M. W., Njoroge, M. W., Gitau, P., & Temple, J. R. (2021). Application of the theory of planned behaviour to predict smoking intentions: cross-cultural comparison of Kenyan and American young adults. *Health Education Research*, *36*(1), 140-150. <https://doi.org/10.1093/her/cyaa041>
- Luby, S. P., Mendoza, C., Keswick, B. H., Chiller, T. M., & Hoekstra, R. M. (2008). Difficulties in bringing point-of-use water treatment to scale in rural

Guatemala. *The American Journal of Tropical Medicine and Hygiene*, 78(3), 382-387.

Maddatu, J., Anderson-Baucum, E., & Evans-Molina, C. (2017). Smoking and the risk of type 2 diabetes. *Translational Research*, 184, 101-107.

Maddux, J. E., & Rogers, R. W. (1983). Protection motivation and self-efficacy: A revised theory of fear appeals and attitude change. *Journal of Experimental Social Psychology*, 19(5), 469-479. [https://doi.org/10.1016/0022-1031\(83\)90023-9](https://doi.org/10.1016/0022-1031(83)90023-9)

Magkos, F., Hjorth, M. F., & Astrup, A. (2020). Diet and exercise in the prevention and treatment of type 2 diabetes mellitus. *Nature Reviews Endocrinology*, 16(10), 545-555.

Magliano, D. J., Boyko, E. J., & Atlas, I. D. (2021). Global picture. In *IDF DIABETES ATLAS [Internet]. Tenth Edition*. International Diabetes Federation.

Maina, W. K., Ndegwa, Z. M., Njenga, E. W., & Muchemi, E. W. (2010). Knowledge, attitude and practices related to diabetes among community members in four provinces in Kenya: a cross-sectional study. *Pan African Medical Journal*, 7(1). <https://doi.org/10.4314/pamj.v7i1.69095>

Majeed-Ariss, R., Jackson, C., Knapp, P., & Cheater, F. M. (2015). A systematic review of research into black and ethnic minority patients' views on self-management of type 2 diabetes. *Health Expectations*, 18(5), 625-642.

Marcus, B. H., Rakowski, W., & Rossi, J. S. (1992). Assessing motivational readiness and decision making for exercise. *Health Psychology*, 11(4), 257. <http://dx.doi.org/10.1037/0278-6133.11.4.257>

Marshall, S. J., & Biddle, S. J. (2001). The transtheoretical model of behaviour change: a meta-analysis of applications to physical activity and exercise. *Annals of Behavioural Medicine*, 23(4), 229-246. http://link.springer.com/article/10.1207/S15324796ABM2304_2

Martinez, L. C., Sherling, D., & Holley, A. (2019). The screening and prevention of diabetes mellitus. *Primary Care: Clinics in Office Practice*, 46(1), 41-52. <https://doi.org/10.1016/j.pop.2018.10.006>

Martínez-Santos, P. (2017). Does 91% of the world's population really have "sustainable access to safe drinking water"? *International Journal of Water Resources Development*, 33(4), 514-533.

- Masaba, B., & Mmusi-Phetoe, R. M. (2021). Determinants of non-adherence to treatment among patients with type 2 diabetes in Kenya: a systematic review. *Journal of Multidisciplinary Healthcare*, 2069-2076.
- Mason, L., Dellicour, S., Ter Kuile, F., Ouma, P., Phillips-Howard, P., Were, F., ... & Desai, M. (2015). Barriers and facilitators to antenatal and delivery care in western Kenya: a qualitative study. *BMC Pregnancy and Childbirth*, 15, 1-10.
- Mastrototaro, L., & Roden, M. (2021). Insulin resistance and insulin sensitizing agents. *Metabolism*, 125, 154892.
- Mauck, K. F., Cuddihy, M. T., Trousdale, R. T., Pond, G. R., Pankratz, V. S., & Melton lii, L. J. (2002). The decision to accept treatment for osteoporosis following hip fracture: exploring the woman's perspective using a stage-of-change model. *Osteoporosis International*, 13(7), 560-564. <https://doi.org/10.1007/s001980200073>
- McClintic, E. E., Ellis, A., Ogutu, E. A., Caruso, B. A., Ventura, S. G., Arriola, K. R. J., ... & Girard, A. W. (2022). Application of the capabilities, opportunities, motivations, and behavior (COM-B) change model to formative research for child nutrition in Western Kenya. *Current Developments in Nutrition*, 6(7), nzac104.
- McIntyre, H. D., Catalano, P., Zhang, C., Desoye, G., Mathiesen, E. R., & Damm, P. (2019). Gestational diabetes mellitus. *Nature Reviews Disease Primers*, 5(1), 1-19. <https://doi.org/10.1038/s41572-019-0098-8>
- McLeroy, K. R., Bibeau, D., Steckler, A., & Glanz, K. (1988). An ecological perspective on health promotion programs. *Health Education Quarterly*, 15(4), 351-377.
- McSherry, L. A., Dombrowski, S. U., Francis, J. J., Murphy, J., Martin, C. M., O'Leary, J. J., ... & ATHENS Group. (2012). 'It's a can of worms': understanding primary care practitioners' behaviours in relation to HPV using the theoretical domains framework. *Implementation Science*, 7, 1-16.
- Mertens, F., Saint-Charles, J., & Mergler, D. (2012). Social communication network analysis of the role of participatory research in the adoption of new fish consumption behaviours. *Social Science & Medicine*, 75(4), 643-650.
- Michie, S., Johnston, M., Abraham, C., Lawton, R., Parker, D., & Walker, A. (2005). Making psychological theory useful for implementing evidence based practice: a consensus approach. *BMJ Quality & Safety*, 14(1), 26-33.
- Michie, S., Pilling, S., Garety, P., Whitty, P., Eccles, M. P., Johnston, M., & Simmons, J. (2007). Difficulties implementing a mental health guideline: an exploratory investigation using psychological theory. *Implementation Science*, 2, 1-8.

- Michie, S., Johnston, M., Francis, J., Hardeman, W., & Eccles, M. (2008). From theory to intervention: mapping theoretically derived behavioural determinants to behaviour change techniques. *Applied Psychology, 57*(4), 660-680.
- Michie, S., Van Stralen, M. M., & West, R. (2011). The behaviour change wheel: a new method for characterising and designing behaviour change interventions. *Implementation Science, 6*, 1-12.
- Milne, S., Orbell, S., & Sheeran, P. (2002). Combining motivational and volitional interventions to promote exercise participation: Protection motivation theory and implementation intentions. *British Journal of Health Psychology, 7*(2), 163-184. <https://doi.org/10.1348/135910702169420>
- Milne, S., Sheeran, P., & Orbell, S. (2000). Prediction and intervention in health-related behaviour: A meta-analytic review of protection motivation theory. *Journal of Applied Social Psychology, 30*(1), 106-143. <https://doi.org/10.1111/j.1559-1816.2000.tb02308.x>
- Ministry of Health (2006). Taking the Kenya essential package for health to the community: a strategy for the delivery of level one services. In (pp. i-50): Health Sector Reform Secretariat of the Republic of Kenya Nairobi, Kenya.
- Ministry of Health (2018). *Kenya National Clinical Guidelines for the Management of Diabetes Mellitus, 2nd Edition*. Kenya Diabetes Management and Information Center.
- Moan, I. S., & Rise, J. (2011). Predicting intentions not to “drink and drive” using an extended version of the theory of planned behaviour. *Accident Analysis & Prevention, 43*(4), 1378-1384. <https://doi.org/10.1016/j.aap.2011.02.012>
- Mohamed, S. G., & Tayel, D. I. (2012). Dietary behaviour toward osteoporosis among women in a slum area influenced by nutritional knowledge and stages of precaution adoption model. *Journal of American Science, 8*(8), 222-227.
https://www.researchgate.net/publication/274081863_Dietary_Behavior_toward_Osteoporosis_among_Women_in_a_Slum_Area_Influenced_by_Nutritional_Knowledge_and_Stages_of_Precaution_Adoption_Model
- Mohr, P., Quinn, S., Morell, M., & Topping, D. (2010). Application of the precaution adoption process model to the promotion of consumption of an unfamiliar nutrient. *International Journal of Behavioural Medicine, 17*(Suppl 1), 1–329. <https://doi.org/10.1007/s12529-009-9062-4>
- Mokaya, M., Saruni, E., Kyallo, F., Vangoitsenhoven, R., & Matthys, C. (2022). Perceived facilitators and barriers to healthy dietary behaviour in adults with

type 2 diabetes mellitus in Kenya: a qualitative study. *Public Health Nutrition*, 25(12), 3335-3343.

- Morema, E. N., Atieli, H. E., Onyango, R. O., Omondi, J. H., & Ouma, C. (2014). Determinants of cervical screening services uptake among 18–49 year old women seeking services at the Jaramogi Oginga Odinga Teaching and Referral Hospital, Kisumu, Kenya. *BMC health services research*, 14, 1-7.
- Murea, M., Ma, L., & Freedman, B. I. (2012). Genetic and environmental factors associated with T2DM and diabetic vascular complications. *The Review of Diabetic Studies: RDS*, 9(1), 6. <https://doi.org/10.1900/RDS.2012.9.6>
- Mutua, K., Pertet, A. M., & Otieno, C. (2017). Cultural factors associated with the intent to be screened for prostate cancer among adult men in a rural Kenyan community. *BMC Public Health*, 17, 1-8.
- Muturi, N. (2020). Perceived risk of the harmful use of alcohol among young adults in the context of HIV&AIDS in Kenya. *Journal of Communication in Healthcare*, 13(2), 119-128.
- Muturi, N. (2022). The influence of information source on COVID-19 vaccine efficacy and motivation for self-protective behavior. *Journal of Health Communication*, 27(4), 241-249.
- Mwaliko, E., Van Hal, G., Bastiaens, H., Van Dongen, S., Gichangi, P., Otsyula, B., ... & Temmerman, M. (2021). Early detection of cervical cancer in western Kenya: determinants of healthcare providers performing a gynaecological examination for abnormal vaginal discharge or bleeding. *BMC Family Practice*, 22, 1-11.
- Naanyu, V., Vedanthan, R., Kamano, J. H., Rotich, J. K., Lagat, K. K., Kiptoo, P., ... & Inui, T. S. (2016). Barriers influencing linkage to hypertension care in Kenya: qualitative analysis from the LARK hypertension study. *Journal of General Internal Medicine*, 31, 304-314.
- Naanyu, V., Mujumdar, V., Ahearn, C., McConnell, M., & Cohen, J. (2020). Why do women deliver where they had not planned to go? A qualitative study from peri-urban Nairobi Kenya. *BMC Pregnancy and Childbirth*, 20, 1-9.
- Newman, J. D., Schwartzbard, A. Z., Weintraub, H. S., Goldberg, I. J., & Berger, J. S. (2017). Primary prevention of cardiovascular disease in diabetes mellitus. *Journal of the American College of Cardiology*, 70(7), 883-893.
- Nganda, J. M., Komen, L. J., & Mbogoh, B. (2020). Perception of HIV/AIDS infection and its effect on condom use among the youth of Kenya's Kibera Slum. *Journal of Development and Communication Studies*, 7(1-2), 34-45.

- Ngugi, C. W., Boga, H., Muigai, A. W., Wanzala, P., & Mbithi, J. N. (2012). Factors affecting uptake of cervical cancer early detection measures among women in Thika, Kenya. *Health care for Women International*, 33(7), 595-613.
- Nigbur, D., Lyons, E., & Uzzell, D. (2010). Attitudes, norms, identity and environmental behaviour: Using an expanded theory of planned behaviour to predict participation in a kerbside recycling programme. *British Journal of Social Psychology*, 49(2), 259-284. <https://doi.org/10.1348/014466609X449395>
- Nigg, C. R., & Courneya, K. S. (1998). Transtheoretical model: examining adolescent exercise behaviour. *Journal of Adolescent Health*, 22(3), 214-224. [http://dx.doi.org/10.1016/S1054-139X\(97\)00141-9](http://dx.doi.org/10.1016/S1054-139X(97)00141-9)
- Nor, N. M., Shukri, N. M., Yassin, N. Q. A. M., Sidek, S., & Azahari, N. (2019). Barriers and enablers to make lifestyle changes among type 2 diabetes patients: a review. *Sains Malaysiana*, 48(7), 1491-1502.
- Norman, P., Boer, H., & Seydel, E. R. (2005). Protection motivation theory. *Predicting Health Behaviour*, 81, 126. <https://research.utwente.nl/en/publications/protection-motivation-theory-2>
- Nyaoke, B. A., Mutua, G. N., Sajabi, R., Nyasani, D., Mureithi, M. W., & Anzala, O. A. (2017). Volunteer motivators for participating in HIV vaccine clinical trials in Nairobi, Kenya. *PloS one*, 12(9), e0183788.
- Nyawade, S. A., Middlestadt, S. E., & Peng, C. Y. J. (2016). Beliefs about supporting mothers to exclusively breastfeed for 6 months: an elicitation study of health professionals working in maternal-child health clinics in Nairobi, Kenya. *Journal of Human Lactation*, 32(3), 551-558.
- Odeny, T. A., Newman, M., Bukusi, E. A., McClelland, R. S., Cohen, C. R., & Camlin, C. S. (2014). Developing content for a mHealth intervention to promote postpartum retention in prevention of mother-to-child HIV transmission programs and early infant diagnosis of HIV: a qualitative study. *PloS one*, 9(9), e106383.
- Ogden, J. (2003). Some problems with social cognition models: A pragmatic and conceptual analysis. *Health Psychology*, 22(4), 424. <https://doi.org/10.1037/0278-6133.22.4.424>
- Ogurtsova, K., Guariguata, L., Barengo, N. C., Ruiz, P. L. D., Sacre, J. W., Karuranga, S., Sun, H., Boyko, E. J., & Magliano, D. J. (2022). IDF diabetes Atlas: Global estimates of undiagnosed diabetes in adults for 2021. *Diabetes Research and Clinical Practice*, 183, 109118.

