

DISCLAIMER:

This document does not meet the
current format guidelines of
the Graduate School at
The University of Texas at Austin.

It has been published for
informational use only.

Copyright

by

Ahmed Mohammed Alshehri

2018

**The Dissertation Committee for Ahmed Mohammed Alshehri Certifies that this is
the approved version of the following dissertation:**

**Muslims' Patients' Medication Use Behavior and Perceptions
Regarding Collaboration with Pharmacists during Ramadan**

Committee:

Jamie C. Barner, Supervisor

Carolyn Brown

Kentya Ford

Karen Rascati

Said Atif

**Muslims' Patients' Medication Use Behavior and Perceptions
Regarding Collaboration with Pharmacists during Ramadan**

by

Ahmed Mohammed Alshehri

Dissertation

Presented to the Faculty of the Graduate School of

The University of Texas at Austin

in Partial Fulfillment

of the Requirements

for the Degree of

Doctor of Philosophy

The University of Texas at Austin

May 2018

Dedication

This doctoral dissertation projects is dedicated to my great parents, Mohammed and Zeina, who brought me to the life, raised me, and believed in my ability to accomplish my Ph.D. degree. It is also dedicated to my lovely wife, Asma, who supported me during my study and gave me enormous time to concentrate on my dissertation. Also, It is dedicated to my siblings, who supported me during my graduate journey in the United States.

Acknowledgements

First of all, praise to Allah for his countless grace of health and ability to accomplish my doctoral dissertation. Also, I want to thank people who have enormous impact on me to finish my study. I would like to thank Dr. Jamie Barner for every single minutes she spent guiding me throughout my graduate studies. Her support, feedback and encouragement as well as her sweet and kind personality was a huge influence in my graduate studies. Also, I want to thank Dr. Carolyn Brown, Dr. Kentya Ford, Dr. Karen Rascati, and Dr. Saeed Atif for their great feedback, comments, and expertise that shaped and strength this research.

In addition, I want to thank my lovely parents for their endless encouragements, love, and support throughout my life. Words are not enough to express my thankfulness for them. Lovely thanks to my sweet wife, Asma, for her love and encouragement, and her endless support in my graduate studies. Special thanks for my siblings for their encouragements throughout my graduate study, care about my progress, and overall support during my stay in the US. Also, I want to thank my friends in Saudi Arabia and in the U.S. for their support.

Muslims' Patients' Medication Use Behavior and Perceptions Regarding Collaboration with Pharmacists during Ramadan

Ahmed Mohammed Alshehri, Ph.D.

The University of Texas at Austin, 2018

Supervisor: Jamie C Barner

The purpose of this study was to identify factors influencing Muslim diabetic patients' medication usage changes during Ramadan without a health care provider's approval and to describe their perceptions of proposed pharmacists' services during Ramadan. An anonymous survey was distributed in two languages (English and Arabic) to a convenience sample of adult diabetic Muslims at two mosques in San Antonio, TX. Andersen's behavioral model of health services for vulnerable populations was used as the study model. Bivariate and multivariate logistic regression analysis was used to identify the impact of participants' predisposing, enabling, need, and satisfaction with care factors on whether they changed their medication usage during Ramadan without a health care provider's approval (no change or changing only the medication time vs. changing aspects other than the medication time). In addition, a scale of 17 items divided into four subdomains (encouragement and support regarding fasting, understanding Islamic religion/culture, creating a Muslim-friendly and welcoming environment, and modifying medications for fasting) was used to address the second objective. Descriptive statistics were performed for all the study variables and Cronbach's alphas were performed to assess

scale reliability. A total of 76 participants with diabetes completed the survey. The scales showed good to excellent internal consistency reliability (i.e., Cronbach's alphas between 0.67 and 0.91). The independent-samples *t*-test showed that participants who changed their medications without health care providers' approval had: more health care barriers (2.7 ± 0.5 vs. 2.2 ± 0.4), more diabetic complications (2.8 ± 2.2 vs 1.5 ± 0.7), and lower satisfaction with care (3.3 ± 0.9 vs 3.8 ± 0.6) when compared to those who did not change or changed only the time of their medications. The multivariate logistic regression showed that only health care barriers had a significant relationship with participants' changing medication usage during Ramadan without a health care provider's approval (Wald chi-square = 5.70, $p = 0.017$). As the score for health barriers increased by one unit, the odds of changing medication usage without a health care provider's approval increased by 7.20 times (OR = 7.20, 95% CI = 1.43 – 36.4, $p = 0.017$). A post-hoc multivariate logistic regression analysis exploring specific barriers showed that only the health care cost barriers had a statistically significant relationship with participants' changing medication usage during Ramadan without a health care provider's approval (Wald chi-square = 4.37, $p = 0.037$). As health care cost barriers increased by one unit, the odds of changing medication usage without a health care provider's approval increased by 2.23 times (OR = 2.23, 95% CI = 1.05 – 4.72, $p = 0.037$). Regarding the proposed pharmacists' services during Ramadan, participants had positive perceptions (3.9 ± 0.7 ; out of 5). Participants were in favor of pharmacists better understanding their religion and culture so as to help them manage their medication while fasting during Ramadan. In conclusion, barriers related to health care, especially those related to cost, constituted the only predictor of participants'

changing medication usage during Ramadan without a health care provider's approval. Health care providers should be aware of health care cost barriers and identify strategies that may help to mitigate them. Pharmacists and other health care providers need to know the importance of Ramadan so that they are able to advise Muslim patients who choose to fast.

Table of Contents

List of Tables	xviii
List of Figures	xxiii
CHAPTER ONE: INTRODUCTION.....	1
1.1 Background.....	1
1.1.1 Islam.....	1
1.1.2 Fasting During Ramadan	1
1.1.2.1 Muslims' Health.....	2
1.1.2.2 Muslim Health Care Practices During Ramadan	3
1.1.2.3 Factors Affecting Health Care Utilization During Ramadan	4
1.2 Study Purpose	6
1.3 Study Significance	7
CHAPTER TWO: LITERATURE REVIEW.....	8
2.1 PART ONE: THE RELIGION OF ISLAM.....	8
2.1.1 Overview.....	8
2.1.2 Islamic Perspectives on Health Care.....	9
2.1.3 The Five Pillars of Islam.....	10
2.1.3.1 Ramadan.....	11
2.1.3.1.1 Overview	11
2.1.3.1.2 The Period of Fasting	14
2.1.3.1.3 Fasting Exemptions.....	15
2.1.3.1.4 The Islamic Rules Regarding Health Care During Ramadan	15
2.1.3.1.4.1 Overview	15
2.1.3.1.4.2 Islamic Rules Regarding Medication Use While Fasting	16
2.2 PART TWO: MUSLIMS' HEALTH DURING RAMADAN	17
2.2.1 General Health	17
2.2.2 The Effect of Fasting on Muslims' Health	17

2.2.2.1	Lifestyle Conditions	18
2.2.2.1.1	Exercise	18
2.2.2.1.2	Sleep	19
2.2.2.1.3	Diet	20
2.2.2.2	Exempt Medical Conditions.....	22
2.2.2.3	Disease Conditions.....	23
2.2.3	The Effect of Fasting on Patients' Disease Conditions	25
2.2.3.1	Diabetes.....	25
2.2.3.2	Other Diseases.....	27
2.2.3.3	Disease Management.....	28
2.2.3.3.1	Diabetes Management.....	28
2.2.3.3.2	Management of Other Diseases.....	31
2.2.4	Muslims Medication Use During Ramadan.....	33
2.2.4.1	Overview	33
2.2.4.2	Medication Management During Ramadan	33
2.2.4.3	The Effect of Medication Usage Modification on Patients' Health.....	35
2.2.4.3.1	Overview	35
2.2.4.3.2	Muslim's Perspective on Medication Usage.....	41
2.3	PART THREE: FACTORS THAT AFFECT MUSLIMS' HEALTH CARE UTILIZATION AND MEDICATION USE	42
2.3.1	Overview.....	42
2.3.2	Predisposing Factors	45
2.3.2.1	Demographic Factors	45
2.3.2.1.1	General and Minority Populations	45
2.3.2.1.2	Muslim Populations	46
2.3.2.2	Health Belief Factors.....	47
2.3.2.2.1	Values Concerning Health and Illness and Attitudes Toward Health Care Services	47
2.3.2.2.1.1	General and Minority Populations	48
2.3.2.2.1.2	Muslim Populations	50

2.3.2.2.2	Knowledge About Diseases	54
2.3.2.2.2.1	General and Minority Populations	54
2.3.2.2.2.2	Muslim Populations	55
2.3.2.2.3	Social Structure	55
2.3.2.2.3.1	The General Population.....	56
2.3.2.2.3.2	Minority Populations.....	58
2.3.2.2.3.3	Muslim Populations	60
2.3.3	Enabling Factors	65
2.3.3.1	Personal/Family Resources	65
2.3.3.1.1	General Population.....	65
2.3.3.1.2	Minority population.....	67
2.3.3.1.3	Muslim Populations	67
2.3.3.1.3.1	Barriers to Muslims' Health Care Utilization Related to U.S. Society and provider characteristics	69
2.3.3.1.3.1.1	Islamophobia	69
2.3.3.1.3.1.2	Health care provider characteristics	70
2.3.4	Need Factors	72
2.3.4.1	General and Minority Populations	72
2.3.4.2	Muslim Populations	76
2.3.5	Satisfaction with Care	77
2.3.5.1	General and minority populations	77
2.3.5.2	Muslims Populations.....	80
2.3.6	Summary	80
2.4	Part Four: STUDY OBJECTIVES AND HYPOTHESES	81
2.4.1	Objective 1:.....	81
2.4.2	Objective 2:.....	82
2.4.3	Objective 3:.....	82
2.4.3.1	Hypotheses:	83
2.4.4	Objective 4:.....	86

CHAPTER THREE: METHODOLOGY	87
3.1 Study Setting and Population, Inclusion Criteria, and IRB Approval	87
3.1.1 Study Setting and Population.....	87
3.1.2 Inclusion Criteria	88
3.1.3 Institutional Review Board Approval	88
3.2 Health Care Behavior Model	89
3.2.1 Overview	89
3.2.2 The Behavioral Model of Health Services Utilization.....	89
3.2.2.1 Description	89
3.2.3 The Behavioral Model for Vulnerable Populations (BMVP)	93
3.2.3.1 Vulnerable Populations	93
3.2.3.2 Model Description.....	94
3.2.3.3 Adaptations to the model.....	97
3.2.3.4 Summary	100
3.3 The Study Instrument.....	100
3.3.1 Overview	100
3.3.2 Survey Instrument.....	100
3.3.2.1 Study Variables	101
3.3.2.1.1 Study Dependent Variables.....	102
3.3.2.1.1.1 Primary Dependent Variable.....	102
3.3.2.1.1.2 Secondary Dependent Variable.....	103
3.3.2.2 Study Independent Variables	104
3.3.2.2.1 Predisposing factors	105
3.3.2.2.1.1 Health beliefs.....	105
3.3.2.2.1.2 Religiosity level.....	106
3.3.2.2.1.3 Acculturation.....	108
3.3.2.2.1.4 Islamophobia	109
3.3.2.2.2 Enabling Factors.....	110
3.3.2.2.2.1 Regular Source of Care	110
3.3.2.2.2.2 Insurance	111

3.3.2.2.2.3	Social Support	112
3.3.2.2.2.4	Perceived Barriers to Care.....	113
3.3.2.2.2.5	Self-Help Skills and Ability to Negotiate the Health Care System	114
3.3.2.2.3	Need Factors.....	114
3.3.2.2.4	Health Behavior.....	116
3.3.2.2.4.1	Personal Health Practices	116
3.3.2.2.5	Outcomes: Satisfaction with Care	117
3.3.2.3	Patients' Sociodemographics	117
3.4	Survey pretest.....	118
3.5	Data Collection	119
3.6	Data Analysis	120
3.6.1	Objective One	120
3.6.2	Objective Two.....	120
3.6.3	Objective Three.....	120
3.6.3.1	Multivariate logistic Regression Test Assumptions...	124
3.6.3.2	Power Analysis.....	125
3.6.4	Objective Four	126
CHAPTER FOUR: RESULTS		127
4.1	Data collection and inclusion criteria	127
4.1.1	Inclusion criteria	128
4.2	Independent variables	128
4.2.1	Predisposing variables	129
4.2.1.1	Traditional Variables.....	129
4.2.1.1.1	Demographics.....	129
4.2.1.1.2	Health beliefs.....	131
4.2.1.1.3	Social structure.....	136
4.2.1.1.3.1	Race/ethnicity.....	136
4.2.1.1.3.2	Level of education.....	136
4.2.1.1.3.3	Employment	137

4.2.1.1.3.4	Family size	138
4.2.1.1.3.5	Religion	140
4.2.1.2	Vulnerability variables	144
4.2.1.2.1	Social structure	144
4.2.1.2.1.1	Country of birth	144
4.2.1.2.1.2	Acculturation	147
4.2.1.2.2	Victimization	151
4.2.1.2.2.1	Islamophobia	151
4.2.2	Enabling variables	154
4.2.2.1	Traditional variables	154
4.2.2.1.1	Regular source of care	154
4.2.2.1.2	Insurance	156
4.2.2.1.3	Income	157
4.2.2.1.4	Social support	158
4.2.2.1.5	Perceived barriers to care	160
4.2.2.1.5.1	Cost barriers	161
4.2.2.1.5.2	Language barriers	161
4.2.2.1.5.3	Trust barriers	162
4.2.2.1.5.4	Barriers related to health care providers' characteristics 163	
4.2.2.1.5.5	Discrimination barrier	164
4.2.2.1.5.6	Total perceived barriers to care	164
4.2.2.2	Vulnerable variables	168
4.2.2.2.1	Self-help skills and ability to negotiate the health care system	168
4.2.3	Need variables	169
4.2.3.1	Perceived condition of participants' diabetes	170
4.2.3.2	Evaluated condition of participants' diabetes	170
4.2.3.2.1	Evaluated general health conditions	171
4.2.3.2.2	Evaluated diabetes condition	173
4.2.3.2.2.1	Diabetes types	173

4.2.3.2.2.2	Years of being diagnosed with diabetes	175
4.2.3.2.2.3	Diabetes management	176
4.2.3.2.2.4	Medication schedule.....	177
4.2.3.2.2.5	Diabetes-related complications	179
4.2.3.2.2.6	Diabetes-Related Hospitalization and emergency room visits	180
4.2.3.2.2.7	The number of low and high blood glucose level incidents during the past Ramadan	182
4.2.3.2.2.8	Composite diabetes Complication Score	185
4.2.4	Health behavior variables	187
4.2.4.1	General personal health behavior.....	187
4.2.4.2	Diabetic-related personal health behavior.....	188
4.2.5	Outcomes variables.....	192
4.2.5.1	Satisfaction with care	192
4.3	Dependent variables.....	197
4.3.1	Medication changes during Ramadan.....	198
4.3.2	Participants' perception of proposed pharmacist engagement activities during Ramadan.....	201
4.4	Objectives Results.....	207
4.4.1	Objective One	207
4.4.2	Objective Two.....	208
4.4.3	Objective Three.....	208
4.4.3.1	Independent variables.....	209
4.4.3.1.1	Age.....	209
4.4.3.1.2	Gender	209
4.4.3.1.3	Marital Status.....	210
4.4.3.1.4	Health Beliefs.....	210
4.4.3.1.5	Race	210
4.4.3.1.6	Level of education.....	210
4.4.3.1.7	Level of employment	211
4.4.3.1.8	Family size	211

4.4.3.1.9	Country of birth	211
4.4.3.1.10	Acculturation level	212
4.4.3.1.11	Perceived Islamophobia	212
4.4.3.1.12	Regular source of care.....	212
4.4.3.1.13	Insurance	213
4.4.3.1.14	Income.....	213
4.4.3.1.15	Social support.....	213
4.4.3.1.16	Health care barriers	214
4.4.3.1.16.1	Cost barriers	214
4.4.3.1.16.2	Language barriers.....	215
4.4.3.1.16.3	Trust barriers	215
4.4.3.1.16.4	Health care providers' characteristics barriers ...	215
4.4.3.1.16.5	Discrimination barriers.....	216
4.4.3.1.17	Self-help/ability to negotiate the system	216
4.4.3.1.18	Perceived diabetic health status.....	216
4.4.3.1.19	Composite diabetes complication score	217
4.4.3.1.20	Satisfaction with care	217
4.4.3.2	Multivariate logistic regression analysis	223
4.4.3.2.1	Multivariate logistic regression model (first model)	228
4.4.3.2.2	Multivariate logistic regression model (second model)	229
4.4.4	Objective Four	231
CHAPTER FIVE: DISCUSSION AND CONCLUSION		232
5.1	Overview of the research questions	232
5.1.1	Background	232
5.1.2	The present study	233
5.2	Study research objectives.....	234
5.2.1	A description of participants' predisposing, enabling, and need factors, and their satisfaction with care.....	234
5.2.1.1	Participant demographic.....	235
5.2.1.2	Health Beliefs.....	235

5.2.1.3	Social Structure	238
5.2.1.4	Perceived Victimization	243
5.2.1.4.1	Perceived Islamophobia	243
5.2.1.5	Participants' personal and family resources.....	243
5.2.1.6	Participants' Perceived Diabetic Health Status.....	250
5.2.1.7	Evaluated condition of participants' diabetes	251
5.2.1.7.1	Evaluated general health conditions.....	251
5.2.1.7.2	Evaluated diabetes conditions	252
5.2.1.8	Satisfaction with care	255
5.2.2	Description of participants' diabetes medication usage changes and diabetes management behaviors	257
5.2.2.1	Diabetes Management Behavior	260
5.2.3	Factors affecting participants' medication usage changes during Ramadan without a health care provider's approval.....	262
5.2.4	Participants' perceptions of pharmacists' proposed engagement services during Ramadan.	270
5.2.5	The Behavioral Model for Vulnerable Population Study Findings	273
5.3	Study Limitation	275
5.4	recommendations	278
5.5	Future Research	280
5.6	conclusion	282
Appendices.....		283
Appendix A: Islamic Center of San Antonio (ICSA) cite Letter.....		284
Appendix B: Muslim Children's Education and Civic Center (MCECC) Cite Letter		285
Appendix C: Survey Instrument (English version).....		286
Appendix D: Survey Instrument (Arabic version).....		297
References.....		308
Vita		325