- Oketch, S. Y., Kwena, Z., Choi, Y., Adewumi, K., Moghadassi, M., Bukusi, E. A., & Huchko, M. J. (2019). Perspectives of women participating in a cervical cancer screening campaign with community-based HPV self-sampling in rural western Kenya: a qualitative study. *BMC Women's Health*, *19*, 1-10.
- Oluoch, P., Orwa, J., Lugalia, F., Mutinda, D., Gichangi, A., Oundo, J., Karama, M., Nganga, Z., & Galbraith, J. (2017). Application of psychosocial models to home-based testing and counseling (HBTC) for increased uptake and household coverage in a large informal urban settlement in Kenya. *The Pan African Medical Journal*, *27*.
- Omollo, J. V. (2016). Factors and challenges influencing mothers choice of birth attendance in Bunyala sub-county, Kenya. *International Journal of Scientific & Technology Research*, *5(7)*, 101-105.
- Opiyo, R. O., Nyasulu, P. S., Olenja, J., Zunza, M., Nguyen, K. A., Bukania, Z., Nabakwe, E., Mbogo, A., & Were, A. O. (2019). Factors associated with adherence to dietary prescription among adult patients with chronic kidney disease on hemodialysis in national referral hospitals in Kenya: a mixed-methods survey. *Renal Replacement Therapy*, *5(1)*, 1-14.
- Orban, J.-C., Van Obberghen, E., & Ichai, C. (2018). Acute Complications of Diabetes. In *Metabolic Disorders and Critically Ill Patients* (pp. 341-363): Springer. https://doi.org/10.1007/978-3-319-64010-5_15
- Orbell, S., & Sheeran, P. (1998). 'Inclined abstainers': A problem for predicting health-related behaviour. *British Journal of Social Psychology*, *37(2)*, 151-165. <https://doi.org/10.1111/j.2044-8309.1998.tb01162.x>
- Orem, D. E. (1985). A concept of self-care for the rehabilitation client. *Rehabilitation Nursing Journal*, *10(3)*, 33-36.
- Osur, J. O., Chengo, R., Muinga, E., Kemboi, J., Sidibe, M., & Rarieya, M. (2022). Determinants of COVID-19 vaccine behaviour intentions among the youth in Kenya: a cross-sectional study. *Archives of Public Health*, *80(1)*, 159.
- Othman, N., Wong, Y. Y., Lean, Q. Y., Noor, N. M., & Neoh, C. F. (2020). Factors affecting self-management among adolescents and youths with type 2 diabetes mellitus: a meta-synthesis. *European Journal of Integrative Medicine*, *40*, 101228.
- Oti, S. O., van de Vijver, S. J., Agyemang, C., & Kyobutungi, C. (2013). The magnitude of diabetes and its association with obesity in the slums of Nairobi, Kenya: results from a cross-sectional survey. *Tropical Medicine & International Health*, *18(12)*, 1520-1530. <https://doi.org/10.1111/tmi.12200>

- Otteng, O., Wenje, P., Kiptoo, M., Anyonje, L., & Mwangi, M. (2020). Using the Health Belief Model to identify communication needs in the male circumcision campaigns to prevent HIV/AIDS in Siaya County of Kenya. *Advances in Social Sciences Research Journal*, 7(6).
- Ouellette, J. A., & Wood, W. (1998). Habit and intention in everyday life: The multiple processes by which past behaviour predicts future behaviour. *Psychological Bulletin*, 124(1), 54. <https://doi.org/10.1037/0033-2909.124.1.54>
- Oyando, R., Njoroge, M., Nguhiu, P., Sigilai, A., Kirui, F., Mbui, J., Bukania, Z., Obala, A., Munge, K., Etyang, A., & Barasa, E. (2020). Patient costs of diabetes mellitus care in public health care facilities in Kenya. *The International Journal of Health Planning and Management*, 35(1), 290-308. <https://doi.org/10.1002/hpm.2905>
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., ... & Moher, D. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*, 372.
- Pakpour, A. H., & Sniehotta, F. F. (2012). Perceived behavioural control and coping planning predict dental brushing behaviour among Iranian adolescents. *Journal of Clinical Periodontology*, 39(2), 132-137. <https://doi.org/10.1111/j.1600-051X.2011.01826.x>
- Pakpour, A. H., Hidarnia, A., Hajizadeh, E., & Plotnikoff, R. C. (2012). Action and coping planning with regard to dental brushing among Iranian adolescents. *Psychology, Health & Medicine*, 17(2), 176-187. <https://doi.org/10.1080/13548506.2011.596551>
- Pakpour, A. H., Zeidi, I. M., Chatzisarantis, N., Molsted, S., Harrison, A. P., & Plotnikoff, R. C. (2011). Effects of action planning and coping planning within the theory of planned behaviour: A physical activity study of patients undergoing haemodialysis. *Psychology of Sport and Exercise*, 12(6), 609-614. <https://doi.org/10.1016/j.psychsport.2011.06.008>
- Pakpour, A. H., Zeidi, I. M., Emamjomeh, M. M., Asefzadeh, S., & Pearson, H. (2014). Household waste behaviours among a community sample in Iran: An application of the theory of planned behaviour. *Waste Management*, 34(6), 980-986. <https://doi.org/10.1016/j.wasman.2013.10.028>
- Palinkas, L. A., Atkins, C. J., Miller, C., & Ferreira, D. (1996). Social skills training for drug prevention in high-risk female adolescents. *Preventive Medicine*, 25(6), 692-701.

- Park, H. S. (2000). Relationships among attitudes and subjective norms: Testing the theory of reasoned action across cultures. *Communication Studies*, 51(2), 162-175. <https://doi.org/10.1080/10510970009388516>
- Park, H. S., Levine, T. R., & Sharkey, W. F. (1998). The theory of reasoned action and self-construals: Understanding recycling in Hawai'i. *Communication Studies*, 49(3), 196-208. <https://doi.org/10.1080/10510979809368531>
- Parker, D., Manstead, A. S., Stradling, S. G., & Reason, J. T. (1992). Determinants of intention to commit driving violations. *Accident Analysis & Prevention*, 24(2), 117-131. [https://doi.org/10.1016/0001-4575\(92\)90028-H](https://doi.org/10.1016/0001-4575(92)90028-H)
- Patel, N., Ferrer, H. B., Tyrer, F., Wray, P., Farooqi, A., Davies, M. J., & Khunti, K. (2017). Barriers and facilitators to healthy lifestyle changes in minority ethnic populations in the UK: a narrative review. *Journal of Racial and Ethnic Health Disparities*, 4(6), 1107-1119.
- Patey, A. M., Islam, R., Francis, J. J., Bryson, G. L., Grimshaw, J. M., & Canada PRIME Plus Team. (2012). Anesthesiologists' and surgeons' perceptions about routine pre-operative testing in low-risk patients: application of the Theoretical Domains Framework (TDF) to identify factors that influence physicians' decisions to order pre-operative tests. *Implementation Science*, 7, 1-13.
- Paulson, Q. X., Hong, J., Holcomb, V. B., & Nunez, N. P. (2010). Effects of body weight and alcohol consumption on insulin sensitivity. *Nutrition Journal*, 9(1), 1-14. <https://doi.org/10.1186/1475-2891-9-14>
- Pelling, E. L., & White, K. M. (2009). The theory of planned behaviour applied to young people's use of social networking web sites. *CyberPsychology & Behaviour*, 12(6), 755-759. <https://doi.org/10.1089/cpb.2009.0109>
- Pentz, M. A., Dwyer, J. H., MacKinnon, D. P., Flay, B. R., Hansen, W. B., Wang, E. Y. I., & Johnson, C. A. (1989). A multicomponent trial for primary prevention of adolescent drug abuse: Effects on drug use prevalence. *JAMA*, 261(22), 3259-3266.
- Pereira, M. A., Mullane, S. L., Toledo, M. J. L., Larouche, M. L., Rydell, S. A., Vuong, B., ... & Buman, M. P. (2020). Efficacy of the 'Stand and Move at Work' multicomponent workplace intervention to reduce sedentary time and improve cardiometabolic risk: a group randomized clinical trial. *International Journal of Behavioral Nutrition and Physical Activity*, 17, 1-11.
- Perry, C. L., Williams, C. L., Veblen-Mortenson, S., Toomey, T. L., Komro, K. A., Anstine, P. S., McGovern, P.G., Finnegan, J. R., Forster, J. L., Wagenaar, A. C. & Wolfson, M. (1996). Project Northland: outcomes of a communitywide

alcohol use prevention program during early adolescence. *American Journal of Public Health, 86*(7), 956-965.

- Plotnikoff, R. C., & Higginbotham, N. (2002). Protection motivation theory and exercise behaviour change for the prevention of heart disease in a high-risk, Australian representative community sample of adults. *Psychology, Health & Medicine, 7*(1), 87-98. <https://doi.org/10.1080/13548500120101586>
- Prochaska, J. O., & DiClemente, C. C. (1983). Stages and processes of self-change of smoking: toward an integrative model of change. *Journal of Consulting and Clinical Psychology, 51*(3), 390. <https://doi.org/10.1037/0022-006X.51.3.390>
- Prochaska, J. O., DiClemente, C. C., & Norcross, J. C. (1992). In search of how people change: applications to addictive behaviours. *American Psychologist, 47*(9), 1102. <http://dx.doi.org/10.1037/0003-066X.47.9.1102>
- Rai, A., Misra, R., Khan, H., Shukla, S., Patel, D. C., & Brown, A. (2023). Systematic review of the barriers and facilitators to dietary modification in people living with type 2 diabetes and pre-diabetes from South Asian ethnic populations. *Diabetic Medicine, 40*(8), e15132.
- Rajani, N. B., Weth, D., Mastellos, N., & Filippidis, F. T. (2019). Use of gamification strategies and tactics in mobile applications for smoking cessation: a review of the UK mobile app market. *BMJ Open, 9*(6), e027883.
- Rakhshani, T., Najafi, S., Javady, F., Taghian dasht bozorg, A., Mohammadkhah, F., & Khani Jeihooni, A. (2022). The effect of Orem-based self-care education on improving self-care ability of patients undergoing chemotherapy: a randomized clinical trial. *BMC Cancer, 22*(1), 770.
- Randall, D. M., & Gibson, A. M. (1991). Ethical decision making in the medical profession: An application of the theory of planned behaviour. *Journal of Business Ethics, 10*(2), 111-122. <http://dx.doi.org/10.1007/BF00383614>
- Rehman, A. A., & Alharthi, K. (2016). An introduction to research paradigms. *International Journal of Educational Investigations, 3*(8), 51-59.
- Riang'a, R. M., Nangulu, A. K., & Broerse, J. E. (2017). "When a woman is pregnant, her grave is open": health beliefs concerning dietary practices among pregnant Kalenjin women in rural Uasin Gishu County, Kenya. *Journal of Health, Population and Nutrition, 36*, 1-12.
- Rippetoe, P. A., & Rogers, R. W. (1987). Effects of components of protection-motivation theory on adaptive and maladaptive coping with a health threat. *Journal of Personality and Social Psychology, 52*(3), 596. <https://doi.org/10.1037/0022-3514.52.3.596>

- Risérus, U., Willett, W. C., & Hu, F. B. (2009). Dietary fats and prevention of T2DM. *Progress in Lipid Research*, 48(1), 44-51. <https://doi.org/10.1016/j.plipres.2008.10.002>
- Rogers, R. W. (1975). A protection motivation theory of fear appeals and attitude change. *The Journal of Psychology*, 91(1), 93-114. <https://doi.org/10.1080/00223980.1975.9915803>
- Rogers, R. W. (1983). Cognitive and psychological processes in fear appeals and attitude change: A revised theory of protection motivation. *Social Psychophysiology: a sourcebook*, 153-176. [https://www.scirp.org/\(S\(351jmbntvnsjt1aadkposzje\)\)/reference/ReferenceSPapers.aspx?ReferenceID=1632333](https://www.scirp.org/(S(351jmbntvnsjt1aadkposzje))/reference/ReferenceSPapers.aspx?ReferenceID=1632333)
- Rosenstock, I. M. (1974). The health belief model and preventive health behaviour. *Health Education Monographs*, 2(4), 354-386. <https://doi.org/10.1177/109019817400200405>
- Ross, D. A. (2010). Behavioural interventions to reduce HIV risk: what works? *AIDS* 24(suppl 4), S4-S14. <https://doi.org/10.1097/01.aids.0000390703.35642.89>
- Rotheram-Borus, M. J., Swendeman, D., & Chovnick, G. (2009). The past, present, and future of HIV prevention: integrating behavioural, biomedical, and structural intervention strategies for the next generation of HIV prevention. *Annual Review of Clinical Psychology*, 5, 143-167. <https://doi.org/10.1146/annurev.clinpsy.032408.153530>
- Rubinelli, S., & Diviani, N. (2020). The bases of targeting behavior in health promotion and disease prevention. *Patient Education and Counseling*, 103(12), 2395-2399.
- Rushforth, B., McCrorie, C., Glidewell, L., Midgley, E., & Foy, R. (2016). Barriers to effective management of type 2 diabetes in primary care: qualitative systematic review. *British Journal of General Practice*, 66(643), e114-e127.
- Ryan, M. J., & Bonfield, E. H. (1975). The Fishbein extended model and consumer behaviour. *Journal of Consumer Research*, 2(2), 118-136. <https://doi.org/10.1086/208623>
- Sahin, C. (2020). *Effective message strategies for mobile text messaging interventions targeting type 2 diabetes self-management* (Doctoral dissertation).
- Salmeron, J., Hu, F. B., Manson, J. E., Stampfer, M. J., Colditz, G. A., Rimm, E. B., & Willett, W. C. (2001). Dietary fat intake and risk of T2DM in women. *The*

- American Journal of Clinical Nutrition*, 73(6), 1019-1026.
10.1093/ajcn/73.6.1019
- Sarafian, I. (2012). Process assessment of a peer education programme for HIV prevention among sex workers in Dhaka, Bangladesh: a social support framework. *Social Science & Medicine*, 75(4), 668-675.
<https://doi.org/10.1016/j.socscimed.2011.09.003>
- Schulze, M. B., Schulz, M., Heidemann, C., Schienkiewitz, A., Hoffmann, K., & Boeing, H. (2007). Fiber and magnesium intake and incidence of T2DM: a prospective study and meta-analysis. *Archives of Internal Medicine*, 167(9), 956-965. <https://doi.org/10.1001/archinte.167.9.956>
- Shafiei, A., & Maleksaeidi, H. (2020). Pro-environmental behavior of university students: Application of protection motivation theory. *Global Ecology and Conservation*, 22, e00908. <https://doi.org/10.1016/j.gecco.2020.e00908>
- Sharma, M. (2007). Precaution Adoption Process Model: need for experimentation in alcohol and drug education. *Journal of Alcohol and Drug Education*, 51(3), 3. <https://www.jstor.org/stable/45091773>
- Shepherd, G. J., & O'keefe, D. J. (1984). Separability of attitudinal and normative influences on behavioural intentions in the Fishbein-Ajzen model. *The Journal of Social Psychology*, 122(2), 287-288.
<https://doi.org/10.1080/00224545.1984.9713496>
- Shi, L., Shu, X.-O., Li, H., Cai, H., Liu, Q., Zheng, W., . . . Villegas, R. (2013). Physical activity, smoking, and alcohol consumption in association with incidence of T2DM among middle-aged and elderly Chinese men. *PloS One*, 8(11), e77919. <https://doi.org/10.1371/journal.pone.0077919>
- Shimp, T. A., & Kavas, A. (1984). The theory of reasoned action applied to coupon usage. *Journal of Consumer Research*, 11(3), 795-809.
<https://doi.org/10.1086/209015>
- Shiroya, V., Neuhann, F., Müller, O., & Deckert, A. (2019). Challenges in policy reforms for non-communicable diseases: the case of diabetes in Kenya. *Global Health Action*, 12(1), 1611243.
<https://doi.org/10.1080/16549716.2019.1611243>
- Short, S. E., & Mollborn, S. (2015). Social determinants and health behaviors: conceptual frames and empirical advances. *Current Opinion in Psychology*, 5, 78-84.
- Siddiqui, S. (2019). Research paradigms: Their assumptions and relevance. *International Journal of Research in Social Sciences*, 9(5), 254-265.

- Sigal, R. J., Armstrong, M. J., Bacon, S. L., Boule, N. G., Dasgupta, K., Kenny, G. P., & Riddell, M. C. (2018). Physical activity and diabetes. *Canadian Journal of Diabetes*, 42, S54-S63. <https://doi.org/10.1016/j.jcjd.2017.10.008>
- Smillie, K., Borek, N. V., Kop, M. L. V. D., Lukhwaro, A., Li, N., Karanja, S., Patel, A. R., Ojaka, D., & Lester, R. T. (2014). Mobile health for early retention in HIV care: a qualitative study in Kenya (WeTel Retain). *African Journal of Aids Research*, 13(4), 331-338.
- Sniehotta, F. F., Luszczynska, A., Scholz, U., & Lippke, S. (2005). Discontinuity patterns in stages of the precaution adoption process model: Meat consumption during a livestock epidemic. *British Journal of Health Psychology*, 10(2), 221-235. <https://doi.org/10.1348/135910705X26137>
- Snowden, A., Donnell, A., & Duffy, T. (2014). *Pioneering Theories in Nursing*. Andrews UK Limited.
- Sohal, T., Sohal, P., King-Shier, K. M., & Khan, N. A. (2015). Barriers and facilitators for type-2 diabetes management in South Asians: a systematic review. *PLoS One*, 10(9), e0136202.
- Sommer, L. (2011). The theory of planned behaviour and the impact of past behaviour. *International Business & Economics Research Journal*, 10(1). <https://doi.org/10.19030/iber.v10i1.930>
- Sparks, P., & Shepherd, R. (1992). Self-identity and the theory of planned behaviour: Assessing the role of identification with "green consumerism". *Social Psychology Quarterly*, 388-399. <https://www.jstor.org/stable/2786955>
- Stanley, M. A., & Maddux, J. E. (1986). Cognitive processes in health enhancement: Investigation of a combined protection motivation and self-efficacy model. *Basic and Applied Social Psychology*, 7(2), 101-113. https://doi.org/10.1207/s15324834basp0702_2
- Stranger-Hall, K., & Hall, D. (2011). Abstinence-only education and teen pregnancy rates: why we need comprehensive sex education in the US. *Plos One*, 6(10). E24658. <https://doi.org/10.1371/journal.pone.0024658>
- Sturges, J. W., & Rogers, R. W. (1996). Preventive health psychology from a developmental perspective: An extension of protection motivation theory. *Health Psychology*, 15(3), 158. <https://doi.org/10.1037/0278-6133.15.3.158>
- Suglo, J. N., & Evans, C. (2020). Factors influencing self-management in relation to type 2 diabetes in Africa: A qualitative systematic review. *PLoS One*, 15(10), e0240938.

- Sutton, J. (2001). *Technology and market structure: theory and history*: MIT Press. <https://mitpress.mit.edu/9780262692649/technology-and-market-structure/>
- Sutton, S. (2005). Stage theories of health behaviour. *Predicting Health Behaviour: Research and Practice with Social Cognition Models*, 2, 223-275. https://oldvch.iuims.ac.ir/files/hshesoh/files/predicting_Health_beh_avior.pdf#page=240
- Syrjälä, M. B., Bennet, L., Dempsey, P. C., Fharm, E., Hellgren, M., Jansson, S., ... & Wennberg, P. (2022). Health effects of reduced occupational sedentary behaviour in type 2 diabetes using a mobile health intervention: a study protocol for a 12-month randomized controlled trial—the ROSEBUD study. *Trials*, 23(1), 607.
- Tarricone, R., Petracca, F., Svae, L., Cucciniello, M., & Ciani, O. (2024). Which behaviour change techniques work best for diabetes self-management mobile apps? Results from a systematic review and meta-analysis of randomised controlled trials. *Ebiomedicine*, 103.
- Tavender, E. J., Bosch, M., Gruen, R. L., Green, S. E., Knott, J., Francis, J. J., ... & O'Connor, D. A. (2014). Understanding practice: the factors that influence management of mild traumatic brain injury in the emergency department—a qualitative study using the Theoretical Domains Framework. *Implementation Science*, 9, 1-10.
- Taylor, N., Lawton, R., Moore, S., Craig, J., Slater, B., Cracknell, A., ... & Mohammed, M. A. (2014). Collaborating with front-line healthcare professionals: the clinical and cost effectiveness of a theory based approach to the implementation of a national guideline. *BMC Health Services Research*, 14, 1-10.
- Terry, D. J., & O'Leary, J. E. (1995). The theory of planned behaviour: The effects of perceived behavioural control and self-efficacy. *British Journal of Social Psychology*, 34(2), 199-220. <https://doi.org/10.1111/j.2044-8309.1995.tb01058.x>
- Tobler, N. S. (1992). Drug prevention programs can work: Research findings. *Journal of Addictive Diseases*, 11(3), 1-28.
- Todd, J., & Mullan, B. (2011). Using the theory of planned behaviour and prototype willingness model to target binge drinking in female undergraduate university students. *Addictive Behaviors*, 36(10), 980-986.

- Tunmer Jr, J. F., Day, E., & Crask, M. R. (1989). Protection motivation theory: An extension of fear appeals theory in communication. *Journal of Business Research*, 19(4), 267-276. [https://doi.org/10.1016/0148-2963\(89\)90008-8](https://doi.org/10.1016/0148-2963(89)90008-8)
- United Nations Programme on HIV/AIDS. (2008). *Report on the global AIDS epidemic 2008*.
https://www.unaids.org/en/resources/documents/2008/20081107_jc1510_2008globalreport_en.pdf
- Usman, A. M., & Pamungkas, R. A. (2018). A social-ecological approach to determine barriers of DMSM practice for patients with type 2 diabetes mellitus: A literature review. *International Journal of Nursing and Health Services*, 1(1), 1-20.
- Vallerand, R. J., Deshaies, P., Cuerrier, J.-P., Pelletier, L. G., & Mongeau, C. (1992). Ajzen and Fishbein's theory of reasoned action as applied to moral behaviour: A confirmatory analysis. *Journal of Personality and Social Psychology*, 62(1), 98. <https://doi.org/10.1037/0022-3514.62.1.98>
- Van Gaal, L., & Scheen, A. (2015). Weight management in T2DM: current and emerging approaches to treatment. *Diabetes Care*, 38(6), 1161-1172. <https://doi.org/10.2337/dc14-1630>
- Van Rhon, L., Byrne, M., Morrissey, E., Murphy, J., & McSharry, J. (2020). A systematic review of the behaviour change techniques and digital features in technology-driven type 2 diabetes prevention interventions. *Digital Health*, 6, 2055207620914427.
- Vermandere, H., van Stam, M. A., Naanyu, V., Michielsen, K., Degomme, O., & Oort, F. (2016). Uptake of the human papillomavirus vaccine in Kenya: testing the health belief model through pathway modeling on cohort data. *Globalization and Health*, 12, 1-13.
- Vilafranca Cartagena, M., Tort-Nasarre, G., & Rubinat Arnaldo, E. (2021). Barriers and facilitators for physical activity in adults with type 2 diabetes mellitus: a scoping review. *International Journal of Environmental Research and Public Health*, 18(10), 5359.
- Vinokur-Kaplan, D. (1978). To have—or not to have—another child: family planning attitudes, intentions, and behaviour. *Journal of Applied Social Psychology*, 8(1), 29-46. <https://doi.org/10.1111/j.1559-1816.1978.tb00763.x>
- Vongmany, J., Lockett, T., Lam, L., & Phillips, J. L. (2018). Family behaviours that have an impact on the self-management activities of adults living with Type 2 diabetes: a systematic review and meta-synthesis. *Diabetic Medicine*, 35(2), 184-194.

- Waly, M. I., Essa, M. M., & Ali, A. (2010). The global burden of T2DM: a review. *International Journal of Biological and Medical Research*, 1(4), 326-329. https://www.academia.edu/23786929/The_global_burden_of_type_2_diabetes_a_review
- Wang, Z. Q., & Cefalu, W. T. (2010). Current concepts about chromium supplementation in T2DM and insulin resistance. *Current Diabetes Reports*, 10(2), 145-151. <https://doi.org/10.1007/s11892-010-0097-3>
- Weinstein, N. D. (1988). The precaution adoption process. *Health Psychology*, 7(4), 355. <https://doi.org/10.1037/0278-6133.7.4.355>
- Weinstein, N. D., Lyon, J. E., Sandman, P. M., & Cuite, C. L. (1998). Experimental evidence for stages of health behaviour change: the precaution adoption process model applied to home radon testing. *Health Psychology*, 17(5), 445. <https://doi.org/10.1037/0278-6133.17.5.445>
- Weinstein, N. D., & Sandman, P. M. (2002). The precaution adoption process model and its application. *Emerging Theories in Health Promotion Practice and Research*. Jossey-Bass, San Francisco, 16-39. https://www.researchgate.net/publication/261773340_The_Precaution_Adoption_Process_Model_and_its_Application
- Weinstein, N. D., Sandman, P. M., & Blalock, S. J. (2020). The precaution adoption process model. *The Wiley Encyclopedia of Health Psychology*, 495-506.
- Willi, C., Bodenmann, P., Ghali, W. A., Faris, P. D., & Cornuz, J. (2007). Active smoking and the risk of T2DM: a systematic review and meta-analysis. *JAMA*, 298(22), 2654-2664. <https://doi.org/10.1001/jama.298.22.2654>
- Wong, C. L., & Mullan, B. A. (2009). Predicting breakfast consumption: An application of the theory of planned behaviour and the investigation of past behaviour and executive function. *British Journal of Health Psychology*, 14(3), 489-504. <https://doi.org/10.1348/135910708X360719>
- Wood, S., Foster, J., & Kols, A. (2012). Understanding why women adopt and sustain home water treatment: insights from the Malawi antenatal care program. *Social Science & Medicine*, 75(4), 634-642.
- World Health Organization (2010) *Health systems financing: the path to universal coverage*. <https://www.who.int/publications/i/item/9789241564021>
- World Health Organization (2011). *The Brazzaville declaration on noncommunicable diseases prevention and control in the WHO African region*.