List of Tables

Table 1: Schedule of standard prayers during Ramadan Day 1 in Austin, Texas: June 18, 2015.....	13
Table 2: Schedule of standard and extra prayers during Ramadan Day 1 in Austin, Texas: June 18, 2015.....	13
Table 3: Schedule of standard, extra prayers during Ramadan and extra prayers during the last ten nights of Ramadan in Austin, Texas: July 7-16, 2015	13
Table 4: Selected medications with variations in pharmacokinetics and pharmacodynamics	38
Table 5: Commonly encountered drug–food interactions and recommendations .	40
Table 6: Arab Muslims’ Health Beliefs and Practices.....	52
Table 7. Example Medication Usage Items	102
Table 8. Objective Three: Dependent Variable: Medication Utilization Changes During Ramadan without Health Care Provider’s Approval	103
Table 9: Objective Three: Independent Variables Related to Medication Usage Changes During Ramadan	122
Table 10: Mean and Frequency Distribution of Participants’ Age ($N = 73$) ¹	130
Table 11: Frequency Distribution of Participants’ Gender ($N = 75$) ¹	130
Table 12: Frequency Distribution of Participants’ Marital Status ($N = 75$) ¹	131
Table 13: Mean and Frequency Distribution of Participants’ Health Beliefs Related to Fasting During Ramadan ($N = 76$).....	134
Table 14: Frequency Distribution of Participants’ Race/Ethnicity ($N = 76$)	136
Table 15: Frequency Distribution of Participants’ Level of Education ($N = 76$)	137

Table 16: Frequency Distribution of Participants' Employment Status ($N = 76$)	138
Table 17: Mean and Frequency Distribution of Participants' Family Size ($N = 73$) ¹	139
Table 18: Frequency Distribution of Numbers of Adults and Children Living with Participants in the Same House ($N = 76$)	140
Table 19: Mean and Frequency Distribution of Participants' Religiosity Scale ($N =$ 76)	143
Table 20: Frequency Distribution of Participants' Country of Birth ($N = 76$)	145
Table 21: Frequency Distribution of Participants' Region of Birth ($N = 76$)	146
Table 22: Mean and Frequency Distribution of Participants' Number of Years in the U.S. ($N = 74$) ¹	146
Table 23: Mean and Frequency Distribution of Participants' Acculturation Scale ($N =$ 76)	150
Table 24: Mean and Frequency Distribution of Participants' Perception of Islamophobia ($N = 76$)	153
Table 25: Frequency Distribution of Participants' Source of Health Care ($N = 76$)	155
Table 26: Frequency Distribution of Participants' Regular Source of Care ($N = 76$)	156
Table 27: Frequency Distribution of Participants' Health Care Insurance Coverage (N $= 75$) ¹	157
Table 28: Frequency Distribution of Participants' Household Income ($N = 76$)	158
Table 29: Frequency Distribution of Participants' Adherence to Their Social Support on Whether to Fast and How to Manage Medications During Ramadan ($N = 76$)	160

Table 30: Mean and Frequency Distribution of Participants' Perceived Barriers to Care (N = 76)	166
Table 31: Mean and Frequency Distribution of Participants' Perceived Barriers to Self-Help (N = 76)	169
Table 32: Mean and Frequency Distribution of Participants' Perceived Diabetes Condition (N = 76).....	170
Table 33: Frequency Distribution of Participants' Evaluated General Health Condition (N = 75 ¹)	172
Table 34: Frequency Distribution of Participants' Number of Medications Utilized (N = 76)	173
Table 35: Frequency Distribution of Participants' Diabetic Type (N = 76)	174
Table 36: Mean and Frequency Distribution of Participants' Years of Being Diagnosed with Diabetes (N = 68) ¹	175
Table 36: Frequency Distribution of Participants' Methods of Diabetes Management (N = 76)	177
Table 37: Frequency Distribution of Participants' Oral Diabetes Medications Frequency (N = 57) ¹	178
Table 38: Frequency Distribution of Participants' Insulin Subcutaneous Medications Frequency (N = 15) ¹	179
Table 39: Frequency Distribution of Participants' Diabetes-Related Complications (N = 70) ¹	180
Table 40: Mean and Frequency Distribution of Participants' Number of Diabetes- Related Hospital Admissions (N = 66)	181
Table 41: Mean and Frequency Distribution of Participants' Number of Diabetes- Related Emergency Room Visits (N = 68) ¹	182

Table 42: Mean and Frequency Distribution of Participants' Number of Hypoglycemic Incidents during the past Ramadan ($N = 59$) ¹	183
Table 43: Mean and Frequency Distribution of Participants' Number of Severe Hypoglycemic Incidents during the past Ramadan ($N = 61$) ¹	184
Table 44: Mean and Frequency Distribution of Participants' Number of Severe Hyperglycemic Incidents during the past Ramadan ($N = 58$) ¹	185
Table 45: Mean and Frequency Distribution of Participants' Composite Diabetes Complication Score ($N = 76$)	187
Table 46: Frequency Distribution of Participants' Tobacco Product Usage ($N = 75$) ¹	188
Table 47: Mean and Frequency Distribution of Participants' Personal Health Behaviors in the Three Months Prior to Ramadan ($N = 76$)	190
Table 48: Participants' Personal Health Behaviors Distribution during Ramadan ($N = 76$)	192
Table 49: Mean and Frequency Distribution of Participants' Satisfaction with Pharmacists' Services ($N = 76$)	196
Table 50: Frequency Distribution of Participants' Number of Fasting Days During Ramadan ($N = 71$) ¹	199
Table 51: Frequency Distribution of Participants' Medications Usage Modification During Ramadan without Health Care Providers' Approval ($N = 76$)	201
Table 52: Mean and Frequency Distribution of Participants' Perceptions of Proposed Pharmacist Engagement Activities (PPPEA) During Ramadan ($N = 76$)	205

Table 53: Mean, <i>t</i> -values, and <i>p</i> -values for Age, Health Belief Level, Family Size, Years in the U.S., Religiosity Level, Acculturation Level, Islamophobia Level, Source of Care, Health Care Barriers (Total, Cost, Language, Trust, Health Care Providers' Characteristics, and Discrimination), Self-Ability, Diabetic Complication Score, and Satisfaction with Care	219
Table 54: Chi-Square Results for Gender and Marital Status, Race, Level of Education, Level of Employment, Country of Birth, Insurance, Income Level, Social Support, and Perceived Diabetic Health Status	222
Table 55: Fisher's Exact Test Results for Country of Birth and Social Support.	223
Table 56: The Twenty Hypothesis Relationship between The Study Independent and Dependent Variable, and Whether This Relationship was Found Statically Significant in The Appropriate Bivariate Analysis.....	225
Table 57: The Five Hypothesis Relationship between The five constructs of Health Care Barriers and The Dependent Variable, and Whether This Relationship was Found Statically Significant in The Appropriate Bivariate Analysis.....	227
Table 58: Multivariate Logistic Regression for Health Care Barriers, Diabetic Complications and Satisfaction with Care on Medication Usage Changes without Health Care Providers' Approval during Ramadan (First Model) (N= 51) ^a	230
Table 59: Multivariate Logistic Regression for Health Care Cost Barriers, Health Care Providers' Characteristics Barriers, Discrimination, Diabetic Complications and Satisfaction with Care on Medication Usage Changes without Health Care Providers' Approval during Ramadan (Second Model) (N= 51) ^a	231

List of Figures

Figure 1: The Behavioral Model for Vulnerable Population.....	43
Figure 2: The Behavioral Model of Health Services Utilization—Phase 1 (1968).....	90
Figure 3: The Behavioral Model of Health Services Utilization—Phase 2 (1970).....	91
Figure 4: The Behavioral Model of Health Services Utilization—Phase 3 (1994).....	92
Figure 5: The Behavioral Model of Health Care Services Use—Phase 4 (1995).....	93
Figure 6: Adapted Andersons' Behavior Model for Vulnerable Populations for Present Study	99
Figure 7 Formula for Calculating Multivariate Regression Sample Size	126

CHAPTER ONE: INTRODUCTION

1.1 BACKGROUND

1.1.1 Islam

Islam is the second largest religion in the world, with 1.6 billion believers (Muslims). It is considered to be the world's fastest growing religion, and in 2030, it is estimated that the world's Muslim population will be 2.2 billion and is projected to grow twice as fast as any other non-Muslim population (Grim & Karim, 2011). In the United States, Muslims comprise 0.8% ($N = 2.6$ million) of the population, and it is estimated that in 2030 they will be 1.7% ($N = 6.2$ million) of the population (Grim & Karim, 2011). Islam has five pillars, among which is fasting during the month of Ramadan (discussed below).

1.1.2 *Fasting During Ramadan*

Ramadan is the ninth month of Islamic calendar (*Hijri*), where Muslims are required to fast during the whole month from sunrise until sunset. Muslims who are post-pubescent and sane are required to abstain from eating, drinking, having sexual intercourse (Quran 2. 183, 187), and taking medications (e.g., oral medications) (Brown, 1947). However, Islam exempts people from fasting who have medical conditions or other constraints (e.g., travelers) that prevent them from fasting or that would make their fasting difficult (Quran 2. 183). Nevertheless, many individuals who self-identify or are identified by health care providers as having a serious health care conditions (e.g., diabetes) still choose to fast during Ramadan.

1.1.2.1 Muslims' Health

Islam encourages Muslims to maintain good health and avoid actions that negatively impact their health. However, in the United States (U.S.), Muslims may struggle to maintain good health, since 63% are immigrant and 29% are unemployed or working part time, compared to 20% of general U.S. population. Therefore, the chance of having health insurance is very low compared to the general population, which leads to low health care status ("Muslim Americans: No Signs of Growth in Alienation or Support for Extremism," 2011). To our knowledge, there is no previous research that has identified U.S. Muslims' health related issues. However, the prevalence of diabetes among Arab Americans (15.5%-20.1%) is higher than the prevalence among non-Hispanic Whites (7.6%), Blacks (13.2%), and Hispanics (12.8%) (Control & Prevention, 2014).

Regarding fasting during Ramadan, the medical condition most frequently discussed in the literature is diabetes (Laajam, 1990; Mafauzy, Mohammed, Anum, Zulkifli, & Ruhani, 1990; Pinelli & Jaber, 2011; Salti et al., 2004; Sulimani et al., 1991; Uysal, Erdoğan, Sahin, Kamel, & Erdoğan, 1998). One study revealed that more than 40% (42.8%) of Muslims with type 1 diabetes and almost 80% (78.7%) with type 2 diabetes, who could be exempt from fasting, still fasted during Ramadan (Salti et al., 2004). Diabetes is a disease state that is significantly impacted by fasting because fasting can lead to hypoglycemia. Diabetics patients reported that the incidence of hypoglycemia was 1.6 times higher when they fast compared to when they do not fast (Loke, Rahim, Kanesvaran, & Wong, 2010). Hypoglycemia may be severe in some cases and may lead patients to be hospitalized (Salti et al., 2004). Thus, because of the prevalence of diabetes among

Muslims, the requirement for fasting during Ramadan and the negative consequences of hypoglycemia, it is important to examine healthcare practices of Muslims with diabetes during Ramadan.

1.1.2.2 Muslim Health Care Practices During Ramadan

Although exemptions are permitted, Muslims have different perspectives regarding fasting during Ramadan. Some of them consult their health care providers to determine whether they can modify their medication schedules to accommodate fasting (Pinelli & Jaber, 2011), whereas others change their medication schedules on their own (Aslam & Healy, 1986). Changes in medication use include: stopping medications, combining multiple doses into a single dose, and changing medication type, form, time, or dosage. In a general population of patients in Arabic and non-Arabic countries, a survey showed that 58%–64% of Muslim patients changed their medication usage to fast during Ramadan (Aslam & Assad, 1986; Aslam & Healy, 1986). Among these changes, the vast majority (75%) stopped using their medications during fasting hours or altogether (Aslam & Healy, 1986), 17%–18% changed their medication schedule (Aslam & Assad, 1986; Aslam & Healy, 1986), and 18% combined multiple doses into a single dose (Aslam & Healy, 1986). Combining medication doses into a single dose may increase the possibility of drug–drug interactions or toxicity (Aslam & Assad, 1986).

Regarding patients with diabetes, researchers in one study reported that 33% changed their medications (Mafauzy et al., 1990), while another study reported that 46% changed their medications (Pinelli & Jaber, 2011). Among patients who used either insulin

or oral hypoglycemic medications, a population-based study found that 25%–33% changed their medication dosing time (Mygind, Kristiansen, Wittrup, & Nørgaard, 2013). While, using insulin is not considered a violation of fasting by Islamic organizations, 50% of insulin users adjusted their administration times (Pinelli & Jaber, 2011). In another disease state, 87% of asthmatic patients (N=80) rearranged their medication usage at the *iftare* (i.e., meal at the sunset) and *sahur* (i.e., meal one hour before the sunrise) time, and 68.6% stated that they would not use their quick relief medication during the fasting period. Similar to insulin, Islamic authorities consider inhaler medications acceptable for use while fasting (Aadil, Houti, & Moussamih, 2004; Erkeköl et al., 2006; *An Islamic View of Certain Contemporary Medical Issues*, 1997).

These studies show that despite exemptions, most Muslims still choose to fast during Ramadan. Patients with exemptions who choose to fast without consulting their health care providers may change or stop using medications, which may worsen their disease conditions (Aslam & Assad, 1986; Aslam & Healy, 1986; B. Gaborit et al., 2011; Mafauzy et al., 1990; Mygind et al., 2013; Salti et al., 2004; Weissman et al., 2005; Wheatly & Shelly, 1993). Therefore, understanding the factors that impact Muslim patients' medication-taking behaviors, particularly during Ramadan, is important.

1.1.2.3 Factors Affecting Health Care Utilization During Ramadan

Factors that impact patient health care utilization have been examined in many studies using Andersen's Healthcare Utilization model, which purports that predisposing, enabling and need for care factors are the major influencers of health care services

utilization (Boyd, Song, Meyer, & Altice, 2015; H. M. Gonzalez et al., 2010; P. Gonzalez et al., 2012; Graves et al., 2008; Harcourt et al., 2014; Haynes-Maslow et al., 2014; London et al., 2015; Nandi et al., 2008; Tsuyuki & Surratt, 2015; Varga & Surratt, 2014; S. L. Williams, 2014). Predisposing factors make patients more susceptible to utilizing health care services than others. These factors are divided into demographic (e.g., gender) (de Boer, Wijker, & de Haes, 1997; Mueller, Schur, & O'Connell, 1997; Poisal & Chulis, 2000), social structure (e.g., ethnicity), and health beliefs (e.g., value concerning health and illness). Enabling factors include personal, family and community resources (e.g., insurance) that facilitate access to use and the ability to pay for health care services (M. Davis, Poisal, Chulis, Zarabozo, & Cooper, 1999; Gianfrancesco, Baines, & Richards, 1993; Goldman et al., 2004; Mueller et al., 1997; Poisal, Murray, Chulis, & Cooper, 1999; Stuart & Coulson, 1993; Weissman, Witzburg, Linov, & Campbell, 1999; Wolinsky, Stump, & Johnson, 1995). Finally, need factors include perceived health, which is how people view their own health (e.g., excellent to poor) (Dhingra, Zack, Strine, Pearson, & Balluz, 2010) (de Boer et al., 1997; Goldman et al., 2004; Wolinsky et al., 1995), and evaluated health, which is how health care providers evaluate the patient (e.g., clinical values). However, little research has been conducted among Muslim patients to determine if these factors are important and if additional factors are needed that may better describe their medication-taking behaviors during Ramadan.

Muslims in the U.S. have unique characteristics that may contribute to health disparities and negatively impact their health care utilization. Acculturation, which may be exhibited by limited English skills and traditional dress (e.g., women wearing hijabs) has

been associated with limiting access to care (Shah, Ayash, Pharaon, & Gany, 2008). Additionally, religious practices (e.g., Ramadan, frequent prayer times) may lead to disparities in receipt of health care services (Einbinder & Schulman, 2000). Islamophobia, which is a phenomenon that increased among Americans after the 9/11 attacks, and fear of deportation were cited as reasons for not seeking health care services among Muslims (Shah et al., 2008). Therefore, several factors unique to Muslims may lead to sub-optimal health care utilization in the U.S. The Anderson Healthcare Behavior Model for Vulnerable Populations was employed in this study because it incorporates the aforementioned factors (e.g., acculturation), which are relevant to Muslims.

1.2 STUDY PURPOSE

By better understanding Muslim culture, especially the importance of fasting during Ramadan, healthcare professionals can be part of the solution to bridge the gap in health disparities among Muslims,. Understanding more about medication use and the role that pharmacists can play in helping Muslims with diabetes better manage their disease state during Ramadan is important. However, little is known about Muslims' diabetes medication use behaviors or how Muslims view pharmacists' roles in the care process. The objectives of the present study are as follows:

Objective 1: To describe the predisposing (individual demographic characteristics, health beliefs, and social structure), enabling (personal and family resources) and need factors, and satisfaction with pharmacy services of Muslim patients with diabetes.

Objective 2: To describe Muslims' diabetes medication usage and diabetes management behaviors (diet, exercise, self-care) during Ramadan.

Objective 3: To determine if predisposing, enabling, and need factors, and satisfaction with pharmacy services have an impact on diabetic Muslims' medication usage during Ramadan.

Objective 4: To describe Muslims' perceptions of pharmacist engagement services regarding Muslims during Ramadan.

1.3 STUDY SIGNIFICANCE

The present study is significant in two aspects. The first is related to health outcomes of the Muslim population in the U.S. According to the U.S. Department of Health and Human Services Office of Minority Health, health care disparities have affected and continue to affect the health of minority populations ("National Minority Health Month/April 2015," 2015). The Muslim population, as mentioned earlier, is a minority in the U.S. and thus research is needed that would identify relevant factors that can be used to develop interventions designed to improve their health. Secondly, this study will increase pharmacists' understanding of Muslims' medication-taking behaviors during Ramadan, their perceptions of pharmacists and pharmacy services, as well as perceived preferences for patient-provider encounters among Muslim patients with diabetes who are fasting during Ramadan, which is a time when medication related problems have a higher likelihood of occurring.

CHAPTER TWO: LITERATURE REVIEW

This chapter is divided into two parts: an overview of Islam and Muslims' health during Ramadan. The first part will provide an overview of Islam's five pillars and perspective on health care, as well as detailed information related to Ramadan. In the second part, more information will be presented about the impact of fasting on Muslims' health and health management practices, including medication use during Ramadan.

2.1 PART ONE: THE RELIGION OF ISLAM

2.1.1 Overview

Islam is a monotheistic religion, which means that there is one God (Allah), and it holds Mohammad (Peace be upon him) to be the last messenger of Allah. The holy book, the Quran, and the teachings of Prophet Mohammed are the two sources that inform Islam (Gatrad & Sheikh, 2001). As of 2010, Islam was considered the second largest religion in the world with 1.6 billion believers (Muslims). It is also considered the world's fastest growing religion, with an estimated global Muslim population of 2.2 billion (26.4% of the world's population) in 2030. Additionally, it is projected to grow twice as fast as other non-Muslim populations (Grim & Karim, 2011).

Over 80% of Muslims are concentrated in Africa (19.9%) and Asia (62.1%), with Islam being the predominant (~90%) religion in the Middle East and North Africa. In the U.S., the Muslim population is expected to more than double between 2010 (2.6 million, or 0.8% of the U.S. population) and 2030 (6.2 million, 1.7% of the U.S population) (Grim

& Karim, 2011). After the death of Ali, the fourth leader of Islam after the Prophet Mohammed, Muslims divided into two branches based on political differences: Sunni and Shia. Sunnis represent the vast majority (87%–90%) of Muslims, and Shias represent the remainder (A. H. Blackwell, 2009; Grim & Karim, 2011). According to the Pew Research Center, out of Muslims in the U.S., 65% identified themselves as Sunni, 15% as Shia, 11% as simply Muslim, and the rest as ‘Others’ ("Muslim Americans: No Signs of Growth in Alienation or Support for Extremism," 2011). Another researcher found that 80% of Muslims in the U.S. are Sunni and the remaining are Shia (Hodge, 2005). This dissertation will focus on Sunni Muslims because they comprise the majority of Muslims worldwide and in the U.S. and because Shias differ in their religious practices related to prayer and fasting.

2.1.2 Islamic Perspectives on Health Care

Islam places a person’s health in high regard. It considers the body as a loan or gift from Allah, and it requires individuals to take care of themselves, seek treatment, and utilize medicine and medical technology when needed (Inhorn, 2003). According to the Quran, anything that leads to physical or mental harm is prohibited (Quran 7. 157). Thus, Muslim religious leaders prohibit the use of illicit drugs, smoking and alcohol. Additionally, contraceptives are prohibited if the goal is to avoid ever becoming pregnant, although women are allowed to regulate the time of childbirth (el-Islam, Malasi, & Abu-Dagga, 1988). Moreover, terminating the life of critically ill patients is controversial and generally not accepted in Islam.

In the early period of Islam (around 1,000 years ago), Muslim health care providers in Islamic countries were leaders in health care (Syed, 2002). Thus, Muslim patients during that time received health care services in their own countries (Lyons, Petrucelli, Bosch, & Barnert, 1978). However, during recent times, Muslims in eastern countries travel to western countries (e.g., U.S.) for health care because it is more established and advanced (Meleis, 1981). Thus, understanding the health behavior of Muslims who live and receive health care services in western countries, specifically the U.S., where Muslims are a growing minority, is of importance.

2.1.3 The Five Pillars of Islam

Islam has five pillars that Muslims are required to believe in and practice. The five pillars are as follows: 1) stating the testimony, which is believing that there is no God except Allah and that Mohammed is the messenger of Allah; 2) praying five times a day; 3) paying the *zakat*, which is a fixed portion (2.5%) of money that is paid by non-poor Muslims to help the poor; 4) fasting during the month of Ramadan; and 5) making the pilgrimage (*Hajj*) to Mecca for every Muslim who is able (Quran 2. 196, (A. H. Blackwell, 2009; Hussain, 2012). The following sections will highlight the Muslim practice of fasting during Ramadan and the rules that govern their lifestyle because this pillar of Islam has the most significant impact on Muslim health care behaviors.

2.1.3.1 Ramadan

2.1.3.1.1 Overview

Ramadan is the ninth month in the Islamic calendar; during this month the Quran was sent to the Prophet Mohammed (Peace be upon him), and it is the only month that is mentioned in the Quran (Quran 2. 185). The purpose of this month is to allow Muslims to experience the hunger and thirst of the poor, so that they can humble themselves. It also allows them to learn how to control their desires and to avoid committing sins, so that they will adopt these practices for the remainder of the year. Moreover, fasting during Ramadan rewards the Muslim with blessings, forgiveness, and the avoidance of hell fire on the Day of Judgment (Melton & Baumann, 2010; Zaidi, 2003). Muslims are required to fast throughout the whole month of Ramadan from sunrise until sunset (Quran 2. 187). Fasting requires Muslims to abstain from eating, drinking and having sexual intercourse. Although smoking is prohibited for Muslims even outside of Ramadan (Quran 2. 183, 187), those who smoke during Ramadan also break the fast. Most importantly, with few exceptions, in addition to abstaining from food and drink between sunrise and sunset, Muslims must also avoid taking oral medications during this time. This will be discussed in more detail in Section 2.2.4.

In general, Muslims are required to avoid committing sins (e.g., lying) at any time; however, during Ramadan, committing sins may decrease their rewards for fasting (e.g., forgiveness and blessing). To increase their rewards, Muslims are encouraged to devote their time to performing good works. Besides fasting, Muslims are expected to: pray

additional prayers (i.e., more than the standard five times per day) each night; donate money to the poor or charitable organizations; recite all or some of the holy Quran; and feed poor people and as well as other Muslims who are ready to break the fast. Regarding prayers, there are two extra recommended prayers: evening prayers and prayers during the final ten days of Ramadan. Evening prayers are performed throughout the whole month, approximately two hours after breaking the fast and these prayers last for one to two hours. The final ten days of prayers occur during the last ten nights of Ramadan during the early hours of the morning; these additional prayers usually last for around two hours (Sakr, 1975).

The last ten days of Ramadan, which includes the second recommended additional prayer, are significant because they include the Night of the Decree (Lailatul Qadar), which is the night when the Quran was sent to the Prophet Mohammad. When Muslims worship during this time, it is equal to the reward of worshipping more than 1,000 months (Quran 97. 1-4). Because the exact day of the Night of the Decree during the last ten days is unknown, Muslims perform additional activities during each of the ten nights to obtain the rewards of this night. These additional activities may include: praying the second additional prayers approximately two to three hours before sunrise; spending all or part of the last ten days in a mosque reciting the Quran and praying; and avoiding sexual intercourse (Melton & Baumann, 2010). Tables 1-3 show prayer schedules for the following: standard prayers (Table 1); standard plus Ramadan extra prayers (Table 2); and Standard plus Ramadan extra prayers plus Ramadan extra prayers during the last ten nights (Table 3).

Table 1: Schedule of standard prayers during Ramadan Day 1 in Austin, Texas: June 18, 2015

Prayer Name	Fajr	Dhuhr	Asr	Maghrib	Isha
Time	5:12 a.m.	1:35 p.m.	5:08 p.m.	8:33 p.m.	9:49 p.m.
Length (minutes)	5	5	5	5	5

Table 2: Schedule of standard and extra prayers during Ramadan Day 1 in Austin, Texas: June 18, 2015

Prayer Name	Fajr	Dhuhr	Asr	Maghrib	Isha	Taraweeh ^a
Time	5:12 a.m.	1:35 p.m.	5:08 p.m.	8:33 p.m.	9:49 p.m.	10:15 p.m. ^b
Length (minutes)	5	5	5	5	5	60-120

^a Extra prayers during Ramadan

^b The prayer time is flexible

Table 3: Schedule of standard, extra prayers during Ramadan and extra prayers during the last ten nights of Ramadan in Austin, Texas: July 7-16, 2015

Prayer	Tahajjud ^a	Fajr	Dhuhr	Asr	Maghrib	Isha	Taraweeh ^b
Time	2:00 a.m. ^c	5:20 a.m.	1:39 p.m.	5:12p.m.	8:34 p.m.	9:49 p.m.	10:15p.m. ^c
Length (minutes)	60-120	5	5	5	5	5	60-120

^a Extra prayers during the ten nights period of Night of Decree

^b Extra prayers during Ramadan

^c The prayer time is flexible

2.1.3.1.2 The Period of Fasting

The period of fasting during Ramadan, that is, the number days of Ramadan as well as the number of hours of fasting, differs from one place to another and from year to year within the same place. Ramadan usually lasts 29 or 30 days, depending on the sighting of the crescent moon during the following month (A. H. Blackwell, 2009; Richards, 1999). Therefore, some places around the globe may start or end observing the month of Ramadan before other places. Moreover, the number of hours of fasting ranges from 12 hours to 22 hours, depending on the variations in daylight from one region to another (Zaidi, 2003). At one extreme, Muslims who live close to or at the equator may fast for 12 hours, whereas at 64 degrees latitude, Muslims may fast for as long as 22 hours (Sakr, 1975). For the latter individuals, religious leaders recommend fasting according to the time in Mecca or Medina in Saudi Arabia, or according to the fasting time in the nearest temperate zone (Muazzam & Khaleque, 1959; Sakr, 1975). Furthermore, variations also occur in the same area or country due to the changes in the season when Ramadan occurs (Malhotra, Scott, Scott, Gee, & Wharton, 1989; Richards, 1999; Sakr, 1975; Zaidi, 2003). The Islamic calendar (*hijri*) rotates through all the four seasons every 32 Islamic years (A. H. Blackwell, 2009; Richards, 1999). Although the number of fasting hours can vary from region to region, in 2014, Muslims in the U.S. fasted between 15 and 17 hours (i.e., sunrise to sunset) during Ramadan.

2.1.3.1.3 Fasting Exemptions

Islam requires Muslims who are post-pubescent and sane to fast during the month of Ramadan. In the Quran (2. 183), God said “**O you who believe! Fasting is prescribed to you, as it was prescribed for those before you (i.e., Jews, and Christians) so that you may (learn) self-restraint.**” However, Islam exempts people from fasting who have medical and other conditions that prevent them from fasting or that would make their fasting difficult (Quran 2. 183). Islam exempts individuals who self-identify or are identified by health care providers as seriously sick. Islam exempts women who are pregnant, have postnatal bleeding, are breastfeeding, or who are menstruating. Because it may make fasting difficult, Muslims who are traveling or residing in another place temporarily are exempt from fasting (Sakr, 1975; Zaidi, 2003). Exempt individuals are instead required to fast at an alternate time (Quran 2. 183). For example, sick people are required to make up fasting when they become healthy or can tolerate fasting. However, if the reason for the exemption persists, Islam permits individuals to feed one poor person for each missed fasting day (Sakr, 1975; Zaidi, 2003).

2.1.3.1.4 The Islamic Rules Regarding Health Care During Ramadan

2.1.3.1.4.1 Overview

As mentioned above, Muslim patients who are ill or have a medical condition, such as pregnancy, are exempt from fasting (Quran 2. 183). The reason for exempting such people is that abstaining from eating and drinking may adversely affect their health and Islam desires Muslims to be healthy (Quran 2. 185). Another reason for the exemption is

that Muslims who fast are required to abstain also from taking medications, with exception of those who are exempt. The following section will describe the Islamic rules regarding the use of medication while fasting.

2.1.3.1.4.2 Islamic Rules Regarding Medication Use While Fasting

Religious people and Islamic authorities have different points of view regarding the use of medications while fasting. They agree on some types of medications and disagree on others. The agreement is based on whether or not the medications are taken orally and pass through the stomach.

Medications are generally classified as oral or non-oral; the latter includes intravenous or subcutaneous injections, eye or ear drops, nasal sprays, and topical medications. Islamic organizations and prominent religious leaders agree that using any type of oral medications violates the fast (Brown, 1947) because they enter the body by mouth and are delivered to the stomach. Some religious organizations consider that using sublingual medications, such as nitroglycerin, does not violate the fast because such medications bypass the stomach. However, not all Islamic organizations agree that using non-oral medications violates fasting during Ramadan. They agree that subcutaneous, intravenous, inhaled, and topical medications such as creams and ointments do not violate the fast. On the other hand, some Islamic organizations consider use of eye and nasal drops as a violation if used excessively, because they perceive that the medication will pass through to the stomach. Moreover, intravenous infusions that contain nutrition are considered a violation of the fast because they provide patients with nutrition via a non-

oral route. More detailed information on medications and medication management will be discussed in Part 2, Section 2.2.4.

2.2 PART TWO: MUSLIMS' HEALTH DURING RAMADAN

2.2.1 General Health

The health of a Muslim is considered valuable and Muslims are required to take care of themselves. Just as Muslims are required to avoid all harmful habits such as smoking, so also are they required to avoid any actions that may adversely affect their health. For example, Islam allows Muslims to avoid praying in front of other people if they feel that their life will be endangered by doing so. In addition, Muslims who travel are allowed to decrease the number of prayer units (*rak'a*) or to combine prayers. In the same vein, Islam encourages Muslims to break the fast if their health is at risk (Zaidi, 2003). However, one study reported that more than 40% (42.8%) of Muslims with type 1 diabetes and almost 80% (78.7%) with type 2 diabetes, still fasted during Ramadan, even though they would have met the exemption criteria (Salti et al., 2004).

2.2.2 The Effect of Fasting on Muslims' Health

The following sections highlight the impact of fasting on lifestyle and disease conditions, both of which impact medication-taking behaviors. In addition, management of these issues during Ramadan will be discussed.

2.2.2.1 Lifestyle Conditions

This section will focus on three Muslim lifestyle conditions: exercise, sleep, and diet. These conditions are recommended to be monitored due to their impact on patients' disease status (Barnard, Jung, & Inkeles, 1994; Fagard, 2001; Sacks et al., 2001). Dietary monitoring and exercise are not just advantageous in controlling glucose levels for patients with diabetes, these tools can also play a preventative role in the development of diabetes. These lifestyle conditions can be affected by the environment (e.g., hot weather) as well as by fasting itself. In addition to Ramadan being a time of fasting, Muslims also spend a considerable amount of time visiting the sick and meeting with relatives during this month. These activities, which require energy and effort, in addition to fasting during Ramadan, may have a significant impact on managing diseases such as diabetes. The following paragraphs will highlight the management of lifestyle conditions including exercise, sleep and diet.

2.2.2.1.1 Exercise

Exercise is one of the lifestyle conditions which health care providers encourage patients to modify. For example, exercise helps diabetes patients better manage their disease state. One study showed that the odds of using antidiabetic, antihypertensive, and dyslipidemia medications were negatively associated with high physical activity and cardiorespiratory fitness (P. T. Williams & Franklin, 2007). These findings highlight the importance of exercise in managing patients' diseases and preventing any further decline in health.

Research has shown that fasting during Ramadan and exercising while fasting helps the body become more efficient at utilizing fat, which will increase skeletal muscle and the liver's ability to store carbohydrates (Stannard, 2011). This would help diabetic patients spare carbohydrates, so they will be less likely to have a hypoglycemic event during fasting. However, exercise is the first behavior that may be affected during Ramadan. Abstaining from food and drink results in low energy and thirst, which negatively impacts exercise (Leiper, Pitsiladis, & Maughan, 2001). Living in hot weather, such as in Saudi Arabia or any other hot regions in and outside of the U.S., may prevent individuals from exercising due to excessive dehydration (Brown, 1947; Shephard, 2013). Dehydration would greatly impact diabetic patients since it is already a symptom of diabetes. Finally, during Ramadan, Muslims spend additional time visiting the sick and meeting relatives. Such activities may mean they have less time for exercising. Choosing times of the day when the temperature is mild or choosing low impact exercises (e.g., walking) may facilitate Muslims to engage in physical activity even when fasting (Shephard, 2013). Another way to help promote exercise is to allocate times every week that would not interfere with visiting the sick and meeting relatives.

2.2.2.1.2 Sleep

A short duration of sleep (e.g., <7 hours) has been associated with increased risk of obesity (i.e., high Body Mass Index (BMI)) and diabetes (Knutson, Ryden, Mander, & Van Cauter, 2006; Knutson & Van Cauter, 2008), as well as with increased stress levels (Schneider, 1976). Obtaining high quality and sufficient sleep during Ramadan may be difficult, especially at the beginning of Ramadan, due to the early waking time (e.g., 2am-

5am). There is no consensus as to whether fasting impairs sleep or not. However, because Muslims break the fast after sunset, eating large amounts of food and consuming large volumes of liquid before bedtime may cause sleep disruptions such as indigestion and frequent urination.

During Ramadan, fasting Muslims usually eat their *Sohour* (i.e., the first meal of the day) before sunrise to prepare them to start fasting, which is in accordance with the Prophet Mohammed's habit of taking the first meal at the last period of time before the sunrise. This habit is practiced by a majority of Muslims (Zaidi, 2003); however, it may lead Muslims who do not get enough sleep before sunrise to engage in sleep during the day. To determine whether those factors or fasting itself are responsible for the change in sleep patterns, researchers (BaHammam, Almushailhi, Pandi-Perumal, & Sharif, 2014) conducted a study on the effects of fasting that controlled for the previously mentioned factors. They found that fasting only decreased the rapid eye movement (REM) sleep stage and had no effect on the other stages or on daytime sleepiness. Therefore, sleep could be managed and improved while fasting by having a fixed sleep–wake schedule and eating low calorie food before going to bed. In addition, avoiding socializing late at night would allow for more sleep (BaHammam, Almushailhi, Pandi-Perumal, & Sharif, 2014).

2.2.2.1.3 Diet

Diet, which is significantly impacted by fasting, can affect medication-taking behavior, especially when medications need to be taken with food. Moreover, diet is very important in patients with diabetes because some Muslims tend to eat a large amount of

sugary food when breaking their fast (Akbari et al., 2005). During Ramadan, Muslims are allowed to eat a variety of food (Athar, 2005); however, different countries have their own traditional meals, some of which may negatively affect diabetes. Thus, Muslims in the U.S. may have different diets due to varying countries of origin. There are specific terms for meals during Ramadan: *Sohour* is the first meal Muslims eat before they begin fasting (i.e., one to one and a half hours before sunrise) and *Iftar* (i.e., breakfast) is the second meal Muslims eat immediately after sunset to break the fast. Another term that is not specific to Ramadan is *Asha* (i.e., dinner), which is the meal that Muslims eat three to four hours after *Iftar*.

In non-Islamic countries such as the United Kingdom (UK), Muslims' *Sohour* consists of foods rich in protein and vitamins, and *Iftar* consists of sweet snacks such as dried fruits, whereas *Asha* includes nonspecific food (Zaidi, 2003). In Islamic countries such as Morocco, at *Sohour*, Muslims eat food that is similar to breakfast food, whereas at *Iftar*, the food consists mainly of fat and carbohydrates, and at *Asha*, their food consists of animal protein (Aadil et al., 2004). On the other hand, in Saudi Arabia and Kuwait, where Muslims are the majority and the Gross Domestic Product (GDP) is high, the diet differs from other Islamic countries with low GDPs. In Saudi Arabia, people have the same number of meals, but for the first meal (*Sohour*), they eat animal protein. In Kuwait, Muslims tend to eat a large amount of sweet food and they drink a large quantity of fluid at one time to compensate for fasting (Aslam & Assad, 1986). Similarly, Muslims in Malaysia also eat more sweet food. Thus, Muslims in the U.S., who come from different

countries may have diverse diets that may impact management of disease states during Ramadan, such as diabetes (Mafauzy et al., 1990).