- <https://www.afro.who.int/publications/brazzaville-declaration-noncommunicable-diseases-prevention-and-control-who-african>
- World Health Organization (2013) *Global action plan for the prevention and control of NCDs 2013–2020*.
- World Health Organization (2018) *Millennium Development Goals*. [https://www.who.int/news-room/fact-sheets/detail/millennium-development-goals-\(mdgs\)](https://www.who.int/news-room/fact-sheets/detail/millennium-development-goals-(mdgs))
- Wurtele, S. K., & Maddux, J. E. (1987). Relative contributions of protection motivation theory components in predicting exercise intentions and behaviour. *Health Psychology, 6*(5), 453. <https://doi.org/10.1037/0278-6133.6.5.453>
- Yates, B. C., Pullen, C. H., Santo, J. B., Boeckner, L., Hageman, P. A., Dizona, P. J., & Walker, S. N. (2012). The influence of cognitive-perceptual variables on patterns of change over time in rural midlife and older women's healthy eating. *Social Science & Medicine, 75*(4), 659-667.
- Yazdanpanah, M., & Forouzani, M. (2015). Application of the Theory of Planned Behaviour to predict Iranian students' intention to purchase organic food. *Journal of Cleaner Production, 107*, 342-352. <https://doi.org/10.1016/j.jclepro.2015.02.071>
- Zhikun, D., & Fungfai, N. (2009). Knowledge sharing among architects in a project design team: An empirical test of theory of reasoned action in China. *Chinese Management Studies, 3*(2), 130-142. <https://doi.org/10.1108/17506140910963639>

APPENDICES

Appendix 1: Questionnaire

Study 1: Project title: To examine potential for behaviour change among Kenyan type 2 diabetes service users attending the Thika Level 5 Hospital diabetes clinic

Section A- Socio-demographic information

For each question, choose one answer that best describes you.

1. Gender

- Male
- Female

2. Education level

- Primary school
- High school
- College
- University

3. Number of children

- None
- One
- Two
- Three or more

4. Which of the following describes your family unit?

- Mother, father and children
- Father and children
- Mother and children
- Step-parent and children

- Grandparents and children
- Mother, father, children, grandparents, aunts, uncles, cousins

5. How far above or below Ksh. 190 does your household live on in a day?

- A lot above that
- A little above
- About the same
- A little below
- A lot below that
- Don't know

6. Place of residence

- Informal urban area
- Rural area
- Recognised urban area

Section B: Will test the Health belief model

Standard 26 Item ABCD risk questionnaire adapted to type two diabetes mellitus (Woringer et al. 2017) to test knowledge on type 2 diabetes and related complications and to assess the health belief model constructs perceived susceptibility, perceived severity/threat/ risk, perceived benefits, cues to action and self-efficacy. After anonymous receipt of the completed questionnaires and data entry into SPSS, analysis will begin with psychometric measurement using explanatory factor analysis and cronbach's alpha reliability analysis. Reliability will be assessed by interpreting the subscale correlations between all items. Items with less than $r = .30$ correlation among sub-scale items will be excluded.

Use the 4-point Likert scale (completely disagree, disagree, agree or totally agree) to answer the questions in section B. Select one answer that you most relate to.

Scale	Item	Coding
<p>Knowledge</p> <p>Higher sum score = more knowledgeable / more correct about having a heart attack or stroke</p>	<ol style="list-style-type: none"> 1. In type 2 diabetes, one of the main causes of heart attack and stroke is stress 2. In type 2 diabetes, walking and gardening are considered types of exercise that can lower the risk of having a heart attack and stroke. 3. In type 2 diabetes, moderately intense activity 2 ½ hours a week will reduce your chances of having a heart attack or stroke. 4. People who have type 2 diabetes are at higher risk of having a heart attack or stroke. 5. In type 2 diabetes, managing your stress levels will help you manage your blood pressure. 6. Drinking high levels of alcohol can increase your cholesterol and triglyceride levels. 7. HDL refers to ‘good’ cholesterol and LDL refers to ‘bad’ cholesterol. 8. A family history of heart disease is not a risk factor for type 2 diabetes related high blood pressure 	<p>Correct answers:</p> <p>Q1-T Q2-T Q3-T Q4-T Q5-T Q6-T Q7-T Q8-F</p> <p>T= True F= False Correct: Score = 1 Incorrect or Don’t Know: Score = 0</p>
<p>Perceived Risk of Heart Attack/Stroke</p> <p>Higher sum score = higher</p>	<p>Due to my type 2 diabetes, I feel I will suffer from a heart attack or stroke in the near future</p> <p>Due to my type 2 diabetes, it is likely that I will suffer a heart attack or stroke sometime during</p>	<p>1=Strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree; N/A = 0</p> <p>1=Strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree; N/A = 0</p>

perception of risk of having a heart attack or stroke	my life	
	Due to my type 2 diabetes, it is likely that i will have a heart attack or stroke sometime during my life	1=Strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree; N/A = 0
	Due to my type 2 diabetes, there is a good chance I will experience a heart attack or stroke in the next ten years	1=Strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree; N/A = 0
	Due to my type 2 diabetes, I am not worried that I might have a heart attack or stroke	1=Strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree; N/A = 0
	Due to my type 2 diabetes, my chances of suffering from a heart attack or stroke in the next ten years are great	1=Strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree; N/A = 0
	Due to my type 2 diabetes, it is likely I will have a heart attack or stroke because of my past and/or present behaviours	Reverse coded 4=Strongly disagree; 3 = disagree; 2 = agree; 1 = strongly agree; N/A = 0
	Due to my type 2 diabetes, I am concerned about the likelihood of having a heart attack or stroke in the near future	1=Strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree; N/A = 0
Perceived benefits and intentions to change Higher average score = Higher	Due to my type 2 diabetes, I am thinking about exercising at least 2 ½ hours a week	1=Strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree; N/A = 0
	Due to my type 2 diabetes, I intend to or want to exercise at least 2 ½ hours a week	1=Strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree; N/A = 0
	When I exercise for at least 2 ½	1=Strongly disagree; 2 =

perceived benefits of diet and exercise and higher perceived readiness for change in regards to exercise behaviour	hours a week I am doing something good for the health of my heart and for management of my type 2 diabetes in general	disagree; 3 = agree; 4 = strongly agree; N/A = 0
	I am confident that I can maintain a healthy weight by exercising at least 2 ½ hours a week within the next 2 months	1=Strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree; N/A = 0
	Even though I am type 2 diabetic, I am not thinking about exercising for 2 ½ hours a week	Reverse coded 4=Strongly disagree; 3 = disagree; 2 = agree; 1 = strongly agree; N/A = 0
	When I eat at least 5 portions of fruits and vegetables a day I am doing something good for the health of my heart and for the management of my type 2 diabetes	1=Strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree; N/A = 0
	As I am type two diabetic, increasing my exercise to at least 2 ½ hours a week will decrease my chances of having a heart attack or stroke	1=Strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree; N/A = 0
Healthy eating intentions	I am confident that I can eat at least 5 portions of fruits and vegetables a day	1=Strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree; N/A = 0
Higher average score = Higher perceived readiness for change with regard to health	Since I am type 2 diabetic, I am thinking about eating at least 5 portions of fruits and vegetables a day	1=Strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree; N/A = 0
	Even though I am type 2 diabetic,	Reverse coded 4=Strongly

dietary behaviour	I am not thinking about eating at least 5 portions of fruits and vegetables a day	disagree; 3 = disagree; 2 = agree; 1 = strongly agree; N/A = 0
-------------------	---	--

Appendix 2: Interview Guide

Study 2- Project title: To explore type 2 diabetes mellitus (T2DM) service users' behaviour change from Kenyan healthcare professionals' perspectives.

	Indicative interview questions
1) Background	<ul style="list-style-type: none">• What is your understanding of behaviour change in the context of type 2 diabetes mellitus (T2DM)?
2) Strategic relevance	<ul style="list-style-type: none">• What level of priority of action do you attach to deal with behaviour change in T2DM?
3) Challenges	<ul style="list-style-type: none">• What are in your opinion the main challenges with behaviour change among T2DM service users?• Can you list the different factors hindering behaviour change among T2DM service users?
4) Solutions	<ul style="list-style-type: none">• What are in your opinion the primary targets to prevent T2DM in Kenya?• What are in your opinion the primary targets to promote behaviour change among T2DM service users in Kenya?• What actions are you engaged in regarding T2DM management in Thika level 5 Hospital and Kenya in general?• What other actions could you contribute to for a combined multisectoral collaboration to encourage and support behaviour change among T2DM service users?• What specific actions by other

	sectors/departments/organizations/associations and people that encourage and support behaviour change among T2DM service users would you like to see?
5) Barriers	<ul style="list-style-type: none"> • What are in your opinion the potential barriers to effective action regarding behaviour change in T2DM by your sector/department/hospitals/countries guidelines and policies.

APPENDIX 3a: Informed Consent Form- Service Users



KENYATTA UNIVERSITY

OFFICE OF THE CHAIRMAN ETHICS REVIEW COMMITTEE

Informed Consent

My name is Eva Waithaka. I am a PhD student from the University of Chester-UK. I am conducting a study titled "Potential for behaviour change among Kenyan type 2 diabetes service users attending the Thika Level 5 Hospital diabetes clinic and behaviour change from Kenyan healthcare professionals' perspectives." The information will be used to predict behaviour change in Kenyan type 2 diabetes service users as per the health belief model and to add new knowledge on the same as this has not been studied much in Kenya.

Behaviour change is complex and has been identified as a challenge in various health issues including type 2 diabetes. The best outcome of T2DM management is going into remission and if not then proper management to avoid T2DM related complications. Given the life threatening T2DM related complications, the study guided by the health belief model aims to understand why people do not take up preventive services (Glanz & Bishop, 2010).

Increasing prevalence of type two diabetes in Kenya has been attributed to urbanization which negatively alters physical activity and diets. Although there have been studies looking into type 2 diabetes management and behaviour change, it has been noted that very few studies have focused on the application of the health belief model in predicting behaviour change among T2DM service users in Kenya. Therefore, part of the study aims to examine potential for behaviour change based

on the health belief model among Kenyan type 2 diabetes service users attending the Thika Level 5 Hospital diabetes clinic.

Procedures to be followed

Participation in this study will require that I ask you some questions. This will be by completing a survey questionnaire in person only once during this study. Completing the questionnaire will take about 20 minutes. I will record the information you provide in a questionnaire.

Voluntarism

You have the right to refuse participation in this study. You will get the same services and care whether you agree to join the study or not and your decision will not change the care you will receive. Please remember the participation in this study is voluntarily. You may ask questions related to the study at any time.

You may refuse to respond to any questions and you may stop an interview at any time. You may also stop being in the study at any time without any consequences to the services you receive here or any other organization now or in the future.

Discomforts and Risks

Some of the questions you will be asked are on intimate subject and may be embarrassing or make you uncomfortable. If this happens, you may refuse to answer these questions if you so choose. You may also stop the interview at any time. The interview may add approximately half an hour to the time you wait before you receive your routine services.

Benefits

If you participate in this study you will help us by contributing to new knowledge on prediction of behaviour change guided by the health belief model among T2DM service users in Kenya as this has not been studied much. . The findings may also contribute to behaviour change information and information materials.

Reward

There are no rewards or any payment to you if you participate.

Confidentiality

The interviews and examinations will be conducted in a private setting within the clinic. Your name will not be recorded on the questionnaire. The questionnaires will be kept in a locked cabinet for safe keeping at the University of Chester. Everything will be kept private and only shared with the study team.

Contact Information

If you have questions about the study call the investigator/researcher Eva Waitthaka on 0723072524 or Supervisor Prof Steve Fallows on +44(0) 1244 513407.

However, if you have questions about your rights as a study participant: You may contact Kenyatta University Ethical Review Committee Secretariat on chairman.kuerc@ku.ac.ke,

Participant’s statement

The above information regarding my participation in the study is clear to me. The study has been explained to me and I have been given a chance to ask questions and my questions have been answered to my satisfaction. My participation in this study is entirely voluntary. I understand that my records will be kept private and that I can leave the study at any time. I understand that I will still get the same care and medical treatment whether I decide to leave the study or not and my decision will not change the care that I will receive from the clinic today or that I will get from any other clinic at any other time.

Name of Participant: _____

Signature or Thumbprint

Date

Name of Representative/Witness (where necessary)
Subject

Relationship to

Investigators statement

I, the undersigned, have explained to the volunteer in a language s/he understands, the procedures to be followed in the study and the risks and benefits involved

Name of Interviewer

Signature

Date

APPENDIX 3b: Informed Consent Form- Healthcare professionals



KENYATTA UNIVERSITY

OFFICE OF THE CHAIRMAN ETHICS REVIEW COMMITTEE

Informed Consent

My name is Eva Waithaka. I am a PhD student from the University of Chester-UK. I am conducting a study titled "Potential for behaviour change among Kenyan type 2 diabetes service users attending the Thika Level 5 Hospital diabetes clinic and behaviour change from Kenyan healthcare professionals' perspectives."