These different types of food may elevate blood glucose and lipid levels, which can negatively affect health outcomes. Eating a large amount of sugary food, especially during the *Iftar* or *Sohour* meals, may lead to elevated blood glucose levels and increased body weight. Regarding the change in total body weight, some studies have shown that weight increased during Ramadan (Bakhotmah, 2011; Frost & Pirani, 1987), other studies have shown a decrease (Al-Hourani & Atoum, 2007; Azizi & Rasouli, 1987; Hajek, Myers, Dhanji, West, & McRobbie, 2012; Hallak & Nomani, 1988; Ziaee et al., 2006), whereas one study showed no difference in weight (El Ati, Beji, & Danguir, 1995). Hajek et al.'s (2012) study showed that even when Muslims lose an average of one kilogram of weight over the month of Ramadan, they quickly gain it back after Ramadan.

2.2.2.2 Exempt Medical Conditions

As mentioned above, medical conditions exempt from fasting during Ramadan include pregnancy and breastfeeding (Zaidi, 2003); however, most pregnant and breastfeeding women fast because they believe it is not harmful, but healthy. The literature is inconclusive on this issue (Cross, Eminson, & Wharton, 1990; Malhotra et al., 1989; Prentice, Prentice, Lamb, Lunn, & Austin, 1983; Zaidi, 2003). In the U.S., Robison and Raiser (2005) estimated that 60%–90% of pregnant American Muslims fast during Ramadan, and the prevalence of fasting among immigrant pregnant Muslims is likely to be higher.

Pregnant women may have more health problems than breastfeeding women when fasting during Ramadan. Pregnant women need food to nourish their fetus, and thus fasting could have a negative impact on their health. Studies have shown that pregnant women who fast have metabolic changes, such as a decrease in glucose concentrations and an increase in fatty acids and ketones (Malhotra et al., 1989; Prentice et al., 1983); however, there was no clear evidence that these changes negatively impacted the outcome of the pregnancy (Zaidi, 2003). Another study showed that Ramadan had no effect on the prevalence of low birth babies in full-term pregnancy (Cross et al., 1990). Previous studies on the issue, however, were conducted outside the U.S. and in countries that have different lifestyle conditions. Regarding breastfeeding women, fasting leads to dehydration and changes in the plasma osmolality, uric acid, lactose, sodium, and potassium content of the breast milk. Although pregnant women are permitted to fast under health care provider supervision, breastfeeding women are not because of the potential to harm the baby as detailed above (Azizi, 2010).

2.2.2.3 Disease Conditions

Islam ranks the individual's health as the first priority, and therefore, Muslims with uncontrolled disease states are not required to fast. However, Muslims tend to fast regardless of their health condition, for example, more than two-thirds of type 2 diabetics fasted during Ramadan (Salti et al., 2004). Fasting may exacerbate health problems if the patient's health is poor or if s/he does not properly manage the condition. Regarding fasting during Ramadan, the medical condition most frequently cited in the literature is diabetes (Laajam, 1990; Mafauzy et al., 1990; Pinelli & Jaber, 2011; Salti et al., 2004; Sulimani et

al., 1991; Uysal et al., 1998). This focus was driven by the fact that the prevalence of diabetes among those ≥ 20 years old worldwide in 1995 was 4.5% and it is expected to rise to 5.4 % in 2025. These prevalence rates are similar in both eastern countries where Muslims are majority and in western countries where Muslims are a minority (King, Aubert, & Herman, 1998). However, in Arabic Gulf countries (e.g., Saudi Arabia, Qatar, Kuwait, the United Arab Emirates and Bahrain) where Muslims are the majority (~95%), more than 19% of the population are diabetic (Alqurashi, Aljabri, & Bokhari, 2011; Whiting, Guariguata, Weil, & Shaw, 2011). Another study showed that among all age groups, diabetes prevalence in 2000 was 2.8% and it is expected to rise to 4.4% by 2030 and in urban developing countries where Muslims are a majority, diabetes is expected to double from 2000 to 2030 (Wild, Roglic, Green, Sicree, & King, 2004). The World Health Organization 2016 report documents the prevalence of diabetes in the following Islamic countries as: 16.2% in Egypt, 13.2% in Iraq, 13.1% in Jordan, 12.6% in Lebanon, 12.4% in Morocco, 9.8% in Pakistan, and 8% in Bangladesh. Although the focus of this dissertation is diabetes, other disease conditions (e.g., chronic kidney disease, cardiovascular disease, hypertension, hyperlipidemia, and asthma) that are impacted by fasting are briefly discussed. The next section discusses the impact of fasting during Ramadan on diabetic patients and management strategies, followed by Ramadan's impact on other disease conditions.

2.2.3 The Effect of Fasting on Patients' Disease Conditions

2.2.3.1 Diabetes

Most of the literature shows that patients with well-controlled diabetes are unlikely to experience complications due to fasting. Most of these studies were conducted in countries where Muslims are a majority (Mafauzy et al., 1990; Salti et al., 2004; Sulimani et al., 1991) and some in countries where Muslims are a minority (Pinelli & Jaber, 2011). Salti et al. (2004) examined 13 Islamic countries and found that out of 12,243 diabetic patients, 42.8% of type 1 ($n = 1,070$) and 78.7% of type 2 ($n = 11,173$) diabetic patients fasted at least 15 days during Ramadan. The percentage of type 1 patients who fasted during Ramadan varied widely among the 13 countries: from 9.4% in Morocco to 71.6% in Saudi Arabia. The study showed that among these patients, 9% of type 1 and 2% of type 2 diabetic patients experienced severe hypoglycemia that required hospitalization, while 13% of type 1 and 4% type 2 diabetic patients experienced severe hyperglycemia that required hospitalization. The authors reported that among those with severe hypoglycemia, modifications to oral antidiabetic medications and insulin doses and/or their level of physical activity may have led to the complications (Salti et al., 2004). On the other hand, in a small study conducted in the U.S., (Pinelli & Jaber, 2011) the authors found that out of 27 patients with type 2 diabetes who fasted during Ramadan, two (7.4%) had hypoglycemia and four (14.8%) had hyperglycemia. Importantly, the same study found that among these 27 patients, 46% received no education on medications during fasting, 62% received no education on the risks of fasting, 69% received no education regarding when to break fasting, 88% received no education on meal plans when fasting, and 85%

received no education on exercise when fasting. Among these patients, 73% reported that they engaged in less exercise during Ramadan, 25% decreased the frequency of blood glucose testing, and 17% did not test their blood glucose at all during Ramadan. The authors concluded that the frequency of complications due to fasting among patients with type 2 diabetes (N=27) was 22%, and those that occurred may have been the result of a dearth of education on how to manage fasting during Ramadan.

Regarding diabetic patients' hemoglobin A1c, some studies reported a decrease during Ramadan, which indicated a positive impact of fasting (Mafauzy et al., 1990; Sulimani et al., 1991). However, another study reported an increase in hemoglobin A1C during Ramadan (Laajam, 1990). In addition, another study showed that the increase in patients' hemoglobin A1C during Ramadan returned to normal levels after Ramadan (Uysal et al., 1998). Sulimani et al. (1991) concluded that more studies are needed to determine whether fasting during Ramadan affects diabetic patients' hemoglobin A1C levels.

To summarize the preceding studies, the incidence of hospitalization due to fasting during Ramadan among patients with diabetes ranged from 2%–15% and results regarding changes in hemoglobin A1C were inconclusive. In fact, fasting may improve lipid values of diabetic patients, including a significant increase in HDL cholesterol levels (Uysal et al., 1998), which is associated with decreased cardiovascular risk. The previous studies were mostly conducted over the past 20 years and to our knowledge, no recent studies have been conducted to examine the effect of fasting on diabetes patients. Because of the increased

prevalence of diabetes and increased numbers of Muslims in the U.S., more studies are needed to better understand how to manage their diabetes during Ramadan.

2.2.3.2 Other Diseases

In addition to diabetes, other diseases have been studied to determine the effects of fasting on health outcomes. Among these are chronic kidney disease (Bernieh, Al Hakim, & Boobes, 2010; Ghalib et al., 2008), cardiovascular disease (Chamsi-Pasha & Ahmed, 2004; Hadi, Bener, Osman, Al-marri, & Al Suwaidi, 2012), hypertension (Perk, Ghanem, Aamar, Ben-Ishay, & Bursztyn, 2001b; Ural et al., 2008), hyperlipidemia (Akanji, Mojiminiyi, & Abdella, 2000), bipolar disorder (Farooq et al., 2010) and asthma (Erkeköl et al., 2006). In patients with chronic kidney disorders, fasting during Ramadan caused an improvement in kidney function, which was exhibited by elevated glomerular filtration rates (Bernieh et al., 2010), whereas in another study fasting had no effect in (Ghalib et al., 2008). Two studies showed that 86% (Chamsi-Pasha & Ahmed, 2004) and 100% (Hadi et al., 2012) of cardiac patients were able to fast the entire month of Ramadan without any adverse events. Patients with hypertension who took their medications as prescribed were not negatively impacted by fasting during Ramadan (Perk et al., 2001b). Even patients with moderate to severe hypertension who used combination drug therapy did not have suboptimal outcomes due to fasting (Ural et al., 2008). Dyslipidemic patients who fasted showed an improvement in their lipid levels, which could lead to reduced risk of coronary heart disease (Akanji et al., 2000). Finally, in patients with bipolar disorder, patients who fasted showed no changes in their bipolar condition (Farooq et al., 2010). Overall, fasting

had either a positive effect or a neutral effect on patients with chronic kidney disease, dyslipidemia, cardiovascular disease, hypertension and bipolar disorder patients.

2.2.3.3 Disease Management

In general, patients are encouraged to manage their disease conditions by conducting self-monitoring tests, watching for any signs of complications, and managing their medication regimens. Such management is highly recommended when changes in treatment regimens or lifestyle occur. In the same way, Muslim patients need to manage their disease while they are fasting, due to both the effects of fasting and of Ramadan-related social activities (e.g., time devoted to visiting relatives and the poor), which can be extensive and may impact patients' ability to self-manage their disease. Different diseases have different management strategies, and therefore, specific information about managing diabetes and other diseases will be provided in the following section.

2.2.3.3.1 Diabetes Management

Diabetes, as mentioned before, is the most frequently studied disease in relation to Ramadan. Patients' methods of managing diabetes have been examined before and during Ramadan, in countries where Muslims are the majority (Salti et al., 2004) and in countries where Muslims are in the minority (Bénédicte Gaborit et al., 2011; Mygind et al., 2013; Pinelli & Jaber, 2011). Both types are included here to illustrate how patients who live in different countries and have employed various strategies in managing disease states during Ramadan.

Salti et al. (2004) found that in 13 countries where Muslims are the majority, approximately one-half of patients (N = 12,243) reported engaging in moderate to light physical activity during Ramadan. The authors also stated that their sleeping duration, physical activity, food intake, sugar intake, and weight remained unchanged during Ramadan. The same study found that among patients with type 1 diabetes, 76% received help managing their disease state from relatives, whereas among those with type 2 diabetes, this percentage was slightly lower (69%). Regarding blood glucose control and self-management, 89% of patients with type 1 diabetes and 80% of patients with type 2 diabetes received recommendations and education from their physicians. This high percentage of education provided by physicians, however, did not translate into similar levels of self-monitoring of blood glucose levels. Only 67% of type 1 and 37% of type 2 diabetes patients monitored their blood glucose. During Ramadan, Salti et al. (2004) reported that 68% of type 1 (N=727/1,070) and 62% of type 2 (N=9,627/11,173) diabetes patients received recommendations regarding fasting from their health care providers; 65% and 57% of patients with diabetes type 1 and type 2, respectively, agreed that they had different meals than their non-diabetic relatives, and 73% of type 1 diabetics and 55% of type 2 diabetics agreed that they could break their fast during Ramadan. Even though, as stated previously, many chose not to break the fast during Ramadan (42.8%, 78.7%, respectively).

Studies conducted in Denmark (Mygind et al., 2013), France (Bénédicte Gaborit et al., 2011), and the U.S. (Pinelli & Jaber, 2011), where Muslims are in the minority, had different findings related to lifestyle and the engagement of health care providers. In a small Denmark study, Mygind et al. (2013) reported that all diabetic patients (N=6) fasted

during Ramadan, and stated that the issue of fasting during Ramadan was “a secret.” This may indicate that patients were not comfortable discussing fasting or they may have viewed fasting as a personal matter. In France, 51% of diabetics (N=101) fasted during Ramadan (Bénédicte Gaborit et al., 2011). Sixty-four percent of diabetic patients in France (N=64/101) (Bénédicte Gaborit et al., 2011) and only 17% of diabetic patients in Denmark (N=1/6) (Mygind et al., 2013), stated that they consulted with their health care providers. In the U.S., Pinelli and Jaber (2011) found that over one-half (55.6%) of diabetic patients (N=15/27) were physically active before Ramadan, and of those (N=15), 73% were less active during Ramadan. Further, two-thirds of these patients (67%) (N=18/27) consulted with their health care provider prior to fasting. However, out of the study sample (N=27), a significant number of these individuals failed to receive education regarding medications (46%), risks of fasting (62%), indications to break fasting (69%), meal plans (88%), and exercise (85%). During Ramadan, five out of 27 patients (19%) either decreased or stopped self-monitoring their blood glucose levels. Collaboration among health care providers on managing patients with diabetes is needed during Ramadan. Research showed that in countries where Muslims are the majority (Salti et al., 2004), the frequency with which health care professionals provided recommendations and education was higher than in countries where Muslims are in the minority (89% vs. 17%-67%, respectively) (Bénédicte Gaborit et al., 2011; Mygind et al., 2013; Pinelli & Jaber, 2011). The high level of health care recommendations in countries where Muslims were a majority, however, did not result in patients’ performing more self-monitoring activities. A smaller percentage of patients in European countries, 64% in France (N=65/101) and 17% in Denmark (N=1/6), were

counseled by their health care providers regarding fasting (Bénédicte Gaborit et al., 2011; Mygind et al., 2013), while in the U.S., 67% (N=18/27) of diabetic patients surveyed received counseling in regard to fast or not from their health care providers (Pinelli & Jaber, 2011). On the other hand, Pinelli and Jaber found that 46% of diabetic patients (N=12/27) mentioned that they did not receive education regarding medication management (Pinelli & Jaber, 2011). It is important to mention that the U.S. study was conducted in Michigan, which has the largest number and proportion of Arabs in the U.S. Therefore, it may be easier for patients to consult health care providers who share the same religion or culture. Because of the unique patient population, the findings from the Pinelli & Jaber (2011) study may be more similar to countries where Muslims are a majority. Additionally, external validity may be limited due to its small sample size (N=27). However, no literature was identified regarding the relationship and communication between patients with diabetes and providers in other states in the U.S. where Muslims comprise a smaller percentage of the population.

2.2.3.3.2 Management of Other Diseases

Fasting could be helpful in managing a disease such as dyslipidemia and fasting is also associated with other favorable lifestyle modifications (e.g., smoking avoidance) that lower cardiovascular risk (Phumipamorn, Pongwecharak, Soorapan, & Pattharachayakul, 2008). Approximately 90% of cardiac patients, for example, were adherent to medication usage and diet during Ramadan (Hadi et al., 2012). Most patients favor fasting during Ramadan, even if their health care providers exempt them from fasting. Therefore, health care providers need to advise these patients on how to fast, how to manage their disease

conditions more carefully; and to monitor for signs and symptoms of health deterioration. For example, bipolar patients should be advised about maintaining good sleep hygiene and adequate levels of fluids and electrolytes, as well as avoiding changes in their medication regimen timing (Farooq et al., 2010). Although Islam permits asthmatic patients to use their inhaler medications while fasting during Ramadan, Erkeköl et al. (2006) found that, out of 80 asthmatic patients, 70 (87%) did not. Due to the importance of regularly using inhaled corticosteroids, which is allowed while fasting, Erkeköl et al. (2006) recommended that physicians stress the importance of adhering to their inhaler medications and that they provide information regarding fasting and medication usage from appropriate sources. It is also important to advise patients to avoid certain activities, such as exercise (e.g., for exercise-induced asthma), especially if patients are not adherent to their controller medication (Qaisi, 2000).

In summary, it is also recommended that Muslim patients self-manage their disease conditions to eliminate problems that may occur due to fasting. Health care providers should play a major role in educating patients about managing their disease conditions during Ramadan while respecting their religious preferences. Patient self-management is one part of managing their disease, and the other part would be managing their medications. However, some Muslims' perspectives on medication use may lead to adverse outcomes. The next section will explore these issues.

2.2.4 Muslims Medication Use During Ramadan

2.2.4.1 Overview

In addition to patients' disease conditions, patients' medication usage is also affected by fasting because the religion of Islam considers the use of oral medications to be a violation of fasting. However, when fasting can have a negative impact on health, Islam exempts Muslims from fasting. Although exemptions are permitted, Muslims have a different perspective regarding fasting during Ramadan. Some of them consult their health care providers to determine whether they can modify their medication schedule to accommodate fasting (Pinelli & Jaber, 2011), whereas 58% of diabetic patients change their medication schedule on their own (Aslam & Healy, 1986). Disease type and severity, and previous health-related experiences all play major roles in determining whether patients consult with their health care providers. The following section will discuss Muslim patients' perspectives on fasting and how they manage their medications during Ramadan.

2.2.4.2 Medication Management During Ramadan

During the month of Ramadan, Muslim patients differ in their medication usage; some of them change their medication usage and others do not. Change in medication use includes stopping medications, combining multiple doses into a single dose, and changing medication type, form, time, or dosage. Some of these changes are recommended by health care providers, while others are not. Below is a review of the available limited evidence regarding medication management during Ramadan.

In a general population of patients in Arabic and non-Arabic countries, a survey showed that 58% (N=47/81)–64% (N=209/325) of Muslim patients changed their medication usage to enable fasting during Ramadan (Aslam & Assad, 1986; Aslam & Healy, 1986). Among these changes, 35 (75%) out of 47 patients stopped using their medications during fasting hours or altogether (Aslam & Healy, 1986), 17% (N=8/47)–82% (N=171/209) changed their medication schedule (Aslam & Assad, 1986; Aslam & Healy, 1986), and 8% (N=8/47)–18% (N=37/209) combined multiple doses into a single dose (Aslam & Assad, 1986; Aslam & Healy, 1986). Combining medications doses in a single dose may elevate the possibility of having drug toxicity (Aslam & Assad, 1986). Regarding specific disease populations, two studies examined how diabetics modify their medication regimens to accommodate fasting. They found that, overall, 7 (32%) out of 22 diabetics changed their medications (e.g., dosing intervals, time) (Mafauzy et al., 1990), and 12 (46%) out of 26 patients who used oral glucose-lowering medications changed their medications (i.e., change medication time, increase dose, and decrease dose) (Pinelli & Jaber, 2011). A population-based study found that, out of 1,070 type 1 diabetic patients, 351 (33%) changed their insulin dose (i.e., decrease, increase, or stop), and 20 (2%) changed their oral glucose-lowering medications, and out of 11,173 type 2 diabetic patients, 657 (6%) changed their insulin dose, and 2,391 (22%) changed their oral glucose-lowering medications (Salti et al., 2004). Using insulin is not considered a violation of fasting by most Islamic organizations; even so, 33% (N=351/1070) 50% (N=2/4) of insulin users made changes (Pinelli & Jaber, 2011; Salti et al., 2004). Among Muslims with asthma (N= 80) , 70 (87%) patients rearranged their medication usage at the *Iftar* and *Sohour* time,

and among those 70 asthmatic patients, 48 (69%) stated that they would not use their symptom-relieving medications during fasting, even though Islam considers inhaler medications acceptable to use while fasting (Erkeköl et al., 2006).

2.2.4.3 The Effect of Medication Usage Modification on Patients' Health

2.2.4.3.1 Overview

Researchers have investigated whether avoiding or changing medication use while fasting during Ramadan negatively affects patients. The answer to this question depends on what changes occur in medication usage, what diseases the patients may have, the patients' diet, and whether the changes were approved by health care providers.

Changes in medication usage could be safe or could lead patients to have serious problems. Stopping medication without counseling by health care providers could lead to severe health problems, especially for patients with chronic diseases. For example, one study reported that after the first two weeks of Ramadan, two Muslim patients were admitted into the intensive care unit after stopping their medications (one of which was an inhaler) during Ramadan fasting hours (Wheatly & Shelly, 1993). Changing the medication time can also lead to problems; even when a medication works well in the morning, taking the medication at night could lead to an increase in the medication's toxicity. For example, a 57-year-old woman switched from using digitalis in the morning to the evening, which was when she also took her thiazide diuretic. This time modification and drug interaction caused a decline in potassium levels and increased sensitivity of the heart muscle to digitalis (Aslam & Assad, 1986). Another study showed a significant difference in

theophylline absorption when taken at 8 p.m. (around 2 hours after breaking the fast) versus 4 a.m. (immediately before the fast), with 4 a.m. having better absorption (Aadil et al., 2000). Increasing absorption permits the medication to reach its therapeutic level in a short period of time. Problems associated with changing a medication dosage arise when patients are unaware of the instructions on using the new dosage. For example, Muslim patients may prefer insulin to oral antidiabetics during Ramadan because insulin does not break the fast, but using subcutaneous insulin without understanding the proper procedures, such as rotating the injection site, could lead to tissue necrosis. Changing multiple doses to a single dose can lead to drug–drug interaction when a large dose is administered with another medication or high dose toxicity when the dose is increased without monitoring. One solution may be to switch patients to long-acting medications that are taken once a day.

Changes in medication usage can lead to various problems, depending on the disease state. The degree of problems associated with changes in medications that treat acute illnesses (e.g., infectious diseases) rather than chronic diseases (e.g., epilepsy) differs. Changes in medications that treat acute illnesses may have little impact. For example, changing a medication's timing may not lead to a problem in treating cold symptoms. However, stopping the use of antibiotics that treat pneumonia may lead to recurrence of the infection or prolongation of the treatment. Similarly, changing chronic disease medication use for illnesses such as diabetes, hypertension and dyslipidemia may or may not lead to problems (Belkhadir et al., 1993; Kadiri et al., 2001; Mafauzy et al., 1990; Mustafa, Mahmoud, Gumaa, & Gader, 1978; Uysal et al., 1998), whereas changing medication use in other diseases, such as epilepsy, may. For example, 20 out of 27 Muslim

patients with idiopathic epilepsy, experienced seizures because they stopped taking their medication while fasting (Etemadyfar, 2001), whereas, changing the timing of some antihypertensive agents may have a little effect (Habbal, Azzouzi, Adnan, Tahiri, & Chraibi, 1998; Perk, Ghanem, Aamar, Ben-Ishay, & Bursztyn, 2001a). Aadil et al. (2004) summarized the results of pharmacokinetics and pharmacodynamics of selected medications that may lead to problems if patients take them in the evening, which is common among Muslims during Ramadan (Table 4).

Table 4: Selected medications with variations in pharmacokinetics and pharmacodynamics

Medication	Variation
Propanol	Absorbed more rapidly after morning dose than after evening dose.
Nifedipine	Immediate release had higher peak concentration and shorter time to peak concentration after morning dose than after evening dose, and bioavailability in the evening dose was reduced by about 40%.
Digoxin	Dose at 8 am reached maximum plasma concentration in shorter time (54 minutes) than 8 pm dosing (96 minutes).
Diltiazem	Extended release dose administered at 10 pm had 17% and 22% greater bioavailability than 7 am or 8 am dose, respectively.
Enalapril	Dose at 7 am would significantly reduce blood pressure during the day but was less effective at night. While, a dose at 7 pm significantly decreased blood pressure at night, followed by slow increase during the day.
Theophylline	Dose at 3 pm achieved therapeutic concentration during the night avoiding toxic concentration during the day.
Inhaled steroids	Doses between 3 pm and 5:30 pm were considered optimal.
Prednisone	Oral dose at 3 pm has been shown to be more effective in improving nocturnal asthma than dosing at 8 pm.
Cimetidine	Dose administered at bedtime has been shown to be more effective in reducing acid secretion promoting ulcer healing, and reducing ulcer recurrence than the morning dose.
Ibuprofen	Rate and extent of absorption of 8 am dose of coated formulation were lower than at 10 pm.

Ref: Aadil, N., Houti, I., & Moussamih, S. (2004). Drug intake during Ramadan. *BMJ: British Medical Journal*, 329(7469), 778.

Changing the usage of long-term oral anticoagulants did not lead to problems; in fact, studies have shown that there was no statistical difference in the incidence of thromboembolism between patients who fasted and then took an anticoagulant at night and those who did not fast and took the medication as usual (Saour, Sick, Khan, & Mamo, 1989). Finally, negative lifestyle and medication changes may lead to problems in disease

control. Excessive work and poor diet and/or bad self-management of diseases combined with a change in medication use may cause medical problems. As mentioned above, during Ramadan, many Muslims tend to eat food that is rich in sugar and what is considered traditional food to them, and this may not be known to U.S. health care providers. Therefore, health care providers may change patients' medication doses to doses that are not sufficient to treat them or that could lead to drug-food interactions. For example, diabetics' eating a large amount of carbohydrates after they have stopped taking their medications during Ramadan may result in hyperglycemic episodes and severe health problems. Aadil et al. (2004), summarized the literature regarding commonly encountered drug-food interactions and recommendations to avoid them (see Table 5).

Table 5: Commonly encountered drug–food interactions and recommendations

Medication	Drug-Food Interaction	Recommendation
Levothyroxine	Decreased absorption when taken with high fiber diets, and high absorption when taken on an empty stomach	Should be taken one hour before eating, at the same time every day
Digoxin	Absorption inhibited and effect decreased if taken with high fiber foods	Should be taken one or two hours before eating
Verapamil	Absorption increased when taken with grapefruit products	Patients should avoid grapefruit products to avoid side effects
Theophylline	Eating a low–carbohydrate and high protein diet increases drug elimination	Should be taken on an empty stomach
Loratadine	Taking with food slows the absorption and increases the total amount absorbed	Should be taken on an empty stomach
Bisphosphonates	Food, black coffee, or orange juice decreases bioavailability	Should be taken with water after overnight fast and 30 minutes before ingesting any food or beverage

Ref: Aadil, N., Houti, I., & Moussamih, S. (2004). Drug intake during Ramadan. *BMJ: British Medical Journal*, 329(7469), 778.

In conclusion, changes in medication use that are supervised by health care providers tend to be safe for patients. The problems occur when patients change their medication use without consulting their health care providers. Health care providers should be aware that Muslim patients have a strong desire to fast during Ramadan, and providers should show them how to modify their medications so that safety and effectiveness can be maximized. A study showed that 18 (67%) out of 27 type 2 diabetes Muslim patients in the U.S. consulted their health care providers before fasting during Ramadan (Pinelli & Jaber, 2011). Some patients, however, believe that fasting during Ramadan is their choice and

they have no desire to consult their health care providers (Mygind et al., 2013). Therefore, health care providers should be open to patients' preferences regarding fasting and support them in achieving their religious and health-related goals.

2.2.4.3.2 Muslim's Perspective on Medication Usage

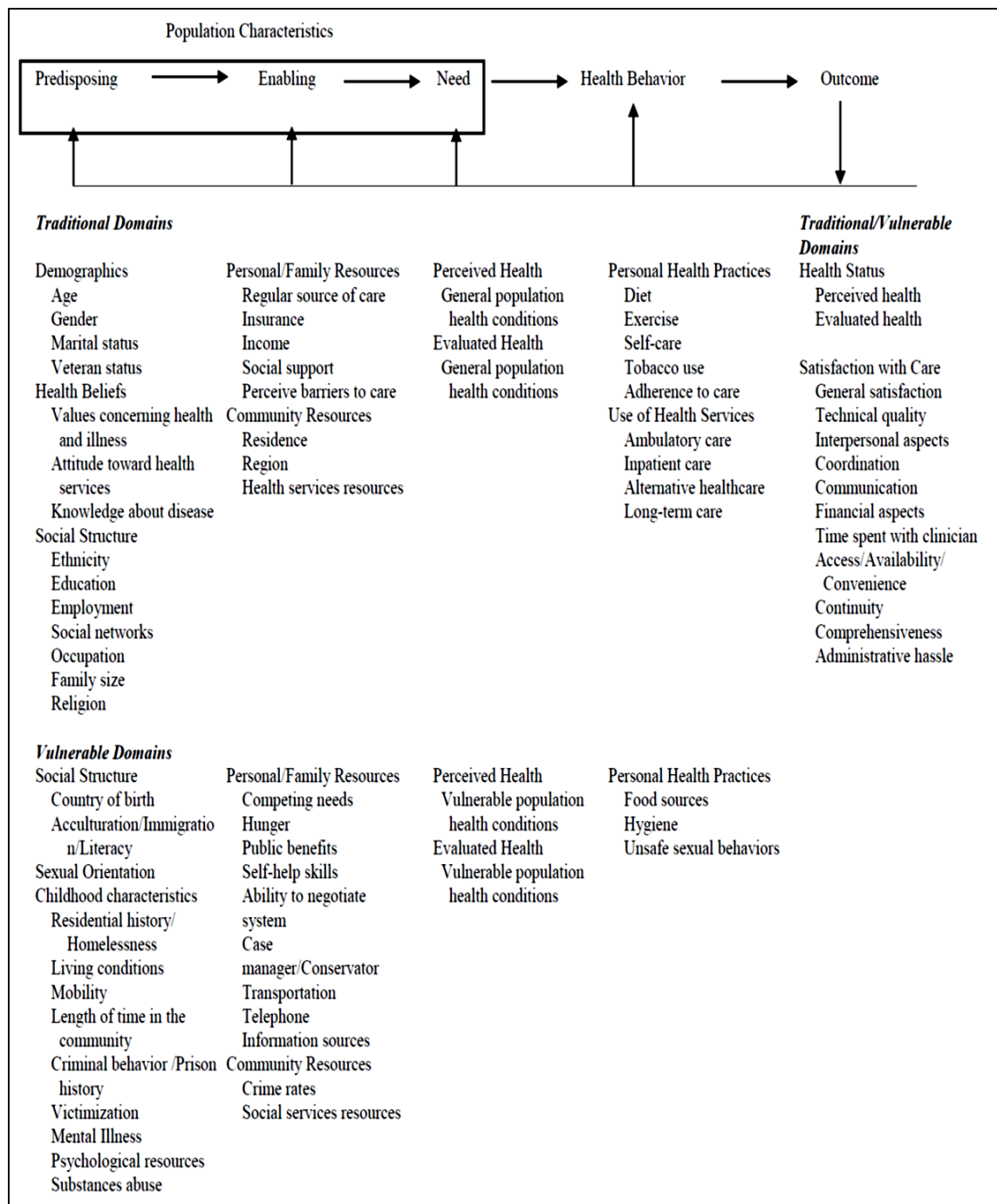
Muslims' perspectives regarding what medications violate fasting differ, even among medications that do not violate fasting. As mentioned above, almost two-thirds of type 2 diabetes patients, despite religious exemptions, do not take their medications while fasting (Salti et al., 2004; Wheatly & Shelly, 1993). Patients with type 2 diabetes know that Islam exempts them from fasting, but they chose to fast regardless (Mygind et al., 2013). Individuals with chronic illnesses who are exempt typically choose to fast because they perceive that their conditions are lifelong. Not fasting during one's entire life is considered unacceptable to many Muslims due to their strong religious beliefs. Some Muslims will take their medications if their conditions worsen. Furthermore, even among those patients who use non-oral medications (e.g., eye drops) that do not violate the fast, some still prefer to not use them (Wheatly & Shelly, 1993). Knowing the factors that may help patients better manage their medications during Ramadan is important especially when Muslim patients live in countries where they are in the minority, such as the U.S.

2.3 PART THREE: FACTORS THAT AFFECT MUSLIMS' HEALTH CARE UTILIZATION AND MEDICATION USE

2.3.1 Overview

A variety of factors could impact patients' health care utilization, and specifically, their medication use. Little is known, however, about what factors impact the medication use of Muslims, especially during Ramadan among those with diabetes. This is especially important because changes in medication use such as omitting, increasing, decreasing, or combining doses may lead to negative health outcomes. Because of religious, cultural, and historical issues, factors affecting Muslims are likely to differ from those affecting non-Muslims. Andersen and colleagues' (Gelberg, Andersen, & Leake, 2000) Behavioral Model for Vulnerable Populations (Figure 6) was used as a framework for examining factors that may impact medication use among diabetic Muslims during Ramadan.

Figure 1: The Behavioral Model for Vulnerable Population



Ref: Gelberg, L., Andersen, R. M., & Leake, B. D. (2000). The Behavioral Model for Vulnerable Populations: application to medical care use and outcomes for homeless people. *Health Services Research*, 34(6), 1273.

The model indicates that factors such as demographics, health beliefs, and social structure may *predispose* individuals to utilize health care (e.g., medication use). It also shows that personal, family, and community resources *enable* individuals to access services. Lastly, the model indicates that an individual's perceived health (e.g., quality of life, health status) and evaluated health (e.g., clinical values) comprise *need* factors. According to the model, each of these three factors (i.e., predisposing, enabling, and need) predict a patient's utilization of health care services. The adaptation for vulnerable populations specific to the Muslim population may include the following: predisposing factors, such as country of birth, acculturation, and immigration status; enabling factors, such as ability to navigate the health care system and access to social services; and need factors, such as unique issues specific to vulnerable populations. For example, in this study, need might involve a Muslim's choice to reject fasting exemptions for diabetes. Specifically, although Muslim patients may have a high need for care, during Ramadan, their perceptions of need may diminish in light of fasting. The following sections will provide a brief review of what is known about predisposing, enabling, and need for care factors that impact medication use among the general population, followed by what is known about Muslims. However, because most studies do not focus specifically on Muslims, and because studies of the general population do not collect data on religion (which would facilitate comparisons between Muslims and non-Muslims), Muslim-specific literature examining factors that impact health care utilization is extremely limited (Abdul-Rahman, 2007; Hammoud, White, & Feters, 2005; Inhorn & Fakih, 2006; Inhorn & Serour, 2011; Jaber, Brown, Hammad, Zhu, & Herman, 2003; Mygind et al., 2013;

Yosef, 2008). When relevant and available, the review will also include information about other ethnic minorities (e.g., Hispanics, African Americans) who may have vulnerability characteristics similar to those of Muslims (e.g., acculturation, low literacy) and about other health care services (e.g., physician visits).

2.3.2 Predisposing Factors

The predisposing factors reviewed below are demographics, health beliefs, and social structure. The impact of each factor on health care utilization will be highlighted in general, minority, and Muslim populations (when available).

2.3.2.1 Demographic Factors

2.3.2.1.1 General and Minority Populations

Demographic factors prevalent in the literature include age, gender, and marital status. Overall, patients who are older or elderly (de Boer et al., 1997; Kaufman, Kelly, Rosenberg, Anderson, & Mitchell, 2002; Lassila et al., 1996; Mueller et al., 1997; Poisal & Chulis, 2000; Shi, 2000; Wolinsky et al., 1995), female (de Boer et al., 1997; Mueller et al., 1997; Poisal & Chulis, 2000), and married (Hammond, Matthews, & Corbie-Smith, 2010; Insaf, Jurkowski, & Alomar, 2010) have higher rates of medication utilization. Regarding physician visits, a study found that younger males (19–39 years) were less likely to visit their health care provider in the preceding year (R. M. Andersen et al., 2002). Also, female patients see their doctors more often than males (Broyles, McAuley, & Baird-

Holmes, 1999; Dhingra et al., 2010; Jorm, Parslow, Christensen, & Jacomb, 2002), which may explain their higher medication utilization rates.

Regarding minority populations, African American married men were more likely to schedule routine visits than single African American men (Hammond et al., 2010), and similarly, single Latino females were more likely to delay care than married Latino females (Insaf et al., 2010). Among Hispanic Americans, younger women were more adherent to cervical cancer screening than older women (P. Gonzalez et al., 2012). In Asian American populations, being an older adult (age 35–65) and being female were associated with a higher rate of antidepressant use than being a younger adult (age 18–35) and male (H. M. Gonzalez et al., 2010). Among Latino immigrants, older women had more mammograms than younger women (Graves et al., 2008; Nandi et al., 2008), and males were more likely to have access to a regular source of health care (Graves et al., 2008; Nandi et al., 2008).

2.3.2.1.2 Muslim Populations

As mentioned above, studies of population's health care utilization do not typically collect data on individuals' religion, and thus identifying how the demographic characteristics of Muslims impact medication use is challenging. According to the Pew Research Center, American Muslims totaled 2.75 million in 2011. Of these, 42.9% are adults (i.e., age 18 or older), 55% are male, and 55% are married. Regarding age, a study found that elderly Arab American men and women had higher impaired fasting glucose, impaired glucose tolerance, and diabetes compared to the non-elderly (Jaber et al., 2003). Importantly, these findings did not mention whether the Arab American patients were

Muslims or not, so generalizing these findings to Arab American Muslims may not be valid. Therefore, it was not possible to clearly identify the impact of age, gender, and marital status on Muslim patients' health care utilization because, to our knowledge, most previous studies of Muslim patients did not include these variables.