The information will be used to understand behaviour change from Kenyan healthcare professionals' perspectives. Although there have been studies looking into type 2 diabetes management and behaviour change, it has been noted that very few studies have focused on the perspective of Kenyan healthcare professionals.

Behaviour change is complex and has been identified as a challenge in various health issues including type 2 diabetes. Failure to change behaviour (diet and physical activity) in type 2 diabetes predisposes one to the development of related complications including peripheral neuropathy, kidney disease, blindness, heart disease and even death. Increasing prevalence of type two diabetes in Kenya has been attributed to urbanization which leads to reduced physical activity and adoption of western diets high in fats and simple sugars. Although there have been studies looking into type 2 diabetes management and behaviour change, it has been noted that very few studies have focused on the perspective of Kenyan healthcare professionals. Therefore, the aim of this study is to understand behaviour change from Kenyan healthcare professionals' perspectives.

Procedures to be followed

Participation in this study will require that I ask you some questions. This will be by Individual interviews will be organised once during this study. Depending on the amount of information you are willing to provide, It is estimated that the interview session will take about 30-45 minutes. An interview guide will be used to guide the discussion and questions asked, however, a majority of the questions asked will be dependent on the information you provide. I will record the information you provide on a recorder

Voluntarism

You have the right to refuse participation in this study. You will get the same services and care whether you agree to join the study or not and your decision will not change the care you will receive. Please remember the participation in this study is voluntarily. You may ask questions related to the study at any time.

You may refuse to respond to any questions and you may stop an interview at any time. You may also stop being in the study at any time without any consequences to the services you receive here or any other organization now or in the future.

Discomforts and Risks

Some of the questions you will be asked are on intimate subject and may be embarrassing or make you uncomfortable. If this happens, you may refuse to answer these questions if you so choose. You may also stop the interview at any time. The interview may add approximately half an hour to the time you wait before you receive your routine services.

Benefits

If you participate in this study you will help us by allowing the voice of healthcare professionals particularly in behaviour change among type 2 diabetes service users to be heard in the research community. The study is envisaged to add knowledge of how factors identified contribute to behaviour change among type 2 diabetes service users from the perspectives of Kenyan healthcare professionals. Findings

from this study will assist in understanding behaviour change among type 2 diabetes service users in Kenya. The findings may also contribute to behaviour change information and information materials.

Reward

There are no rewards or any payment to you if you participate.

Confidentiality

The interviews and examinations will be conducted in a private setting within the clinic. Your name will not be recorded. The interview recordings and transcripts will be kept in a locked cabinet for safe keeping at the University of Chester. Everything will be kept private and only shared with the study team.

Contact Information

If you have questions about the study call the investigator/researcher Eva Waithaka on 0723072524 or Supervisor Prof Steve Fallows on +44(0) 1244 513407.

However, if you have questions about your rights as a study participant: You may contact Kenyatta University Ethical Review Committee Secretariat on chairman.kuerc@ku.ac.ke,

Participant's statement

The above information regarding my participation in the study is clear to me. The study has been explained to me and I have been given a chance to ask questions and my questions have been answered to my satisfaction. My participation in this study is entirely voluntary. I understand that my records will be kept private and that I can leave the study at any time. I understand that I will still get the same care and medical treatment whether I decide to leave the study or not and my decision will not change the care that I will receive from the clinic today or that I will get from any other clinic at any other time.

Name of Participant: _____

Signature or Thumbprint

Date

Name of Representative/Witness (where necessary)
Subject

Relationship to

Investigators statement

I, the undersigned, have explained to the volunteer in a language s/he understands,
the procedures to be followed in the study and the risks and benefits involved

Name of Interviewer

Signature

Date

Appendix 4: Consent Form

Full title of project:

Potential for behaviour change among Kenyan type 2 diabetes service users attending the Thika Level 5 Hospital diabetes clinic and behaviour change from Kenyan healthcare professionals' perspectives

Name, position and contact details of researcher: Eva Waitthaka, PhD student, Email: 1601260@chester.ac.uk Tel: +44(0)7399989319

Name, position and contact details of supervisor:

Prof Steve Fallows, Department of Clinical Sciences & Nutrition, University of Chester.

Tel: +44(0)1244 513407 Email: s.fallows@chester.ac.uk

Tick

here

I have read and understood the participant information sheet for this research project	
I confirm that I have had an opportunity to ask questions	
I agree to take part in this research project.	

-----	-----	-----
Name of participant	Date	Signature
-----	-----	-----
Name of researcher	Date	Signature
This form should be signed and dated by both parties after the participant has read the information sheet. A copy of this form should be kept with the project's main documents which must be securely stored.		

Appendix 5: Risk assessment

General Risk Assessment Pro-forma

Assessment Undertaken By	Eva Waithaka			
Department / Location	Department of Clinical Sciences and Nutrition			
Signed			Date: 10.07.21	
Hazards identified	Risk of or from & who is at risk	Control measures already in place	Further Actions Required	Review Date
Covid-19	Researcher and study participants	Government regulations will be adhered to; <ul style="list-style-type: none"> • Appropriate PPE i.e. masks will be worn • Social distancing will be observed • Outdoor quiet area will be utilized for interviews. Where not possible, online interviews via skype, zoom, teams will be considered. 	N/A	10.07.21

Appendix 6: Workplan

15 th July 2021-20 th August 2021	Submission of ethics application to Kenyatta University graduate school for review. Obtaining research permits from NACOSTI and Kiambu County health offices.
23 rd August	Presenting the research approvals at Thika Level 5 County Hospital
25 th August- 25 th November	Data collection and transcription of interview recordings
26 th November-26 th January 2022	Data analysis and write up of thesis.

Appendix 7: Budget

Item	Cost
Printing of ethics application documents and shipment cost	Ksh. 6,500
Purchase of two recorders	Ksh. 6,500
Mobile data	Ksh. 5000
Ethics review cost for external PhD students	Ksh. 6,000
Total	Ksh. 24,000

Appendix 8: Participant Information Sheet (Service User)



Participant information sheet

The aim of this study is to examine potential for behaviour change among Kenyan type 2 diabetes service users attending the Thika Level 5 Hospital diabetes clinic.

My name is Eva Waithaka. I am a PhD student at the University of Chester, England carrying out research to examine potential for behaviour change among type 2 diabetes service users attending the Thika Level 5 Hospital diabetes clinic. This information sheet is also an invitation to participate in this research project. It will involve completion of a short survey questionnaire. Before you make a decision regarding participation in the study, it is important for you to understand why the research is being carried out and what it will involve as outlined in this sheet. You are free to ask for any clarification or further information that may not be provided on this information sheet.

What is the purpose of the study?

Behaviour change is complex and has been identified as a challenge in various health issues including type 2 diabetes. The best outcome of T2DM management is going into remission and if not then proper management to avoid T2DM related complications. Given the life threatening T2DM related complications, the study guided by the health belief model aims to understand why people do take up preventive services (Glanz & Bishop, 2010).

Increasing prevalence of type two diabetes in Kenya has been attributed to urbanization which negatively alters physical activity and diets. Although there have been studies looking into type 2 diabetes management and behaviour change, it has been noted that very few studies have focussed on the perspective of healthcare professionals. Therefore, the aim of this study is to examine potential for behaviour change based on the health belief model among Kenyan type 2 diabetes service users attending the Thika Level 5 Hospital diabetes clinic.

Why have I been chosen?

You have been invited to take part in this study as you have been identified either as a diabetes clinic service user at the diabetes clinic of Thika level 5 Hospital.

Do I have to take part?

Your decision to take part in or not in this study will be respected with no questions asked as participation is voluntary. You are free to withdraw from participation in the study at any time and will not have to explain your decision. Participation or not will not in any way affect the services you receive from the comprehensive diabetes clinic.

What will happen to me if I take part?

Participation will be by completing a survey questionnaire in person only once during this study. Completing the questionnaire will take about 20 minutes.

What are the possible disadvantages and risks of taking part?

There are no disadvantages or risks foreseen in taking part in this study. Minimal risk is anticipated in this study for both researcher and participants following the results of health and safety assessment. It is not expected that any of the questions will in any way make you feel uncomfortable, however, this cannot be completely ruled out depending on the information that you give. You are free to decline to respond to questions that may make you uncomfortable

What are the possible benefits of taking part?

The study is envisaged to predict behaviour change in Kenyan type 2 diabetes service users as per the health belief model and to add new knowledge on the same as this has not been studied much in Kenya. Findings from this study will assist in understanding behaviour change according to the health belief model among type 2 diabetes service users in Kenya. The findings may also contribute to behaviour change information and information materials.

What if something goes wrong?

If you have any complains or concerns about any aspect of this study, please contact:
Dean of the Faculty of Medicine and Life Sciences, University of Chester, Parkgate Road,
Chester, CH1 4BJ, +44 1244 510000

Will my taking part in the study be kept confidential?

The survey questionnaire for the service users will be completed at the diabetes clinic. Participants will be allowed some time to read the information sheet and decide whether or not to participate. All information obtained from this study will be kept confidential. Data files from the online questionnaire survey will also be stored by the university for ten years. No one beside the researcher will be allowed access to the original data files. Information disseminated from this study will not include any personal identifier information.

What will happen to the results of the research study?

Information from the questionnaire survey will be presented in the document submitted for my doctoral degree, at UoC postgraduate conferences and seminars and at academic conferences. Journal articles may also be published from this study's findings.

Who is organising the research?

The research is conducted as part of a PhD. Clinical Sciences and Nutrition within the Department of Clinical Sciences & Nutrition at the University of Chester. The study is organised, with supervision from the department, by Eva Waithaka, a PhD student.

Who may I contact for further information?

If you would like more information about the research before you decide whether or not you would be willing to take part, please contact me, Eva Waithaka, by email:

1601260@chester.ac.uk.

For further details or information about this research, please call:

Eva Waithaka, Department of Clinical Sciences & Nutrition, University of Chester.

Tel: +44(0)7399989319 Email: 1601260@chester.ac.uk

Thank you for your interest in this research.

Appendix 9: Participant Information Sheet (Healthcare Professionals)



Participant information sheet

The aim of this study is to understand behaviour change from Kenyan healthcare professionals' perspectives.

My name is Eva Waithaka. I am a PhD student at the University of Chester carrying out research to understand behaviour change from the perspectives of Kenyan healthcare professionals. This information sheet is also an invitation to participate in this research project. It will involve interviewing you to discuss behaviour change among Kenyan type two diabetes service users. Before you make a decision regarding participation in the study, it is important for you to understand why the research is being carried out and what it will involve as outlined in this sheet. You are free to ask for any clarification or further information that may not be provided on this information sheet.

What is the purpose of the study?

Behaviour change is complex and has been identified as a challenge in various health issues including type 2 diabetes. Failure to change behaviour (diet and physical activity) in type 2 diabetes predisposes one to the development of related complications including peripheral neuropathy, kidney disease, blindness, heart disease and even death. Increasing prevalence of type two diabetes in Kenya has been attributed to urbanization which leads to reduced physical activity and adoption of western diets high in fats and simple sugars. Although there have been studies looking into type 2 diabetes management and behaviour change, it has been noted that very few studies have focussed on the perspective of Kenyan healthcare professionals. Therefore, the aim of this study is to understand behaviour change from Kenyan healthcare professionals' perspectives.

Why have I been chosen?

You have been invited to take part in this study as you have been identified as a healthcare professional directly involved with the type two diabetes service users at the diabetes clinic of Thika level 5 Hospital.

Do I have to take part?

Your decision to take part in or not in this study will be respected with no questions asked as participation is voluntary. You are free to withdraw from participation in the study at any time and will not have to explain your decision. Participation or not will not in any way affect your professional work.

What will happen to me if I take part?

Individual interviews will be organised once during this study. Depending on the amount of information you are willing to provide, it is estimated that the interview session will take about 30-45 minutes. An interview guide will be used to guide the discussion and questions asked, however, a majority of the questions asked will be dependent on the information you provide.

What are the possible disadvantages and risks of taking part?

There are no disadvantages or risks foreseen in taking part in this study. Minimal risk is anticipated in this study for both researcher and participants following the results of health and safety assessment. It is not expected that any of the questions will in any way make you feel uncomfortable, however, this cannot be completely ruled out depending on the information that you give. You are free to decline to respond to questions that may make you uncomfortable.

What are the possible benefits of taking part?

The study will allow the voice of healthcare professionals particularly in behaviour change among type 2 diabetes service users to be heard in the research community. The study is envisaged to add knowledge of how factors identified contribute to behaviour change among type 2 diabetes service users from the perspectives of Kenyan healthcare professionals. Findings from this study will assist in understanding behaviour change among type 2 diabetes service users in Kenya. The findings may also contribute to behaviour change information and information materials.

What if something goes wrong?

If you have any complaints or concerns about any aspect of this study, please contact: Dean of the Faculty of Medicine and Life Sciences, University of Chester, Parkgate Road, Chester, CH1 4BJ, +44 1244 510000

Will my taking part in the study be kept confidential?

The individual interview sessions with the healthcare professionals will take place in private places such as meeting rooms so as to freely share information. Participants will be allowed some time to read the information sheet and decide whether or not to participate. All information obtained from this study will be kept confidential. Audio-recordings will be used to record the individual interview sessions which will be later converted into text for transcription and analysis. Permission to audio-record prior to commencing the interviews will be sought. Audio files will be stored in a University of Chester (UoC) secure computer network. Audio files will be converted into text for analysis and then be stored by the University for ten years and deleted thereafter as per UoC research ethics and code of practice. No one beside the researcher will be allowed access to the original recordings. Information disseminated from this study will not include any personal identifier information.