2.3.2.2 Health Belief Factors

Patients' beliefs include values concerning health and illness, attitudes toward health services, and knowledge about diseases. These beliefs may have positive or negative influences on patients' medication utilization. Since patients' values concerning health and illness directly affect their attitudes toward health care, the two factors (values concerning health/illness and attitudes toward health care) are combined in one section. The following paragraphs will briefly review health care beliefs of general, minority, and Muslim populations.

2.3.2.2.1 Values Concerning Health and Illness and Attitudes Toward Health Care Services

Values concerning health and illness affect patients' health care utilization, which are reflected in their attitudes toward health care services. If patients associate negative health outcomes due to poor medication adherence, they may have more positive attitudes toward using medications. In the following paragraphs, patients' values concerning health and illness and their attitudes will be highlighted in general, minority, and Muslim populations.

2.3.2.2.1.1 General and Minority Populations

According to the World Health Organization, health is “a state of complete physical, mental, social well-being and not merely ... the absence of disease or infirmity” (World Health Organization, 1946). It is important to mention that how people value their health and available health care services will impact their use of the health care services. For example, patients with diabetes who value western health care as trustworthy tend to adhere to their diabetes medications (Garay-Sevilla, Malacara, Gonzalez-Parada, & Jordan-Gines, 1998).

Minority populations may have different values and beliefs regarding health care in general and regarding different diseases. For example, African Americans often view health care as negative (Spector & Spector, 2004), which may be due to the Tuskegee experiments. Some African Americans delay care or even refuse to get treated due to long waiting times, fear of racism, and feelings of powerlessness (Spector & Spector, 2004). In the Latino population, older adults may see illness as an imbalance between internal and external power, so that may lead them to receive treatment from folk healers. In American Indian culture, people view illness as stemming from breaking a tribal taboo or having an unhealthy relationship with humans or with nature (Salimbene, 2005). Regarding specific diseases, Latino women have positive perceptions of screening for breast and ovarian cancer, but not of prophylactic surgery (e.g., mastectomy). These values or perceptions lead patients to avoid having breasts removed even when they have a family history of breast cancer (Kinney, Gammon, Coxworth, Simonsen, & Arce-Laretta, 2010). Moreover,

Latinos often view cancer as contagious and a source of shame, so Latino cancer patients tend to not reveal their disease to their families (Kinney et al., 2010).

Regarding diabetes, the general population's valuation of diabetes affects their beliefs toward using health care services that are associated with diabetes. Patients' confidence in modern western health care is positively related to the use of diabetes medications, which has been noted in the general population (Garay-Sevilla et al., 1998) and in Mexican American populations (Hunt, Pugh, & Valenzuela, 1998). Moreover, how patients value their medications' effectiveness affects their medication usage. For example, patients with insulin-dependent **diabetes** mellitus (IDDM), who viewed their insulin injections as necessary for disease control, were positively motivated to use their insulin. However, patients with noninsulin-dependent **diabetes** mellitus (NIDDM) who did not view insulin as important to their health, were negatively motivated to use their insulin (Bashoff & Beaser, 1995). One study showed that patients' positive views of their diabetes (e.g., ability to address diabetes complications) were associated with the method by which health care providers communicated diabetes information. Health care providers who communicated to patients that their diabetes was not very serious, resulted in patients having negative attitudes and poor abilities to address diabetes complications (Dietrich, 1996).

2.3.2.2.1.2 Muslim Populations

Muslims' perceptions concerning health and illness and attitudes toward health care services may differ from those of non-Muslim patients. Their perception and attitudes in regard to general health and illness and to specific diseases are highlighted below.

In general, Muslim patients view all diseases as Allah's decision, so they seek to fully obey Allah's will and have a strong spiritual feeling about Allah's decisions. For example, whenever they become sick, they are required to say "*al-hamdu-lilllah*" (praise to Allah). In addition to Allah's decisions, Muslims believe that "*hasad*" (i.e., the evil eye or envy) might cause them to become sick. Muslims praise Allah because they feel their disease has been predetermined by Allah or that it was caused by the evil eye and not themselves (Inhorn & Serour, 2011). These beliefs may negatively affect their attitudes toward the use of health care services. For example, some Muslims may feel that their diabetes is not under their control, but under Allah's control and that Allah will heal them. However, Islam requires Muslims to seek medical treatment and to make their health a priority (Inhorn & Serour, 2011). Thus, although some Muslims believe that Allah will protect them from harm, they also believe that they have a responsibility to manage their own health. In a qualitative study, a woman who chose to fast during Ramadan and not take her medications explained that if Allah had predetermined that she was going to get sick, she would be sick even if she took her medications. Among two other focus group participants, one indicated that having diabetes, which made him exempt, meant that he would not ever be able to fast during Ramadan, which was not an option for him. Another believed that fasting is a private matter, so it should not be discussed with non-Muslim

health care providers (Mygind et al., 2013). These examples show that Muslims' values about or attitudes toward taking medications, even for disease states that qualify for exemption from fasting, may be impacted during Ramadan. Regarding visiting health care providers, Muslim women's modesty leads them to seek treatments from female doctors (McKennis, 1999). Additionally, Muslims have negative attitudes toward utilizing medications that contain pork or alcohol since they are prohibited in Islam. However, Islamic authorities allow the use of these types of medications in case of necessity according to the *fatwa* (religious decree) that "necessity overrides prohibitions" (Laird, Amer, Barnett, & Barnes, 2007). Table 6 shows examples of Arab Muslims' health beliefs and practices that may be helpful for healthcare providers (Yosef (2008)).

Table 6: Arab Muslims' Health Beliefs and Practices

Tenet	Healthcare Provider Consideration
The value of health in Islam	Muslims believe that God created human beings and gave them their bodies as gifts to be cared for. On the Day of Judgment, God will ask what they did with their bodies and their health.
Modesty and health care provider gender preference	Modesty is an extremely important Islamic mandate; women and men should behave in a modest manner. All Muslim women should cover their hair and their bodies; nothing should be exposed except their faces and their hands, although some Muslim women choose not to do so. The Islamic religion does not allow health care professionals of the opposite gender, unless it is impossible to locate one of the same gender.
Misinterpretation of predestination	Some Muslims might not participate in health promotion activities because they do not believe that they can prevent something from happening if God has preordained it for them. However, the Prophet Mohammed clarified this issue and encouraged Muslims to maintain their health and seek medical help. Also, the human being does not know what is written for him or her. Therefore, participating in health promotion activities and preventing diseases could be part of what God wants.
Illness causation misconceptions	Causes of illness categories: supernatural causes (such as God and the devil), social causes (evil eye and stress), natural causes (changes in weather and dirty environment), and hereditary causes.
Arab family patterns of caring	Presence of family members at times of family crisis and when a member of the family is newly diagnosed is important. In some cases, especially cancer and other serious diseases, the patient should not be told his or her diagnosis. The health care providers should inform one of the family members and the family will

Table 6 (continued)

	decide to tell the patient or not. This behavior is to protect the patient, so all information should be filtered through the family.
The unique needs of Arab teenagers	Because of chastity and modesty, several issues usually discussed with American teens cannot be discussed with the Arab Muslim teens—such as safe sex and family planning—because no sexual relations are accepted before marriage. Even discussing physical changes during puberty should be put into an Islamic context.
Confidentiality issues	The husband has to give his approval before the wife can sign a consent form for a tubal ligation or hysterectomy. Male family members protective behaviors toward females are another example of confidentiality.
Abortion	Abortion is prohibited, as human life is given by the Lord and cannot be taken away except by Him or with His permission. The exception to this rule is when the mother's life is threatened and an abortion is necessary.
Organ transplantation	Islam allows organ transplantation only in the case of saving a patient's life. The financial abilities of neither patients nor donors should stand as an obstacle in the case of organ transplantation.

From Yosef, A. R. O. (2008). Health Beliefs, Practice, and Priorities for Health Care of Arab Muslims in the United States Implications for Nursing Care. *Journal of Transcultural Nursing*, 19(3), 284-291.

Regarding specific disease states, Muslims have negative beliefs toward the treatment of specific disease states such as mental illness. Muslims typically view mental illness as a source of shame and a sign of weakness (Laird et al., 2007). Moreover, some Muslims believe that depression is caused by not adhering to Islamic rules (Hammoud et al., 2005). To treat depression, some Muslims believe that rest will help them recover, even when this is contrary to medical advice (Hammoud et al., 2005). Thus, negative attitudes

and beliefs about mental illness may have a negative impact on health care utilization. Although not generalizable, a qualitative study of Pakistani Muslims in Denmark provides a perspective on what influences Muslims' attitudes toward disease management. Muslims' knowledge about diabetes management tends to be derived from their relatives. The qualitative study noted that two Muslim women with diabetes in Denmark asked their relatives whether they should fast during Ramadan or noticed that their relatives who had diabetes fasted during Ramadan, so they decided to fast as well (Mygind et al., 2013).

2.3.2.2.2 Knowledge About Diseases

Patients' knowledge about their diseases typically positively affects their health care utilization. Knowledge could include lab values and disease complications. This section will focus on knowledge regarding diabetes.

2.3.2.2.2.1 General and Minority Populations

The general population's knowledge about diseases affects their health care utilization (Graves et al., 2008; Nandi et al., 2008). Patients who participated in a self-management training program about their disease had more improved physical functioning (e.g., exercise) and fewer hospitalizations than nonparticipants (Lorig, Sobel, Ritter, Laurent, & Hobbs, 2001; Lorig et al., 1999). Higher diabetes knowledge test scores typically mean that patients have the adequate knowledge to control their diabetes (J. T. Fitzgerald et al., 1998). One study showed that patients who had a high level knowledge about their diabetes and its complications showed high compliance with their disease treatments (Heisler, Piette, Spencer, Kieffer, & Vijan, 2005). Diabetic patients' knowledge

differs from one patient to another and is affected by different factors. Diabetic patients with more years of formal education were more knowledgeable about their disease than diabetic patients with fewer years of formal education (Heisler et al., 2005).

2.3.2.2.2 Muslim Populations

Because the literature regarding diabetes knowledge related to Muslims is limited, examples of major influencers and/or decision makers are described. Though it is not technically disease state knowledge, Muslims rely on the ‘knowledge’ of relatives and authority figures when making health care decisions. One large quantitative study of Muslims from 13 different countries revealed that 76% of patients with type 1 diabetes (N=1,070) and 69% of patients with type 2 diabetes (N=11,173) reported that they obtained “help” from their relatives regarding diabetes management, which suggests that relatives played a major educational role (Salti et al., 2004). Moreover, Muslim authorities, such as Imams (spiritual leaders) are well respected and are major influencers in determining whether treatments of diseases are acceptable both during Ramadan and outside of Ramadan. For example, infertile Muslim couples typically seek approval by a religious authority before seeking in vitro fertilization (Clarke, 2013; Inhorn, 2003, 2012).

2.3.2.2.3 Social Structure

The social structure includes factors that determine the status of patients in a community, and their ability to manage current problems, and the influence of culture. Social structure factors that may have an impact on medication utilization include ethnicity, education, employment, social network, family size, religion, country of birth, and

acculturation (e.g., immigration, language). The following highlights these factors among general, minority, and Muslim populations.

2.3.2.2.3.1 The General Population

In the U.S. general population, many studies have linked the impact of social factors to health care utilization. Regarding ethnicity, studies of the general U.S. population typically show that all racial/ethnic groups were less likely to receive treatment than White non-Hispanics (R. M. Andersen et al., 2002; D. L. Blackwell, Martinez, Gentleman, Sanmartin, & Berthelot, 2009; Dhingra et al., 2010). Therefore, non-whites have lower rates of medication utilization (McKercher, Taylor, Lee, Chao, & Kumar, 2002; Poisal & Chulis, 2000). Education also has an impact on patients' health care utilization. Studies have shown that more educated patients tend to utilize health care services more often than less educated patients (R. M. Andersen et al., 2002; D. L. Blackwell et al., 2009; A. W. Chen, Kazanjian, & Wong, 2008; Jorm et al., 2002). In contrast, level of education was negatively associated with mental health care services utilization. For example, a random telephone survey (i.e., state-based random-digit dialed telephone survey the US civilian population) found that people with less than a high school education tended to utilize mental or emotional services more than people with a high school diploma or higher (Dhingra et al., 2010). This finding contradicted the findings of previous studies; a possible reason for this finding could be that less educated people have a lower ability to cope with their mental and emotional problems, so they would be more likely to seek out these services. Employment also had an impact on people's health. Studies have found that employed people have better overall health than unemployed people (Herold & Waldron,

1985; Kessler, House, & Turner, 1987; Linn, Sandifer, & Stein, 1985; C. E. Ross & Bird, 1994). Among women, employed women reported better physical health, housewives reported worse health, and the unemployed reported the worst health (Brenner & Levi, 1987; Jennings, Mazaik, & McKinlay, 1984). Being employed increases the probability of having private insurance coverage and being able to pay for insurance, which would increase a person's health care use.

In addition, in the general population, people's social networks affected their health care use. Social networks might be close, such as relatives or friends, or broad networks. One aspect of social networks is that people who are socially integrated and involved in more social organizations (e.g., religious groups) have better overall health than those who were not (Berkman, Glass, Brissette, & Seeman, 2000). Another aspect, however, is that a social network that is bad or unhealthy may negatively affect people's health. Spouses who were caring for chronically ill partners showed high levels of stress, which could negatively affect their overall health and health care utilization (Lewis, 2014). Family size also has an effect on patients' health. The larger a patient's family size the more social support they may receive, which then could lead to better health care use. However, researchers have found that the more children parents have, the higher parents' mortality rate (Penn & Smith, 2007). Other factors, such as country of birth and acculturation, which are associated with minorities, will be highlighted in the next section.

2.3.2.2.3.2 Minority Populations

Minority populations in the U.S. may have different social structures than majority populations, which may differentially affect their health care utilization. First, different minority groups (e.g., race/ethnicity) may have varying levels of health care utilization. For example, regarding mammogram screenings, Somali immigrant women were significantly less likely than other African immigrants to get screened for breast cancer (Harcourt et al., 2014). Among immigrant populations, a study found that Hispanic, Asian American, and Pacific Islanders had lower levels of screening for cervical and breast cancer compared to non-immigrants (Goel et al., 2003). Among vulnerable populations, non-Whites had a lower likelihood of utilizing alcohol, drug, and mental services compared to Whites (Stockdale, Tang, Zhang, Belin, & Wells, 2007). Level of education also has an impact on minorities' health. In the U.S., Latino immigrants' health care utilization was positively affected by level of education (Graves et al., 2008; Nandi et al., 2008). Employment has an impact on minorities due to the higher levels of unemployment in these populations (Ani et al., 2008). Unemployed African immigrants were found to be less likely to have breast and cervical cancer screening than employed African immigrants (Harcourt et al., 2014).

Regarding social networks, the health of Hispanic populations in the U.S. was shown to be affected by their relatives. In fact, in order to help their relatives who have cancer, Hispanic women agreed to participate in clinical trials focusing on cancer (London et al., 2015). Family size among minority groups has an impact on patients' health care utilization. Among underserved African American and Latino populations, a study found

that patients who had a small family size tended to see health care providers to diagnose their chronic conditions (e.g., diabetes), whereas those with a large family size tended to self-diagnose their chronic conditions (Ani et al., 2008). This could be because as patients' family size increases, their economic burden also increases and their ability to utilize health care services decreases.

Regarding country of birth, immigrant populations have different levels of health care utilization than other minority populations in the U.S. The National Health Interview Survey showed that 373 (61%) of 613 women who immigrated to the U.S. within 10 years, reported that they had a pap smear within the past three years compared to 10,791 (84%) of 12,939 women who were born in the U.S. (Swan, Breen, Coates, Rimer, & Lee, 2003). Acculturation, which is defined by Oxford English Dictionary as “assimilate or cause to assimilate a different culture,”¹⁵² has an impact on minorities' health and especially on immigrants' health. A study found that Chinese immigrants in Canada who had higher acculturation showed a higher likelihood to use health care services (Surood & Lai, 2010). Therefore, immigrants with a higher acculturation level and fewer cultural barriers may have a higher ability to adapt and use health care services (Surood & Lai, 2010). One study showed that non-citizens have limited access to ambulatory care and emergency care, even when insured (Ku & Matani, 2001). Low acculturation also decreased the rate of antidepressant use among Asian Americans (H. M. Gonzalez et al., 2010) and the general health care utilization among Latino immigrants (Graves et al., 2008; Nandi et al., 2008). Short duration of residence in the U.S., which might be a proxy for low acculturation, was

associated with a lower probability of breast and cervical cancer screening among African immigrants (Harcourt et al., 2014).

Language can also impact immigrants' health care utilization. Speaking the language of the country of residence may help patients utilize health care services. Chinese men in Canada who were able to speak English had a higher rate of visiting general practitioners than did Chinese men who had little ability to speak English (A. W. Chen et al., 2008). The length of time that an immigrant had been in Canada showed a positive association with a significant increase in the rate of mental health visits (A. W. Chen et al., 2008). Similarly, for African immigrant women, living in the U.S. less than 5 years was significantly negatively related to having a mammogram screening for breast cancer (Harcourt et al., 2014). In conclusion, the effect of social structure seems to be elevated in minority populations, because they are more likely to have low levels of education, employment, acculturation, and larger family sizes; all of which may negatively impact healthcare utilization.

2.3.2.2.3.3 Muslim Populations

Muslims in the U.S. are a minority based on their religion; some of them are born in the U.S. and some outside. A study found that, among American Muslims, 63% are first-generation immigrants to the U.S., and 15% and 22% are second- and third-generation, respectively. Because the majority of Muslims in the U.S. are immigrants or first-generation immigrants, social structure factors may significantly affect their utilization of health care services. Regarding ethnicity, American Muslims identified themselves as the

following: 30% White, 23% Black, 21% Asian, 6% Hispanic, and 19% other or mixed race. However, among American Muslims born in the U.S., 40% describe themselves as Black, 18% as White, 10% as Asian, 10% as Hispanic, and 21% as other or mixed race ("Muslim Americans: No Signs of Growth in Alienation or Support for Extremism," 2011). Based on the U.S. law, people from the Middle East are identified as White; therefore, people from the Middle East might identify themselves as White, whereas other Americans might not view them as White (Tehrani, 2007). Although this specific issue (ethnicity of Muslims) has not been addressed in the literature, it is likely that Muslims are perceived as minorities in the U.S. Thus, similar findings from studies comparing minorities to Whites (previously discussed) may apply to Muslims.