What will happen to the results of the research study?

Information from individual interviews will be presented in the document submitted for my doctoral degree, at UoC postgraduate conferences and seminars and at academic conferences. Journal articles may also be published from this study's findings.

Who is organising the research?

The research is conducted as part of a PhD. Clinical Sciences and Nutrition within the Department of Clinical Sciences & Nutrition at the University of Chester. The study is organised, with supervision from the department, by Eva Waithaka, a PhD student.

Who may I contact for further information?

If you would like more information about the research before you decide whether or not you would be willing to take part, please contact me, Eva Waithaka, by email:

1601260@chester.ac.uk.

For further details or information about this research, please call:

Eva Waithaka, Department of Clinical Sciences & Nutrition, University of Chester.

Tel: +44(0)7399989319 Email: 1601260@chester.ac.uk

Thank you for your interest in this research.

Appendix 10: Ethic Approval from Kenyatta University



**KENYATTA UNIVERSITY
CENTER FOR RESEARCH ETHICS AND SAFETY**

Fax: 8711242/8711575
Email: chairman.kuerc@ku.ac.ke
Nairobi, 00100

P. O. Box 43844,

Tel: 8710901/12

Website: www.ku.ac.ke
Our Ref: **KU/ERC/APPROVAL/VOL.1**

Date: 07/09/2021

Eva Njambi Waithaka

P.O BOX 43844-00100

Nairobi.

Dear Madam,

RE: POTENTIAL FOR BEHAVIOR AMONG KENYAN TYPE 2 DIABTES SERVICE USERS ATTENDING THE THIKA LEVEL 5 HOSPITAL DIABETES CLINIC AND BEHAVIOR CHANGE FROM KENYAN HEALTHCARE PROFESSIONALS' PERSPECTIVE

This is to inform you that **KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE** has reviewed and approved your above research proposal. Your application approval number is **PKU2300/E1439**. The approval period is **07/09/2021 to 07/09/2022**.

This approval is subject to compliance with the following requirements;

- i. Only approved documents including (informed consents, study instruments, MTA) will be used
- ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by **KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE**
- iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to **KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE** within 72 hours of notification
- iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to **KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE** within 72 hours
- v. Clearance for export of biological specimens must be obtained from relevant institutions.
- vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
- vii. Submission of an executive summary report within 90 days upon completion of the study to **KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE**

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) <https://research-portal.nacosti.go.ke> and also obtain other clearances needed.

To serve you better, researchers are kindly requested to access and complete a customer feedback form and sent it back online as you continue with research and upon completion of data collection found on the following website link; [;\(https://docs.google.com/forms/d/1ytWefDwvzyz5h1oz_VIn0xbxg3uGdIDzMXFWNDsMrRPO/edit?usp=sharing](https://docs.google.com/forms/d/1ytWefDwvzyz5h1oz_VIn0xbxg3uGdIDzMXFWNDsMrRPO/edit?usp=sharing)

Yours sincerely

Prof. Judith Kimiywe

Director: Center for Research Ethics and Safety



Appendix 12: Kiambu County Research Approval

COUNTY GOVERNMENT OF KIAMBU DEPARTMENT OF HEALTH SERVICES

All correspondence should be addressed to HEAD
HRDU – HEALTH DEPARTMENT
Email address: mnnditu@gmail.com
mkwasa@live.com
Tel. Nos: 0721641516
0721974633



HEALTH RESEARCH AND DEVELOPMENT
UNIT
P. O. BOX 2344 – 00900
KIAMBU

Ref. No.: KIAMBU/HRDU/21/09/28/RA_WAITHAKA

Date: 28th Sept 2021

TO WHOM IT MAY CONCERN

RE: CLEARANCE TO CONDUCT RESEARCH IN KIAMBU COUNTY

Kindly note that we have received a request by Ms. Eva Njambi Waithaka of University of Chester to carry out research in Kiambu County, the research topic being on "Potential for behaviour change among Kenyan type 2 diabetes service users and the perspectives of Kenyan healthcare professionals"

We have duly inspected her documents and found that she has been cleared by NACOSTI to carry out the research for a period ending **20th September 2022**. She thus does not need any further clearance with another regulatory body in order to conduct research within the county of Kiambu.

However, it is incumbent upon the institution where she is carrying out research to ensure that she receives adequate supervision during the process of conducting the research. This note also accords her the duty to provide a feedback on her research to the county at the conclusion of her research.




DR. MWANCHA KWASA
COUNTY CLINICAL RESEARCH OFFICER
KIAMBU COUNTY

Appendix 13: Thika Level 5 Hospital Research Approval

COUNTY GOVERNMENT OF KIAMBU
DEPARTMENT OF HEALTH SERVICES

Telephone: +254722106797
Email address: thikal5hospital@gmail.com

When replying please quote:
Ref; TL5H/TREC /VOL. 1/366



THE MEDICAL
SUPERINTENDENT,
P. O. BOX 227 - 01000,
THIKA

Date: 8th October, 2021

APPROVAL TO CARRY OUT RESEARCH

Principle Investigator: EVA NJAMBI WAITHAKA

RE: POTENTIAL FOR BEHAVIOR AMONG KENYAN TYPE 2 DIABETES SERVICE USERS ATTENDING THE THIKA LEVEL 5 HOSPITAL DIABETES CLINIC AND BEHAVIOR CHANGE FROM KENYA HEALTH CARE PROFESSIONALS' PERSPECTIVE

Following deliberations by Thika Level 5 Hospital's Training, Research and Ethics Committee (TREC), and subject to provision of all the necessary licenses and ethical approvals, your proposal to carry out the above referenced research, at this facility, has been approved.

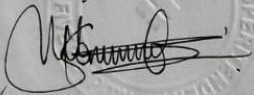
This approval is subject to the following mandatory conditions:

1. You shall submit a copy of the abstract of the final report, through the above contact details.
2. Where called upon, you shall be expected to make a feedback presentation to the hospital's Training, Research and Ethics Committee.
3. You shall maintain ethical consideration and the research subjects' confidentiality as outlined in your proposal.
4. Any patient confidential information that you may access during your research should not be used without consent.
5. You shall make payments of applicable research fees to the hospital before commencing research activities.

This letter is valid up to MARCH 2022.

For any queries fell free to contact the committee chair through the Medical Superintendent's office or Training, Research and Ethics Committee Office.

Thank you and all the best.


✓ **Dr. Christine Munyendo**
Chairperson, Training Research & Ethics Committee,
THIKA LEVEL 5 HOSPITAL

Appendix 14: Research Dissemination

Academic papers
Waithaka, E. (2023). Dietary Habits Fluctuations after Immigration: A Focus on University Students Immigrants in the United Kingdom. <i>International Journal of Scientific Research and Management (IJSRM)</i> , 11(06), 82-86.
Conference presentations
Waithaka, E. 2022. Potential for behaviour change among Kenyan type 2 diabetes service users and the perspectives of Kenyan healthcare professionals. PGR symposium 2022, University of Chester.
Waithaka, E. and Fallows, S. 2024. Potential for Behaviour Change among Kenyan Type 2 Diabetes Service Users: an Exploratory Factor Analysis of the Health Belief Model. (Awaiting publication)

Appendix 15: Summary of Review of Reviews

Author	Time period	No of articles included	Study population	Geographical area	Review aims	Key findings	Conclusion	AMSTAR-2 rating
Rai et al. (2023)	1946-2022	7	T2DM adult patients	South Asia	Summarisation of barriers and facilitators of dietary modification among South Asians with T2DM or pre-diabetes	Facilitators: cultural sensitivity, health education and support networks Barriers: inequity in healthcare, cultural insensitivity, social pressures, time constraints and misconceptions	Interventions that are culturally tailored could lead to improved modification of diet in T2DM patients with South Asian ethnicity	10/16
Lopes et al. (2021)	Past 30 years	Not indicated	T2DM patients	Portugal	Investigation of barriers for behaviour changes that affect therapeutic and non-therapeutic T2DM patients' optimization	Barriers include patients' perception on treatment effectiveness, hypoglycaemia incidence, treatment complexity and convenience, treatment costs, medication beliefs and trust in health professionals	Health system efficiency should improve to ensure follow up, receipt of appropriate pharmacological and clinical services and thereby improve quality of life and reduce complications.	7/16
Masaba and Mmusi-Phetoe (2021)	2013-2020	15	T2DM patients	Kenya	The study explored determinants that contributed to non-adherence to treatment among T2DM patients	Cost (income, insurance, drugs and food cost and distance), patient characteristics (knowledge, perception, comorbidity, family support and beliefs) and health system (health education, support and evaluations, multiple drugs, poor perception of health systems and guidelines) were identified as the barriers	Implementation of integrated care programs will be significant in reduction of non-adherence levels among T2DM patients	11/16
Reshma et al. (2021)	2000-2020	10	Disadvantaged diabetic population	Global	Investigation of possible factors that influence self-care behaviour among disadvantaged diabetic patients	Knowledge, lack of exercise, social support, lack of access to care services, disruptions in life, denial of illness, societal attitudes, costs, responsibilities	Studies exploring factors that influence self-care behaviours are needed in order to promote healthy behaviours	12/16

Author	Time period	No of articles included	Study population	Geographical area	Review aims	Key findings	Conclusion	AMSTAR-2 rating
Vilafranca Cartagena et al. (2021)	2009-2020	18	T2DM in adults	Global	Identification of factors influencing physical activity levels in adults with DM2	Factors identified included socio-demographic characteristics (age and gender), personal component (internal pressure, guilt and discomfort, enjoyment, self-esteem), motivation component, social component (friends and family influence), mental component (depression), clinical component (fatigue and pain in muscles and joints) and self-efficacy component (confidence in ability to engage in physical activity)	Most frequent factors included social and motivation components	9/16
Bekele et al. (2020)	2011-2019	14	T2DM patients	Africa	The study investigated barriers to lifestyle and dietary pattern interventions for T2DM prevention	Barriers included lack of knowledge or education, cost of diabetic care, poverty and population changes	Education, advocacy and capacity building should be enhanced to enhance barriers	9/16
Othman et al. (2020)	Up to 2019	9	Youth with T2DM	Global	Factors affecting self-management of T2DM among adolescents and youth	Factors that facilitate or hinder T2DM self-management include intrapersonal factors (coping skills, knowledge, co-morbidities and health status; interpersonal factors (relationships with friends, family and healthcare professionals); institutional factors (education on diabetes and living environment)	Understanding factors that influence self-management could be helpful in coming up with tailored interventions for each patient	7/16
Al-Sahouri et al. (2019)	2006-2019	32	Adults with T2DM	Jordan	Influence of knowledge, socio-cultural and perceptions factors on adherence to plans of T2DM management	Social, cultural and religious have an influence on management of diabetes	Healthcare providers should address issues related to poor glycaemic control and patients' adherence to diabetes management plan	8/16

Author	Time period	No of articles included	Study population	Geographical area	Review aims	Key findings	Conclusion	AMSTAR-2 rating
Gupta et al. (2019)	Inception-2018	66	T2DM patients	Global	The study investigated partner's and family's support in management of diabetes	Partner and family significantly influence overcoming negative behaviours and behaviours optimisation in diabetes control	Family and partner support enhances adherence to lifestyle interventions and drug therapy for optimum glycaemic control	10/16
Nor et al. (2019)	1990-2018	23	T2DM patients	Western, Arab and Asian countries	Identification of facilitators and barriers for lifestyle changes among T2DM patients	Barriers: lack of self-efficacy, established food habits, lack of social support, lack of motivation, knowledge deficit, low SES, food culture and improper time management Facilitators: high motivation, strong self-efficacy, good food habits and possession of required knowledge	T2DM patients encountered more barriers than facilitators to behaviour change	10/16
Saunders (2019)	2007-2018	10	Older adults with T2DM	Global	Barriers of self-management of T2DM in older adults	Barriers included: lack of knowledge and understanding, challenges in management implementation, culture and language and barriers related to healthcare providers	Older adults aged 65 years or more tend to have more T2DM as compared to younger people and face unique barriers in the process of self-management	9/16
Usman and Pamungkas (2018)		23	T2DM patients	Global	Barriers of self-management practices for T2DM patients	Individual barriers: attitudes and beliefs, knowledge, culture and ethnicity, self-efficacy, financial resources and economic status, lack of social support, lack of times Family factors: lack of skills and knowledge, quality of family ties Healthcare provider factors: beliefs, attitude, skills and knowledge, patient-family-provider relationships Organizational factors: insufficient insurance, health system	The barriers should be considered before interventions development in T2DM patients	7/16

Author	Time period	No of articles included	Study population	Geographical area	Review aims	Key findings	Conclusion	AMSTAR-2 rating
Vongmany et al. (2018)	2000-2016	40	Adults with T2DM	Global	Examining family behaviours with an impact on self-management behaviours in adults with T2DM	Facilitators: positive care, watchfulness, extrinsic motivators, independence from family Barriers: Obstructiveness and limited capacity for support Equivocal behaviours: regular reminders and nagging	Most family behaviours are perceived to be either facilitators or barriers; however, there are some that are neither facilitators nor barriers	10/16
Patel et al. (2017)	1997-2014	34	T2DM minority groups	UK	Identification of barriers and facilitators to healthy lifestyle changes in UK's minority ethnic groups	Barriers and facilitators included: knowledge and attitudes about risk of diabetes, current behaviours, attitudes and knowledge about diet and exercises, social norms and values and structural factors	Minority groups experience disproportionate burden on inequalities in health as compared to the majority white	11/16
Suglo and Evans (2017)	2000-2019	16	T2DM patients	Africa	Factors influencing T2DM self-management	Family support and acceptance of T2DM condition affected self-management	Effect management of T2DM is a challenge for most patients in Africa	8/16
Vanstone et al. (2017)	2002-2015	120	T2DM patients	High income countries	Investigation of diet modification barriers	Barriers include emotions, self-discipline, family and social support, food's social significance and knowledge.	Intervention strategies should address social and environmental factors that determine and sustain changes in diet	10/16
Alsairafi et al. (2016)	1990-2015	34	T2DM patients	Eastern Mediterranean Region	The study identified how cultural, social, health beliefs and knowledge factors affect medication and lifestyle measures' adherence	Lack of health knowledge related to diabetes, health beliefs and cultural factors such as religious beliefs, fasting beliefs and sedentary lifestyles affect medication and lifestyle adherence	Patients' knowledge, beliefs, cultural and lifestyle factors have a significant role on medication and lifestyles' adherence	10/16

Author	Time period	No of articles included	Study population	Geographical area	Review aims	Key findings	Conclusion	AMSTAR-2 rating
Rushforth et al. (2016)	1980-2014	32	Physicians and nurses	Global	An assessment of barriers to effective T2DM management in primary care	Barriers to enhance behaviour change included limited resources, frustration, lack of confidence in guidelines and skills' knowledge.	Many barriers towards improving care relate to strategies of behaviour change.	13/16
Majeed-Ariss et al. (2015)	1986-2014	57	T2DM patients	North America, Europe and Australia.	Barriers and facilitators influencing T2DM self-management	Barriers and facilitators included importance of identity (emotional responses, confidence and roles), being understood by others (family support, social stigma, perceptions of health professionals), making sense of condition (knowledge, attitudes, beliefs, spirituality and fatalism)	Recognition of views of T2DM patients is crucial in designing and delivery care and policies that are patient-centered	9/16
Sohal et al. (2015)	1990-2014	20	T2DM patients	South Asian	Perspectives of patients on barriers and facilitators to T2DM management	Barriers to diet changes: lack of information on diabetic diet tailored for South Asians, social responsibilities to adhere to traditional diet, misconceptions related to diabetic diet. Barriers to exercise: lack of gender-specific facilities for exercise, injury fears and worsening health with exercise Facilitators to exercise and diet changes: presence of culturally acceptable facilities and diet, social support	Diabetes management programmes for South Asians should focus on cultural issues and communication improvement to address existing misconceptions	10/16
Heiss and Petosa (2014)	1980-2013	18	Adults with T2DM	Canada	Identification of psychosocial, biological and environmental correlates of physical activity among adults with T2DM	Biological factors: age, BMI, gender and disease status Psychosocial factors: self-efficacy, perceived barriers and behavioural control Environmental factors: social support, facilities availability and weather	The correlates of physical activity should be incorporated in programs for health promotion	7/16

Strom and Egede (2012)	2000-2012	37	Adults with T2DM	USA	Social support impact on outcomes in adults with T2DM	Higher social support levels are linked to improved adaptation of lifestyle activities that are beneficial.	Researchers should take into consideration the effect of non-traditional neighbourhoods on behaviour change	9/16
------------------------	-----------	----	------------------	-----	---	---	---	------

Appendix 16: Summary Table for Systematic Literature Review

Author	Theory	Target behaviour	Study aim	Study design	Setting/participants' demography	Key findings	Conclusion	Quality score
McClintic et al. (2022)	Capabilities, Opportunities, Motivations and behaviour (COM-B) change model	Stunting in children under 2 years	To develop an integrated water, sanitation and hygiene (WASH) and nutrition strategy for social and behaviour change to reduce stunting in Western Kenya	Qualitative: Cross-sectional, rapid ethnographic design	<p>Sampling: Purposive sampling</p> <p>Sample size: 29 key informant, 24 FGDs</p> <p>Target population: community leaders, project staff and health workers</p> <p>Study setting: Western region, Kenya.</p>	COM-B was used to identify psychological and physical capabilities of caregivers towards maintaining diverse dietary needs, exclusive breastfeeding (EBF), infant and young child feeding. Feeding behaviours such as having a diverse diet, using a spoon to feed a child with thick porridge and EBF were also affected by physical opportunities. The study also identified automatic and reflective motivators that influenced the feeding practices of caregivers.	COM-B model is useful in predicting feeding practices of children under 2 years	7/10 CASP = 70%
Mokaya et al. (2022)	Theory of planned behaviour (TPB), HBM and social cognitive theory	Dietary behaviours in T2DM	The study explored facilitators and barriers to healthy dietary practices in adults with T2DM in Kenya.	Qualitative research design	<p>Sampling: Two-step sampling strategy</p> <p>Sample size: 30</p> <p>Population: Patients diagnosed with T2DM aged 30-85 years</p> <p>Study setting: Nakuru County, Kenya</p>	Internal facilitators included health food choices knowledge, self-efficacy, skills in food preparation, gardening and taking food at home. External facilitators comprised of inaccurate beliefs on dietary practices, inaccurate information, education by HCWs, family support, food availability and proximity to selling points for food. Internal barriers comprised of tastes and preferences, health conditions and randomly intake of unhealthy foods. External barriers included concerns of food safety, socio-economic factors and seasonal fruits' unavailability.	Interventions for enhancing health dietary behaviours should target self-efficacy, skills and knowledge	6/10 CASP = 60%

Author	Theory	Target behaviour	Study aim	Study design	Setting/participants ' demography	Key findings	Conclusion	Quality score
Muturi (2022)	PMT	Covid-19 vaccine efficacy and self-protective behaviour	An investigation of the influence of sources of health information on Covid-19 vaccine efficacy and self-protective behaviour motivators	Quantitative	Sample size: 715	Media sources were perceived as more useful sources of information as compared to interpersonal sources of information such as friends, family, health professionals and other influencers. Media sources had an influence on perceived severity, perception of risk, response efficacy, self-protection behaviour and vaccine efficacy. Interpersonal sources of information had no influence on vaccine efficacy but influenced self-protective behaviour and response efficacy	Media and digital sources of information should be used to enhance appraisal of threats and vaccine efficacy to promote self-protection behaviour in pandemics in the future.	9/14 CASP = 64%
Osuri et al. (2022)	HBM and TPB	Covid-19 vaccine uptake	The study examined determinants of Covid-19 vaccine behaviours and intentions to accept or hesitate uptake of Covid-19 vaccine	Quantitative design	Sample size: 665 youths Sampling: random sampling Population: 53289 youths Study setting: 47 counties in Kenya.	Determinants of behaviour intentions included perceived adverse effects of Covid-19 vaccine on health, inadequate information regarding the vaccine, conflicting information from social media regarding the vaccine, religious implications of the vaccine, education level impact on understanding of the vaccine, perceived risk of contracting Covid-19, efficacy of the vaccine. Causes of vaccine hesitancy included inadequate information and safety concerns. Other hesitancy contributors comprised of lack of trust in MoH and belief that mass vaccination does not help	Vaccine hesitancy among the youth is high but its causes can be modified.	11/14 CASP =79%

Author	Theory	Target behaviour	Study aim	Study design	Setting/participants ' demography	Key findings	Conclusion	Quality score
Katirayi et al. (2021)	HBM	HIV testing	The study evaluated decision by adolescents to undergo HIV testing using HBM	Qualitative study design	<p>Sampling: Purposive</p> <p>Sample size: 85 adolescents in Kenya.</p> <p>Population: Adolescents aged 15-19 years with unknown HIV status</p> <p>Study setting: Kisumu, Kenya; Lusaka, Zambia</p>	Perceived susceptibility, perceived severity, perceived threat of HIV, cues to action, self-efficacy, likelihood of action, perceived benefits versus barriers to change of behaviour affected decision by adolescents to undergo HIV testing	More information is required by adolescents on benefits of early testing and the capacity to live a life that is healthy and long on antiretroviral therapy. Adolescents should be educated on HIV testing so as to strengthen testing.	9/10 CASP = 90%
Kinuthia et al. (2021)	HBM and Social cognitive theory	PMTCT programs	To develop SMS messaging for improvement of retention and viral suppression in PMTCT programs in Kenya.	Mixed	<p>Sample size: 825</p> <p>Population: pregnant women LWH and aged 14 years and above</p> <p>Study setting: Nairobi, Siaya, Kisumu and Homa</p>	SMS messaging did not improve outcomes in PMTCT	In programmes where women are suppressed virally, targeted SMS can improve effectiveness	17/27 MMAT = 63%

					Bay counties.		
--	--	--	--	--	---------------	--	--

Author	Theory	Target behaviour	Study aim	Study design	Setting/participants ' demography	Key findings	Conclusion	Quality score
Mwaliko et al. (2021)	TPB	Cervical cancer detection	The study's aim was to predict behaviour of primary healthcare providers to examine women with abnormal discharge or bleeding	Cross-sectional survey	<p>Sampling: Random sampling</p> <p>Sample size: 107</p> <p>Population: All nurses and clinical officers working in private clinics, health centers, faith-based clinics and dispensaries in Bungoma East Sub-County</p> <p>Study setting: Bungoma East Sub-County, Western Kenya</p>	Predictors of intention to examine cervical cancer patients included being a nurse and workload of patients not exceeding 50 per day	TPB is suitable in prediction of the intention to conduct gynaecological examination	<p>9/14</p> <p>CASP = 64%</p>
Kigatiira (2020)	HBM	Preventive measures for Covid-19	An evaluation of efficacy of fear appeals on boda boda riders adoption of Covid-19 preventive measures	Case study research design	<p>Sampling: Convenience sampling</p> <p>Sample size: 17 boda boda riders</p> <p>Population: Boda boda riders in Nairobi County</p>	Susceptibility to Covid-19, arrests, mandatory quarantine, fines, impounding of motorcycles, threat to health and their lives compelled the riders to adopt preventive measures	For the boda boda riders to continuously practice preventive measures towards Covid-19, riders should be provided with masks	<p>5/10</p> <p>CASP = 50%</p>

					Study setting: Nairobi County		and sanitizers. There should also be development of communication campaigns on awareness and prevention of Covid-19 among the riders.	
Author	Theory	Target behaviour	Study aim	Study design	Setting/participants' demography	Key findings	Conclusion	Quality score
Muturi (2020)	PMT and social cognitive theory	Alcohol use in HIV & AIDs context among the youth	An examination of factors linked with perceived harmful use of alcohol in the context of HIV & AIDs among young adults	Quantitative study	Sample size: 500 Population: Youth Study setting: Three large Kenyan universities	The study found a correlation between alcohol risk perception and HIV & AIDs perceived risk.	Risk perception and self-efficacy for harmful alcohol use and communication in high-risk HIV & AIDs context should be enhanced	9/14 CASP = 64%

Author	Theory	Target behaviour	Study aim	Study design	Setting/participants ' demography	Key findings	Conclusion	Quality score
Naanyu et al. (2020)	HBM	Choice of delivery location	The study investigated reasons why women choose to deliver in a facility/location which they had not planned to	Qualitative design	<p>Sampling: Random sampling</p> <p>Sample size: 60 women</p> <p>Population: Mothers 2-6 months post-delivery</p> <p>Study setting: Nairobi County</p>	<p>Individual level factors: financial limitations, complications, pain onset, precipitate labour, birth plans changes, undisclosed plans in birth, travel during pregnancy, fear of providers, wrong delivery date estimates, misconception of labour onset, onset of labour at night.</p> <p>Supply side factors: sudden referrals, poor services, wrong delivery date projection, long distance to delivery facility chosen,</p>	During antenatal care, there should be deliberate counselling to encourage arrival at the preferred facilities on time	6/10 CASP = 60%
Nganda et al. (2020)	TPB	Condom use	Factors influencing decisions for condom use among the youth	Quantitative design	<p>Sampling: Stratified</p> <p>Sample size: 400</p> <p>Population: youth aged 15-24 years</p> <p>Study setting: Kibera Constituency, Kenya</p>	Perception of not being at risk and that condoms were of low quality impeded condom use.	Campaigns should link use of condoms to perceived risk of infection	7/14 CASP = 50%