Regarding education level, Muslims' education level was found to be similar to the education level of the U.S. general population. For example, there was no statistically significant difference between Muslims in the U.S. and the U.S. general population for rates of attaining the following degrees: graduate degree, college degree, less than high school degree. However, the rates of obtaining only a high school diploma among Muslims in the U.S. (40%), and especially among those born in the U.S. (49%), were statistically higher than the rate of the general U.S. population (31%) ("Muslim Americans: No Signs of Growth in Alienation or Support for Extremism," 2011). Among the Arab American population, who are likely to be Muslims, researchers found that women who had less than a high school education had higher rates of impaired fasting glucose, impaired glucose tolerance, and diabetes (Jaber et al., 2003). Although the impact of education among U.S. Muslims on health care utilization has not been established in the literature, it stands to

reason that it would be similar to the impact for Arab Americans or for the U.S. population at large. The employment level of Muslims in the U.S. is similar to the employment level of the general population. However, 29% of U.S. Muslims are underemployed (i.e., unemployed and looking for work or working part time, but would prefer full-time employment), whereas only 20% of U.S. general population was underemployed. Importantly, Arab American women who were not employed had higher rates of diabetes-related problems (Jaber et al., 2003).

Regarding social networks, the Muslim population considers the family as the core of its society. The entire family may be present at times of birth, illness, or death, and the family usually contributes to decisions about medical treatment. Muslims highly respect their elders and they typically adhere to their advice. Also, it is very common for offspring to remain with their parents until marriage. Therefore, a Muslim patient's decision to use health care services or medication can be impacted by his or her family members (Aboul-Enein & Aboul-Enein, 2010; Hammad, Kysia, Rabah, Hassoun, & Connelly, 1999; Kulwicki, Miller, & Schim, 2000). Regarding family size, U.S. Muslim women have higher fertility rates than the general U.S. population ("Muslim Americans: No Signs of Growth in Alienation or Support for Extremism," 2011), which results in larger family sizes than non-Muslim Americans. In addition, the Prophet Mohammed (Peace be upon him) encouraged Muslims to have many children (Abdul-Rahman, 2007). Therefore, as participants family size increases, their social network increases and affects their utilization of health care services.

Religious factors are the major factors that differentiate the study population from the U.S. general population. Similar to U.S. Christians, approximately 70% of U.S. Muslims acknowledge that religion is very important in their lives. Compared to Muslims in other countries, the percentage of U.S. Muslims who say that their religion is very important in their lives is lower than that of Muslims in Egypt (79%), Jordan (96%), Nigeria (90%), and Pakistan (97%). Regarding U.S. Muslims' religious commitment, a measure that combines Muslims' responses to questions about mosque attendance, daily prayer, and the importance of their religion showed that 29% of respondents had a high level of religious commitment (i.e., attended a mosque at least once a week, prayed all five *Salah* every day, and said that religion was very important in their lives) ("Muslim Americans: No Signs of Growth in Alienation or Support for Extremism," 2011). To our knowledge, no study has examined the effect of Muslims' level of religiosity on their health care utilization. Factors that might potentially impact medication utilization can be gleaned from qualitative studies. One qualitative study of Pakistani Muslims in Denmark focused on medication use among type 2 diabetics during Ramadan. One participant, a 42-year-old Muslim woman chose not to take her medications during Ramadan fasting time because she believed that Allah (God) would keep her safe during fasting (Mygind et al., 2013). This could indicate that when Muslims believe that their religion is very important to them, they may rely more on religion and Allah than health care providers or even their own disease management behaviors. As mentioned previously (3.2.2.2.2.), Muslims tend to confer their religious authorities, such as an Imam, regarding whether treatments of

diseases are acceptable both during Ramadan and outside of Ramadan (Clarke, 2013; Inhorn, 2003, 2012).

Country of origin and acculturation are other factors that distinguish U.S. Muslims from other minorities in the U.S. Country of birth could have a significant impact on Muslims in the U.S., since the majority of American Muslims (63%) are born outside the U.S., although 70% of them are American citizens. Of all American Muslims, 37% born inside the U.S., 26% were born in the Middle East and North Africa, 9% in Pakistan, 7% in other countries in South Asia, 7% in sub-Saharan Africa, and the rest (14%) in other countries ("Muslim Americans: No Signs of Growth in Alienation or Support for Extremism," 2011). No studies were found examining the impact of Muslims' country of birth on their health care utilization, which highlights the need for investigating this topic. Based on the fact that the majority of American Muslims were born outside the U.S. ("Muslim Americans: No Signs of Growth in Alienation or Support for Extremism," 2011), acculturation and the ability to speak English are two factors that may impact their health care utilization. One study reported that American Muslims tend to cluster close to their families and speak their native language at home (Pinelli & Jaber, 2011). This may limit their integration into American society and their ability to speak English fluently, which, in turn, may limit their ability to negotiate and understand how to access health care services in the U.S. Researchers found that Arab immigrants who have limited English speaking skills evaluated their health as poor compared to Arab Americans who spoke English well (Abdulrahim & Baker, 2009). In Michigan, researchers found that, among Arab Americans, being of an older age at immigration, speaking Arabic with friends, being

less active in Arab organizations, more frequent consumption of Arabic food, and less integration into American society were associated with impaired fasting glucose, impaired glucose tolerance, and diabetes (Jaber et al., 2003). This suggests that low acculturation level and an inability to speak English would limit such patients' health care utilization. In conclusion, social factors, such as country of origin and acculturation are two factors that might negatively impact health care utilization among the U.S. Muslim population.

2.3.3 Enabling Factors

Enabling factors are the resources that permit patients to access and utilize health care services. These resources can be described as personal/family and community resources. To our knowledge, the effect of the community on Muslims is not mentioned in the literature, so the next section will focus on personal and family resources.

2.3.3.1 Personal/Family Resources

Personal or family resources include; having a regular source of care, insurance coverage, income, social support, and perceived barriers to care. Because of limited literature on the factors among Muslims, the following overview will be group according to general, minority, and Muslim populations in the U.S.

2.3.3.1.1 General Population

The cost of health care in the U.S. is the highest among developed countries, so individual or family resources are important factors in being able to access health care (Lorenzoni, Belloni, & Sassi, 2014). Having a regular source of care (e.g., a primary

doctor) improves patients' abilities to use and access health care services (Weissman, Stern, Fielding, & Epstein, 1991). Patients with a regular source of care were more likely to utilize antihypertensive medications (Nichol, Margolies, & Gill, 1997), had higher satisfaction with health care services (Hurley, Gage, & Freund, 1991), were less likely to use the emergency department (Newschaffer, Zhang, Hauck, Fanning, & Turner, 1999), and were less likely to be hospitalized (Weiss & Blustein, 1996) than patients who did not have a regular source of care. Insurance coverage is one factor that enables patients to access health care services. Patients who have prescription medication coverage are more likely to use medications than those who do not (M. Davis et al., 1999; Gianfrancesco et al., 1993; Goldman et al., 2004; Mueller et al., 1997; Poisal et al., 1999; Stuart & Coulson, 1993; Weissman et al., 1999; Wolinsky et al., 1995). Patients with insurance coverage are also more likely to be hospitalized and to visit their physicians (R. Andersen & Newman, 2005). Income is also an important enabling factor that helps patients pay out-of-pocket health care expenditures. Patients who have higher incomes (Daumit et al., 2003) and lower out-of-pocket expenditures were more likely to use medications than patients who did not have the aforementioned resources (Huttin, 1994; Leibowitz, Manning, & Newhouse, 1985; Mueller et al., 1997; O'Brien, 1989; Steinberg et al., 2000; Stuart & Grana, 1998). Social support, which may include emotional support, has an effect on patients' health. Patients who receive emotional support are less likely to utilize health care services for mental and emotional issues (Dhingra et al., 2010). Barriers to receiving health care are higher in minority populations; however, in the general population, patients living in rural

areas had a decreased ability to contact a doctor (Thode, Bergmann, Kamtsiuris, & Kurth, 2005).

2.3.3.1.2 Minority population

Personal and family resources enable minority populations to use health care services. As with the general population, having a regular source of care enabled African American women to utilize general health care services (Varga & Surratt, 2014), African American men to schedule routine health examinations (Hammond et al., 2010), and Hispanic Americans to screen for cancer (P. Gonzalez et al., 2012). Lack of health care insurance was associated with low cancer screening and low access to health care providers among Hispanic Americans (P. Gonzalez et al., 2012; Graves et al., 2008; Nandi et al., 2008), and a low rate of antidepressant use among Asian Americans (H. M. Gonzalez et al., 2010). Increased financial difficulties were positively associated with antidepressant use among Asian American populations and Asian immigrants (H. M. Gonzalez et al., 2010). Having social support had a positive effect on the health care utilization among Latino immigrants (Graves et al., 2008; Nandi et al., 2008). Regarding barriers to receiving health care, experiencing discrimination negatively impacted health care utilization among Latino immigrants (Graves et al., 2008; Nandi et al., 2008), and mistrust reduces the odds of routine health examinations among African American men (Hammond et al., 2010).

2.3.3.1.3 Muslim Populations

Personal and family resources may have the same effect on health care utilization of Muslims in the U.S. as they do on other minorities in the U.S. Below, as factors are

discussed, a comparison between the Muslim and the U.S. population will be included, when information is available. The comparison is meant to highlight that Muslims may be at greater risk for health disparities. In terms of having a source of care, since 63% of Muslims in the U.S. are first-generation immigrants, their chances of not having a regular source of care may be high. Another type of personal and family resource is insurance, which enables patients to access health care services. As of 2011, 29% of American Muslims were unemployed or employed part-time ("Muslim Americans: No Signs of Growth in Alienation or Support for Extremism," 2011). Thus, their chances of having health insurance coverage were very low, which would negatively affect access to services. This was shown in a study of Arab Muslim refugees, who lost their health insurance coverage after arriving in the U.S., which negatively affected their access to health care services (Inhorn & Serour, 2011). Income could play a major role in determining Muslims' ability to utilize health care services because almost half of the Muslim population (45%) had an income of less than \$30,000, whereas only 36% of the U.S. general population had an income under \$30,000 ("Muslim Americans: No Signs of Growth in Alienation or Support for Extremism," 2011). In addition, 40% of Muslim Americans reported that their income was between \$40,000 and \$100,000, compared to 48% of the general population. Social support may have a significant positive effect on Muslims since they tend to have larger family sizes compared to the general population ("Muslim Americans: No Signs of Growth in Alienation or Support for Extremism," 2011). Family support is shown when large numbers of Muslims assemble during a family member's illness or death. Moreover, American Muslims may ask health care providers to wait for the family to arrive and allow

them to communicate information about a serious disease to their loved one (Yosef, 2008). Moreover, mosques in the U.S. are not just a place for prayers, as they are in Arab countries; in the U.S., they tend to offer various social activities and support that could improve the health of Muslim patients (Hodge, 2005).

2.3.3.1.3.1 Barriers to Muslims' Health Care Utilization Related to U.S. Society and provider characteristics

Muslims in the U.S. have barriers that limit their ability to utilize health care services. These barriers are related to U.S. society or to health care providers specifically. One such barrier is Islamophobia; other barriers include health care providers of a different religion, different race, or different gender than the patient, and limited knowledge about Islam. These factors are discussed in the following sections.

2.3.3.1.3.1.1 Islamophobia

The Oxford English Dictionary defines *Islamophobia* as “Intense dislike or fear of Islam, esp. as a political force; hostility or prejudice towards Muslims.” Islamophobia has also been defined as “an exaggerated fear, hatred, and hostility toward Islam and Muslims that is perpetuated by negative stereotypes resulting in bias, discrimination, and the marginalization and exclusion of Muslims from social, political, and civic life” (Ali et al., 2011). After the crisis of September 11, 2001 (hereafter referred to as “9/11”), hostility arose in the U.S. against Muslims. Some Americans blamed all Muslims for the actions of a few Muslims. After the 9/11 attack, Muslims in the U.S. faced hostility from Americans (i.e., Islamophobia), which may negatively impact their health care utilization.

The presence of Islamophobia may lead patients to not reveal their religion or religious practices (e.g., fasting during Ramadan) to health care providers, or it may lead to a lack of trust in health care providers. A study conducted in Denmark showed that some Muslim patients believed that fasting is a private matter and should not be discussed with their health care providers (Mygind et al., 2013). In the U.S., some Muslims do not disclose their religion to health care providers for fear of receiving suboptimal treatment. Some non-Muslims believe that Muslim and Arab men are dangerous, untrustworthy, inherently violent, and fanatical (Howell & Shryock, 2003; Inhorn, 2012). Muslim Arab men may perceive that the U.S. health care providers have the similar beliefs about them, which may cause them to avoid seeking medical care (Shah et al., 2008). Fear of deportation was cited as a reason for male Muslim immigrants not seeking health care services (Shah et al., 2008). Several female Muslim patients felt that wearing their hijab contributed to negative perceptions of and treatment by health care providers (Shah et al., 2008).

2.3.3.1.3.1.2 Health care provider characteristics

Health care providers in the U.S. may be of a different religion, race, ethnicity, or gender than their Muslim patients, and may have little knowledge about Islam and Muslims. These factors may limit American Muslims' health care utilization and medication use.

As mentioned above, American Muslims in the U.S. could be Caucasian, which is not a minority from the standpoint of race, but from a religious standpoint, they are in the minority. Lack of knowledge of Islam among health care providers may lead to lack of

communication and misunderstanding regarding cultural issues related to Muslims (Laird et al., 2007). Muslim patients who are treated by non-Muslim health care providers may feel that their providers are not aware of the importance of fasting during Ramadan, so patients may not accept their health care providers' recommendations to avoid fasting and to use medications (Mygind et al., 2013). Muslim patients in the U.S. generally prefer to be treated by Muslim health care providers of the same gender. For example, Muslim women who greatly value modesty wear hijabs (Reece, 1996; Smith, 1999) and they prefer to be treated by female health care providers (Hammoud et al., 2005). In fact, Muslim women have refused to be examined by a member of the opposite sex (Ilkilic, 2002; Yosef, 2008). In general, Muslims choose not to mix with members of the opposite gender who are not immediate family members (Mahmoud, 1996). Furthermore, a few studies have shown that some health care providers give suboptimal treatment to patients of different religions or races (Einbinder & Schulman, 2000; Inhorn & Fakhri, 2006). For example, in the U.S., after the 9/11 attacks, some non-Muslims expressed antagonism against Muslims (Ali et al., 2011; Jamal & Naber, 2008; Shah et al., 2008). This kind of antagonism may occur between patients and their health care providers (Shah et al., 2008; Simpson & Carter, 2008). One study showed that health care providers whose religion differed from their patients' tended to provide suboptimal health care services (Simpson & Carter, 2008). Non-Muslim health care providers often have low levels of information about Muslims' lives and minority populations. For example, 20% of resident physicians (N=2,047), believed that they were not prepared to provide health care service for patients whose religion affected their treatment (Weissman et al., 2005).

2.3.4 Need Factors

Need factors are the factors that highlight patients' need for health care services. These factors are divided into those related to perceived need and evaluated need. Perceived need is what patients think about their health, and evaluated need is what health care providers believe that patients need based on objective and subjective assessments. These two types of factors, perceived need and evaluated need, affect patients' health care utilization. Since Muslim patients' perceived need is assumed to drive their medication usage during Ramadan, patients' perceived need will be discussed in the following paragraphs in relation to the general, minority, and Muslim populations.

2.3.4.1 General and Minority Populations

Patients' need for health care plays an important role in encouraging patients to use health care. In 2008, 55% of the general U.S. population perceived their health as either excellent or very good, while 16% perceived their health as fair or poor. Patients who perceive their health as poor are more likely to use health care services overall (Dhingra et al., 2010), outpatient health care services (McFarland, Freeborn, Mullooly, & Pope, 1985), and medications (de Boer et al., 1997; Goldman et al., 2004; Wolinsky et al., 1995). Patients may perceive their health as very bad and go directly to the emergency department when in fact their health problem is not that serious, but their perception is what prompts their health care utilization (Afilalo et al., 2004).

Perceived illness was defined by Leventhal, Leventhal, and Contrada (1998) using five factors: illness identity (how illness symptoms are perceived), timeline (how long the

illness will last), consequences (what the consequences of the illness are for the patient's life), cure/control (how the condition is controlled or cured), and cause (how the illness was caused). Regarding illness symptoms, patients may adhere to treatment when they feel their disease symptoms worsen. For example, asthma patients perceive that their disease exists when they experience asthma symptoms (breathlessness), which is when they start taking medication. On the other hand, asthmatic patients may not adhere to their prophylactic medication if they fail to perceive asthma symptoms (Halm, Mora, & Leventhal, 2006; Jessop & Rutter, 2003). In addition, in Taiwan, patients who perceived their hypertension symptoms as worsened, were more likely to adhere to their antihypertensive medications (S. L. Chen, Tsai, & Chou, 2011; S. L. Chen, Tsai, & Lee, 2009).

Regarding timeline, patients' perceptions of the duration of their health condition may indirectly improve health care utilization. Patients' with blood pressure problems who perceived that their disease was of long duration were more likely to perceive the importance of their antihypertensive medication, which positively affected their medication adherence (S. L. Chen et al., 2009; Horne & Weinman, 2002; Rees, Leong, Crowston, & Lamoureux, 2010; S. Ross, Walker, & MacLeod, 2004). Perceived duration of the health condition may be affected by patients' age; older patients may not perceive the duration of a health condition in the same way that younger patients do. For example, patients with heart failure whose average age was 80 ± 5 years who perceived their condition to be of long duration were found to be non-adherent to their medications (Molloy et al., 2009). Regarding illness consequences, patients' perception of the serious

consequences of their disease has a positive effect on their medication adherence. For example, patients who perceived the serious consequences of their hypertension for their health were adherent to their antihypertensive medications (S. Ross et al., 2004). Regarding illness cure and/or control, patients' perception that their illness will not be cured or even controlled may lead to non-adherence. Patients who, after they had a heart attack, perceived that their heart condition was severe and incurable developed depression, which led to non-adherence to medication (Dickens et al., 2008). In addition, patients who perceived treatments' inability to cure or control their diseases showed a low adherence to treatments, which increased mortality. In one study, patients with renal failure who had negative perceptions about their treatment's ability to control their disease, also had poor adherence to treatment (Chilcot, Wellsted, & Farrington, 2011). Similarly, in asthmatic patients, positive perceptions about the importance of medications positively affected their adherence to treatments, whereas a high perception of the adverse effects of medications negatively affected their adherence to medications (Horne & Weinman, 2002; Jessop & Rutter, 2003). Regarding perception of how the illness was caused, patients who perceived that their disease was the result of their lifestyle (e.g., poor diet, exercise) may be more likely to adhere to treatments that require lifestyle modifications. However, patients who perceived that their condition was caused by genetic factors, were less likely to engage in lifestyle modifications. (Weinman, Petrie, Sharpe, & Walker, 2000).