Author	Theory	Target behaviour	Study aim	Study design	Setting/participants' demography	Key findings	Conclusion	Quality score
Otteng et al. (2020)	HBM	Male circumcision in HIV/AIDs prevention	The study utilised HBM to identify communication needs in campaigns towards male circumcision for HIV/AIDs prevention	Mixed-methods research design	Sampling: Purposive Sample size: 370 Population: Men aged 18-50 years Study setting: Siaya County, Kenya	Communication needs for male circumcision should target perceptions on severity and susceptibility for HIV/AIDs, perceived benefits and perceived barriers to male circumcision for HIV/AIDs prevention	Implementers of male circumcision programmes should incorporate HBM to develop strategies in communication.	20/27 MMAT = 80%
Oketch et al. (2019)	Theoretical domains framework (TDF) & COM-B	Cervical cancer screening	The study evaluated perspectives of women on human papillomavirus (HPV) self-sampling as a strategy in prevention of cervical cancer in Kenya's rural western.	Qualitative design	Sampling: Purposive Sample size: 10 women per community setting Population: Women Study setting: Migori County, Kenya	Using COM-B model the study established capacity for HPV screening among women as HPV self-sampling acceptability and awareness, confidence and clinicians availability. Opportunities were identified as encouragement from partners and peers, social stigma, proximity to sites for screening and fear of screening of the pelvic. Motivation for self-sampling was identified as privacy and comfort, cervical cancer risk perception, improved outcomes and fear of the disease and death. TDF enhanced identification of facilitators to HPV screening to include: HPV self-sampling acceptability and awareness, cervical cancer risk perception, HPV self-sampling completion confidence, encouragement from peers and partner, HPV self-sampling privacy and comfort, screening sites proximity, improved outcomes in health	COM-B model is suitable in predicting self-sampling for cervical cancer screening	9/10 CASP = 90%

Author	Theory	Target behaviour	Study aim	Study design	Setting/participants ' demography	Key findings	Conclusion	Quality score
Opiyo et al. (2019)	HBM	Adherence to diet among adults with chronic kidney diseases	The study evaluated factors affecting adherence to dietary prescription among adult patients with chronic kidney disease	Parallel mixed design	Sampling: Purposive Sample size: 331 Population: Adult patients attending dialysis Study setting: Kenyatta National Hospital and Moi Teaching and Referral Hospital	Adherence to diet was influenced by flexibility of the diet to fit with other eating ways, difficulties in following recommended diets and adherence to fluid intake	Prescriptions of diet with minimal restrictions and requiring extra efforts and resources that are minimal are more likely to be adhered to than restrictive prescriptions	17/27 MMAT = 63%
Gatumo et al. (2018)	HBM	Cervical cancer	The study evaluated knowledge and attitudes of women towards cervical cancer and its screening.	Cross-sectional survey (Quantitative)	Sampling: multi-stage cluster sampling Sample size: 460 females Population: females of 18 years and above Study setting: Isiolo and Tharaka Nithi Counties	Majority of the women who had knowledge of cervical cancer categorised it as "scary".	HBM can be utilised in assessing knowledge and attitudes related to a health condition	10/14 CASP = 71%

Author	Theory	Target behaviour	Study aim	Study design	Setting/participants' demography	Key findings	Conclusion	Quality score
Kisiangani et al. (2018)	HBM	Breast cancer	Determinants of early detection of breast cancer among women.	Qualitative research design	Sampling: Purposive Sample size: 72 women Population: Women aged 18-60 years Study setting: Kakamega County, Kenya	Early breast cancer screening was influenced by women perceiving the disease as fatal; accessing of equipped facilities for screening, possessing information on screening and perceived benefits and barriers to preventive action.	Breast cancer awareness should be created in addition to clear guidelines on screening and infrastructure for treatment access.	8/10 CASP = 80%
Fleming et al. (2017)	HBM	Antenatal care and delivery	The study assessed whether incentives led to reduced barriers to antenatal care and delivery services	Qualitative	Sampling: Purposive Sample size: 40 Population: Mothers and nurses Study setting: Homa Bay County, Kenya	According to the nurses, incentives encouraged women to seek antenatal care and delivery services. According to the mothers, desire for good outcomes in birth was the motivation behind seeking antenatal care and delivery. Overall, incentives increased use of antenatal care and delivery services.	Structural improvements such as improved infrastructure, staffing, improved nurses' treatment, transport provision and provision of services at low or no cost can lead to increased satisfaction and service	9/10 CASP = 90%

Author	Theory	Target behaviour	Study aim	Study design	Setting/participants' demography	Key findings	Conclusion	Quality score
Kangendo and Gitonga (2017)	HBM and theory of reasoned action	Adherence to ART	The purpose was to establish factors influencing ART adherence among the youth in Meru County	Descriptive research design	Sampling: Stratified Sample size: 167 Population: 12 doctors, 76 nurses and 206 PLWHA	Client factors greatly affected ART adherence followed by provider factors then medication factors; stigma and discrimination linked factors had least effect on ART adherence	TRA and HBM are useful in predicting ART adherence	12/14 CASP = 86%
Kioko and Pertet (2017)	HBM	Adherence to antiretroviral treatment	Factors contributing adherence to antiretroviral drug among adults living with HIV or AIDs in a rural community in Kenya.	Cross-sectional design	Sampling: Stratified Sample size: 1250 (417 males and 833 females) Population: People living with HIV/AIDs in Machakos County Study setting: Machakos County, Kenya.	Level of adherence was found to be high. Adherence was influenced by social support, marital status and side effects	Primary predictors of adherence were side effects' burden and being divorced.	9/14 CASP = 64%

Author	Theory	Target behaviour	Study aim	Study design	Setting/participants' demography	Key findings	Conclusion	Quality score
Mutua et al. (2017)	TPB	Prostate cancer screening	The study determined cultural factors affecting prostate cancer screening among Kenyan men.	Cross-sectional	Sampling: Random Sample size: 155 adult men of 25-98 years Population: men aged 25-98 years	Fatalistic beliefs, fear or apprehension of screening and high influence of family members were significant cultural factors	Fatalistic beliefs, fear and family influence decision making on screening of prostate cancer	8/14 CASP = 57%
Nyaoke et al. (2017)	HBM	HIV vaccine trials	The study evaluated motivators for volunteers to participate in clinical trials for HIV vaccine	Cross-sectional descriptive mixed study design	Sampling: Convenient sampling Sample size: 304 volunteers Population: participants in 4 clinical trials by KAVI-ICR for the years 2009-2015 Study setting: Nairobi County	Motivators to engage in HIV vaccine trials included personal benefits, health benefits, financial gains and social benefits	Social benefits are primary motivators while personal benefits are secondary motivators.	17/27 MMAT = 60%

Author	Theory	Target behaviour	Study aim	Study design	Setting/participants' demography	Key findings	Conclusion	Quality score
Oluoch et al. (2017)	HBM	Home-based HIV testing and counselling	The study applied HBM to assess uptake and coverage of home-based HIV testing and counselling services in a select informal settlement in urban Kenya.	Cross-sectional survey	Sample size: 71, 925 respondents Study setting: Kibera slums, Nairobi, Kenya	As a result of offering HTC services in accordance with HBM constructs, 99.7% of the participants took the HIV test.	Utilising community participation principles in addition to HBM led to high uptake, and coverage of HTC leading to increased HIV diagnosis	9/14 CASP = 64%
Riang'a et al. (2017)	Protection motivation theory (PMT)	Nutritional behaviour of pregnant women	The study investigated the influence of health beliefs on nutritional behaviour of pregnant women	Qualitative research design	Sampling: Purposive Sample size: 42 Population: Expectant women and mothers of children aged not more than one year Study setting: Uasin Gishu County, Kenya	Perceived health threats that influenced nutritional behaviour of pregnant women included abstracted labour, haemorrhage or other diseases and complications.	PMT can be used to explain nutritional practices of pregnant women as an adaptive response to perceived threats to health	9/10 CASP = 90%

Author	Theory	Target behaviour	Study aim	Study design	Setting/participants' demography	Key findings	Conclusion	Quality score
Naanyu et al. (2016)	HBM	Hypertension care	Barriers that influenced hypertension care linkage were assessed.	Qualitative research design	Sampling: Purposive Sample size: 242 Population: Hypertension patients, CHWs and the community Study setting: Uasin Gishu County, Kenya.	27 barriers to hypertension linkage were identified and categorised into individual and environmental barriers.	HBM can be used to identify individual and environmental barriers to seeking care.	9/10 CASP = 90%
Omollo (2016)	Precaution adoption process model (PAPM)	Birth attendance choice	Factors affecting mother's choice of birth attendance	Cross-sectional survey	Sampling: non-proportional quota sampling Sample size: 385 Population: pregnant women Study setting: Bunyala Sub-County, Kenya	Government facilities are more preferred by mothers due to skilled staff availability, medicines and equipment. Traditional birth attendants are preferred by some mothers due to payments' flexibility, odd hours accessibility, good relations, cultural reasons and fear of compulsory HIV testing	Factors that influence choice of birth attendance relate to negative outcomes associated with a choice	20/27 MMAT = 80%

Author	Theory	Target behaviour	Study aim	Study design	Setting/participants' demography	Key findings	Conclusion	Quality score
Vermander et al. (2016)	HBM	HPV uptake	The study investigated HBM utilization in predicting uptake of HPV in Kenya.	Longitudinal survey design	Sampling: Simple random sampling Sample size: 255 Population: 4000 girls aged 9-13 years Study setting: Eldoret Municipality	Perceived susceptibility, self-efficacy and refusal of the father as a foreseen barrier were the HBM constructs that influenced vaccination willingness but was not linked to vaccination	HBM can predict willingness to vaccinate	12/14 CASP = 86%
Nyawade et al. (2016)	TRA	Exclusive breastfeeding	The aim of the study was to identify health professionals' beliefs about supporting mothers to breastfeed exclusively for 6 months	Qualitative research design	Sample size: 15 health professionals Sampling: Purposive Population: Health professional in 6 public facilities in Nairobi County Study setting: Public health facilities in Nairobi County, Kenya	Consequences for exclusive breastfeeding included healthier babies and reduced illness for the child. Main disadvantage for exclusive breastfeeding included HIV transmission. Disapproving factors for exclusive breastfeeding included mothers/couples attitude and substitute industry campaigns. Facilitating factors included light workload, training and more time	Overall, exclusive breastfeeding had positive consequences.	6/10 CASP = 60%

Author	Theory	Target behaviour	Study aim	Study design	Setting/participants' demography	Key findings	Conclusion	Quality score
Mason et al. (2015)	HBM	Antenatal and delivery care	The study investigated barriers and promoters of antenatal and delivery care	Qualitative design	<p>Sampling: Purposive sampling</p> <p>Sample size: 73 women aged 15-49 years</p> <p>Population: Females aged 15-49 years in Western Kenya.</p> <p>Study setting: Rarieda District, Western Kenya</p>	Barriers for antenatal and delivery care included clinical staff's attitude, long waiting times, testing of HIV and cost. Promoters included better complications management.	HBM can be used in assessing users of a service "readiness to act"	8/10 CASP = 80%
Morema et al. (2014)	HBM	Cervical cancer	The study evaluated determinants of uptake of cervical cancer screening among women aged 18-49 years	Cross-sectional study (Quantitative)	<p>Sampling: Purposive</p> <p>Sample size: 424</p> <p>Population: 25,991 women of reproductive age</p> <p>Study setting: Jaramogi Oginga Odinga Teaching and Referral Hospital, Kenya</p>	Factors that were associated with uptake of cancer screening included perceived susceptibility, severity, having knowledge of cervical cancer signs and symptoms as outlined in the HBM	HBM is a psychological model that can be used in explaining and predicting behaviours in health.	11/14 CASP = 79%

Author	Theory	Target behaviour	Study aim	Study design	Setting/participants' demography	Key findings	Conclusion	Quality score
Odeny et al. (2014)	HBM	HIV	The aim of the study was to develop mHealth intervention to enhance postpartum retention so as to prevent mother-to-child transmission of HIV and early HIV diagnosis in infants.	Qualitative design	Sampling: Purposive Study setting: Nyanza Region, Kenya.	Messages should be brief, caring, personalized, encouraging, polite and educative. They should not mention HIV as a result of fear. Messages should also capitalize on motivation of women to attend childhood immunization clinics.	HBM can be used to inform mHealth messages for enhancing early HIV diagnosis in infants and PMTCT.	7/10 CASP = 70%
Smillie et al. (2014)	Theory of reasoned action	HIV care	The aim of the study was to develop a text messaging intervention for improvement of clinical outcomes among patients initiating ART	Qualitative study design	Sample size: 15 PLWH and 5 healthcare providers Sampling: Purposive Population: PLWHA and aged 18 years and above Study setting: Nairobi County, Kenya	Structural and individual barriers for seeking care after HIV diagnosis included fear of stigma, depression and poverty	Effective HIV intervention can be developed upon establishing facilitators and barriers to care	8/10 CASP = 80%

Author	Theory	Target behaviour	Study aim	Study design	Setting/participants' demography	Key findings	Conclusion	Quality score
Koyio et al. (2013)	TPB	Oropharyngeal candidiasis	The study assessed subjective norms, attitudes and intentions of PHC providers in performing routine oral examination for oropharyngeal candidiasis	Cross-sectional study	Sampling: Purposive Sample size: 195 Population: Cos and nurses Study setting: Nairobi County	Attitude and subjective norms influenced intention of HCPs to conduct oral examination.	TPB is applicable in examining intention to conduct oral examination by primary healthcare providers	19/27 MMAT = 80%
Ngugi et al. (2012)	HBM	Cancer screening	The study utilised HBM concept to assess factors that affected uptake of early detection measures of cervical cancer among women	Mixed method design	Sampling: purposive Sample size: 498 Population: 300,000 women at risk of cervical cancer development Study setting: Thika District, Kenya.	HBM categories were used to determine the factors affecting cervical cancer screening among women as perceived severity, perceived susceptibility, perceived benefits, perceived barriers, cues to action, and self-efficacy	HBM categories can be adopted in determining factors affecting cervical cancer detection measures among women	20/27 MMAT = 60%