Need factors of minority populations have been found to be different than those of the general population. Regarding how minorities in general perceive their health, national statistics showed that 41% of African Americans and 39% of the Latinos perceive their

health as excellent or very good, while 56% of Whites perceive their health as excellent or very good. Similarly, 24% of African Americans and 28% of Latinos perceive their health as fair or poor compared to 14% of the White population (McInturff, Harrington, Greenberg, & Walker, 2007). In the southern U.S., 55.8% and 68% of African American males and females, respectively, perceive their health as good to excellent, which is statistically lower than the 76% and 77.1% of Caucasian males and females, respectively, who perceive their health as good to excellent (Brandon & Proctor, 2010). Patients who perceive their health as fair to poor typically have more chronic diseases than people who rate their health as very good to excellent. For example, in 2010, the prevalence of diabetes in non-Hispanic Blacks (10.9%) and Hispanic populations (9.0%) was higher than the prevalence of diabetes in non-Hispanic Whites (6.0%) (Centers for Disease Control Prevention, 2013). Minority populations in general tend to have more chronic diseases than the White population. For example, African Americans are diagnosed with asthma at a 28% higher rate than Whites are, and rates of HIV infection were three times higher in the Hispanic population than in the White population (Centers for Disease Control Prevention, 2013). Perception of illness also differs in minority populations. One study showed that non-White cancer patients reported more concern about understanding their diagnosis and treatment plan and were more likely to have negative perception of their illness compared to Whites (Jean-Pierre et al., 2010). Similarly, ethnic minorities with heart failure were less likely to have positive perceptions of their symptoms and are more likely to have difficulties managing their illness compared to non-ethnic minorities (Lip et al., 2004).

Regarding patients' evaluation, patients with more chronic diseases (D. L. Blackwell et al., 2009; Daumit et al., 2003; de Boer et al., 1997; Lassila et al., 1996; Mutran & Ferraro, 1988), severe diseases (Daumit et al., 2003; Lassila et al., 1996; Mutran & Ferraro, 1988), and severe functional impairments were associated with greater utilization of health care services and medication (Mueller et al., 1997; Wolinsky et al., 1995). Diabetic, hypertensive, and hyperlipidemic patients were more likely to have more physician visits (Broyles et al., 1999), which may lead to higher utilization of medications.

2.3.4.2 Muslim Populations

Muslims patients' need for health care services may be greater than other minority populations because of their religious preferences and because most of them are immigrants. Muslim patients' preference for a treatment might depend on whether the medications are free from alcohol- and pork-based ingredients. Muslims who are immigrants may have low English proficiency, which may limit their ability to receive health care services, which in turn may increase their demand (i.e., need) for health care services. On the other hand, Muslims, like some other immigrant populations, may perceive some health care services as unnecessary or as a burden because they come from cultures that do not emphasize those services. A qualitative study in Canada revealed that some Muslims perceived the use of prenatal care as repetitive and burdensome, so they decided forgo their visits (Reitmanova & Gustafson, 2008). Muslims' perceived health differs by gender and socioeconomic status (e.g., educational level). Married Muslim women with low educational levels tend to evaluate their health as poor, perhaps because they prioritize their family's needs over their own (Asfar et al., 2007).

In conclusion, patients' need for health care services is derived from how they rate their health and how their health care providers evaluate their health. Patients who perceive their health as poor are more likely to use health care services that would improve their health. Patients who perceive that their disease has symptoms, is of long duration, has serious consequences, has the possibility of being cured or controlled, and has a known cause are more likely to utilize health care services.

2.3.5 Satisfaction with Care

Patients' satisfaction plays an important role in encouraging patients to use health care services (Gu, Gai, & Hay, 2008). Health care in the U.S. is a typically privately run, and so, as customers, patients need to be satisfied with the product (i.e., health care services) that they receive from the sellers (i.e., health care providers). In this study, the focus is pharmacist services. In general, pharmacist's services may range from dispensing medications to providing cognitive services (e.g., medication therapy management). Patient satisfaction with these services is important in encouraging them to continue using these services. The following section discusses patient satisfaction with pharmacy services among the general, minority, and Muslim populations.

2.3.5.1 General and minority populations

Patient satisfaction with pharmacy services is an indication of the likelihood patients will continue to use the provided services (Gu et al., 2008) and is important for improving pharmacy services. Patient satisfaction with pharmacy services can be divided into three areas: satisfaction with general services, satisfaction with intervention services,

and satisfaction with cognitive services (Naik-Panvelkar, Saini, & Armour, 2009). Satisfaction with general services includes but is not limited to satisfaction with the pharmacy type, and waiting time. Patients' satisfaction was found to differ between chain and independent pharmacies, and between using a single pharmacy and a primary pharmacy. Patients who use a single pharmacy for their medications were more satisfied than those who used several pharmacies (Xu, 2002). Patients who have a primary pharmacy have all their medication records at one pharmacy, which may lower the chances of medication-related problems (Xu, 2002). In terms of the type of pharmacy, a study showed that patients were more satisfied with independent pharmacies than with chain pharmacies (Briesacher & Corey, 1997). Of general pharmacy services, patients were the least satisfied with waiting time compared to other general pharmacy services (Briesacher & Corey, 1997).

Intervention services refer to any single-focus intervention such as immunizations, which are commonly provided in community pharmacies. A study found that out of 188 patients, 86.9% were satisfied with immunization overall services, 97.8% with pharmacists' time spent, 97.8% pharmacists' counseling, and 98.9% with pharmacists' competency to administer vaccines (Bounthavong et al., 2010). Cognitive pharmacy services are the most advanced type of services and they typically involve "the use of specialized knowledge by the pharmacist for the patient or health professionals for the purpose of promoting effective and safe drug therapy" (Cipolle, Strand, & Morley, 1998). Among these services are medication therapy management (MTM) services, which have been shown to resolve patients' medication-related problems (Alshehri, Barner, Brown, &

Rush, 2015; Scott, Dewey, Johnson, Kessler, & Friesner, 2010; Viswanathan, Kahwati, Golin, Blalock, Coker-Schwimmer, Posey, & Lohr, K. N., 2015). Additionally, patients who received MTM services provided by pharmacists were highly satisfied (Kim, Martin, Pierce, & Zueger, 2014; Scott et al., 2010).

Minority population's satisfaction with care would be impacted by the quality of care they receive. According to the National Health Care Disparities Report, African Americans and Hispanics were receiving lower quality health care than Whites. Compared to Whites, Hispanics and African Americans received 39% and 41% lower quality care, respectively (US Department of Health Human Services, 2011). In addition, minorities' satisfaction with health care providers and especially pharmacists might be impacted by several factors. One study found that doctor-patient race concordance predicted patients' satisfaction with care (LaVeist & Nuru-Jeter, 2002). Although this study did not mention pharmacists, these findings may be applicable to pharmacy services. Pharmacist's ability to speak minority patients' language was an important factor in improving patient satisfaction in a study of Latino patients. The subjects rated the health care provider's ability to speak Spanish as important; and of those, satisfaction was higher with the services that they received from clinical pharmacists who spoke Spanish compared to those who did not (Kim-Romo et al., 2014). In another study, patients who were able to correspond with pharmacists about their medications were highly satisfied (Stergachis, Maine, & Brown, 2002).

Minority populations may perceive discrimination barriers that make them more likely to be less satisfied with the services they receive (Hausmann, Kressin, Hanusa, &

Ibrahim, 2010). In conclusion, increased understanding and diminishing of minorities' health care barriers may have a positive impact on their satisfaction with health care services.

2.3.5.2 Muslims Populations

Muslims in the United States are similar to other minority populations in their satisfaction with care. As mentioned in the previous section, a health care provider's gender, religion, and knowledge about Islam may impact Muslim patients' health care utilization (Hammoud et al., 2005). To our knowledge, there is no literature that examines Muslim patients' level of satisfaction with health care providers, and specifically with pharmacists, nor the impact of their satisfaction on medication use.

In conclusion, if patients are satisfied with the health care services they receive, they will be more likely to continue to use those services, value and maintain the relationship with health care providers, adhere to treatment plans, and have better outcomes (Aharony & Strasser, 1993; Locker & Dunt, 1978; Pascoe, 1983; Schommer & Kucukarslan, 1997). Patient satisfaction, therefore, is important in evaluating and improving the health care services provided (Ford, Bach, & Fottler, 1997).

2.3.6 Summary

The health care utilization of Muslims in the U.S. is affected by factors that are related to the majority as well as to other minority populations in the U.S. Muslims' religion adds another factor that may further affect their health care utilization. During the month of Ramadan, Muslims fast from sunrise to sunset every day for the whole month, which

may alter the factors that could affect their health during fasting. To our knowledge, there are no studies that have identified what factors affect Muslims' health care utilization and medication usage during Ramadan in the U.S. or elsewhere in the world. Moreover, diabetes is a significant health problem in many countries around the world and it requires diabetics to follow a specialized diet and adhere to their medications. Diabetics who fast during Ramadan may have various factors that affect their medication usage, and ultimately, their disease state. Health care professionals, namely pharmacists, have an opportunity to help these patients effectively manage their medications, especially during Ramadan, when medication-related problems are likely to occur.

2.4 PART FOUR: STUDY OBJECTIVES AND HYPOTHESES

This study sought to understand Muslims patients' medication usage before and during Ramadan and what factors affected their usage during Ramadan. In addition, it sought to identify Muslims' views of pharmacists and their role in medication management. The study objectives are as follows:

2.4.1 Objective 1:

To describe the predisposing (demographic characteristics, health beliefs, and social structure), enabling (personal and family resources) and need (perceived health) factors, and satisfaction with pharmacy services of Muslim patients with diabetes.

2.4.2 Objective 2:

To describe Muslims' diabetes medication usage and diabetes management behaviors (diet, exercise, self-care) during Ramadan.

2.4.3 Objective 3:

To determine if predisposing, enabling, and need factors, and satisfaction with pharmacy services have an impact on diabetic Muslims' medication usage during Ramadan.

Note: Andersen's Behavioral Model for Vulnerable populations was used to address this objective. Below are 21 variables that served as potential independent variables while controlling for all other variables (i.e., covariates). Only variables that were significantly related to medication usage during Ramadan in the bivariate (unadjusted) analyses were included in the final multivariate model.

- **Predisposing:** age, gender, marital status, health beliefs, race, education, employment, , family size, religiosity level, country of birth, acculturation level, perceived Islamophobia
- **Enabling:** regular source of care, insurance, income, social support, barriers (i.e., cost, language, trust, health care provider characteristics, and discrimination), self-help/ability to negotiate the system
- **Need:** perceived health status, diabetes complications

- **Satisfaction:** Satisfaction with pharmacy services

2.4.3.1 Hypotheses:

Predisposing

H1: There is no significant relationship between **age** and **medication usage changes during Ramadan** after controlling for covariates.

H2: There is no significant relationship between **gender** and **medication usage changes during Ramadan** after controlling for covariates.

H3: There is no significant relationship between **marital status** and **medication usage changes during Ramadan** while controlling for covariates.

H4: There is no significant relationship between **health beliefs** and **medication usage changes during Ramadan** while controlling for covariates.

H5: There is no significant relationship between **race** and **medication usage changes during Ramadan** while controlling for covariates.

H6: There is no significant relationship between **education** and **medication usage changes during Ramadan** while controlling for covariates.

H7: There is no significant relationship between **employment** and **medication usage changes during Ramadan** while controlling for covariates.

H8: There is no significant relationship between **family size** and **medication usage changes during Ramadan** while controlling for covariates.

H9: There is no significant relationship between **religiosity level** and **medication usage changes during Ramadan** while controlling for covariates.

H10: There is no significant relationship between **country of birth**, and **medication usage changes during Ramadan** while controlling for covariates.

H11: There is no significant relationship between **acculturation level** and **medication usage changes during Ramadan** while controlling for covariates.

H12: There is no significant relationship between **perceived Islamophobia** and **medication usage changes during Ramadan** while controlling for covariates.

Enabling

H13: There is no significant relationship between **regular source of care** and **medication usage changes during Ramadan** while controlling for covariates.

H14: There is no significant relationship between **insurance** and **medication usage changes during Ramadan** while controlling for covariates.

H15: There is no significant relationship between **income** and **medication usage changes during Ramadan** while controlling for covariates.

H16: There is no significant relationship between **social support** and **medication usage changes during Ramadan** while controlling for covariates.

H17: There is no significant relationship between **barriers (i.e., cost, language, trust, health care provider characteristics, and discrimination)** and **medication usage changes during Ramadan** while controlling for covariates.

H18: There is no significant relationship between **self-help/ability to negotiate the system** and **medication usage changes during Ramadan** while controlling for covariates.

Need

H19: There is no significant relationship between **perceived health status** (general and diabetes) and **medication usage changes during Ramadan** while controlling for covariates.

H20: There is no significant relationship between **diabetes complications** and **medication usage changes during Ramadan** while controlling for covariates.

Satisfaction

H21: There is no significant relationship between **satisfaction with pharmacists' services during Ramadan** and **medication usage changes during Ramadan** while controlling for covariates.

2.4.4 Objective 4:

To describe Muslims' perceptions of pharmacist engagement services regarding Muslims during Ramadan.

CHAPTER THREE: METHODOLOGY

This chapter describes the methods used to achieve the study objectives and consists of six sections. The first section provides information about the study setting, inclusion criteria, and Institutional Review Board (IRB) approval. The second section describes the health care behavioral model used to address the study objectives. The third section describes the development of the study instrument. The fourth section describes the study's dependent and independent variables. The fifth section describes the pretest, the data collection and the statistical analyses that were conducted to address the objectives. The last section describes the study limitations.

3.1 STUDY SETTING AND POPULATION, INCLUSION CRITERIA, AND IRB APPROVAL

3.1.1 Study Setting and Population

This study used a cross-sectional survey and was conducted using a convenience sample of Muslims with diabetes from San Antonio. The study timeframe was post-Ramadan 2015 (July 17) and post-Ramadan 2016 (July 05). Muslims from San Antonio comprise a broad spectrum of ethnicities and races, including those originally from the Middle East (e.g., Iraq, Jordan, Lebanon, Egypt, Syria, Palestine) and from South Asia (e.g., India, Pakistan, and Bangladesh). In addition, this population also includes Muslims who were born in the U.S., such as African Americans. San Antonio has several mosques that serve a diverse population of Muslims, including the Islamic Center of San Antonio (ICSA) and the Muslim Children's Education and Civic Center (MCECC). San Antonio

Muslims' ethnicity and races slightly differed between the two mosques. The ICSA included Muslims who were mostly from the Middle East and Somalia, and the MCECC included Muslims primarily from Pakistan, India, and the Middle East. The ICSA is the largest mosque in San Antonio with more than 1,500 worshipers, while the MCECC has approximately 500 worshipers. These two mosques were chosen because: they have the highest number of worshipers during Ramadan (700 at the ICSA and 200 at the MCECC) they come from a diversity of backgrounds; and the researcher is acquainted with the imams (worship leaders) of these mosques (see Appendices A and B for the site letters).

3.1.2 Inclusion Criteria

Muslims aged 18 years and older with diabetes, who were taking at least one diabetes medication and who worshiped at one of the four mosques served as the study population. Diabetes was chosen as the disease state because patients typically need more than one dose of medication per day, diabetes requires self-monitoring, and most of the adverse health events (e.g., fainting) that occurred among Muslims during Ramadan were diabetes-related.

3.1.3 Institutional Review Board Approval

The University of Texas at Austin Institutional Review Board approved the study survey.

3.2 HEALTH CARE BEHAVIOR MODEL

3.2.1 Overview

For patients to achieve optimal health, they need to adopt healthy behaviors (e.g., exercise, proper diet, and good hygiene) and utilize health care services (e.g., medications and primary care). Although the goal is to achieve optimal health through self-management behaviors and appropriate use of health care services, there are underlying factors that may explain why patients may or may not engage in healthy behaviors and access care when needed. To better understand how these factors impact service utilization, Andersen's Behavioral Model of Health Services for Vulnerable Populations (Gelberg et al., 2000) was utilized. The next section describes the model evolution that resulted in Andersen's model for vulnerable populations.

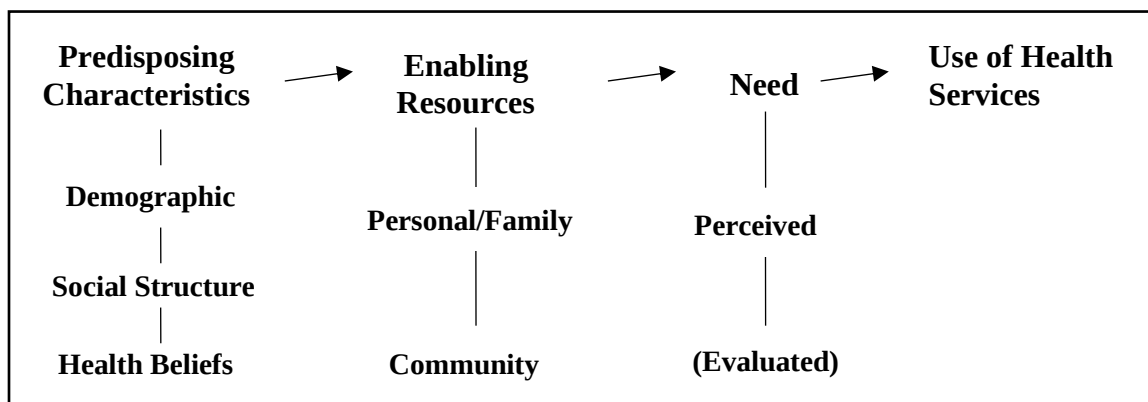
3.2.2 The Behavioral Model of Health Services Utilization

3.2.2.1 Description

The Behavioral Model of Health Services Utilization (BMHSU) was first published in 1968 (Figure 2) as the result of Ronald Andersen's doctoral dissertation (R. Andersen, 1968). Andersen developed the BMHSU to understand why individuals use health services, which in turn could help define and measure health care access and lead to policy development (R. Andersen, 1968). The Andersen model has undergone adaptations over time due to changes in the U.S. health care system, as well as in patients' behaviors. All these changes were summarized by Andersen et al., 1995 (see Figures 2, 3, 4, and 5). The

initial model included three factors that were purported to predict patients' health care utilization: predisposing, enabling, and need factors. Predisposing factors are those that may make patients more likely to utilize health care services. These factors include demographics (e.g., gender), social structure (e.g., ethnicity), and health beliefs (e.g., values concerning health and illness). Enabling factors include personal, family, and community resources that allow patients to use and pay for health care services. Finally, the need factors include perceived health (how a patient views his or her own health), and evaluated health (how health care professionals evaluate a patient's health).

Figure 2: The Behavioral Model of Health Services Utilization—Phase 1 (1968)

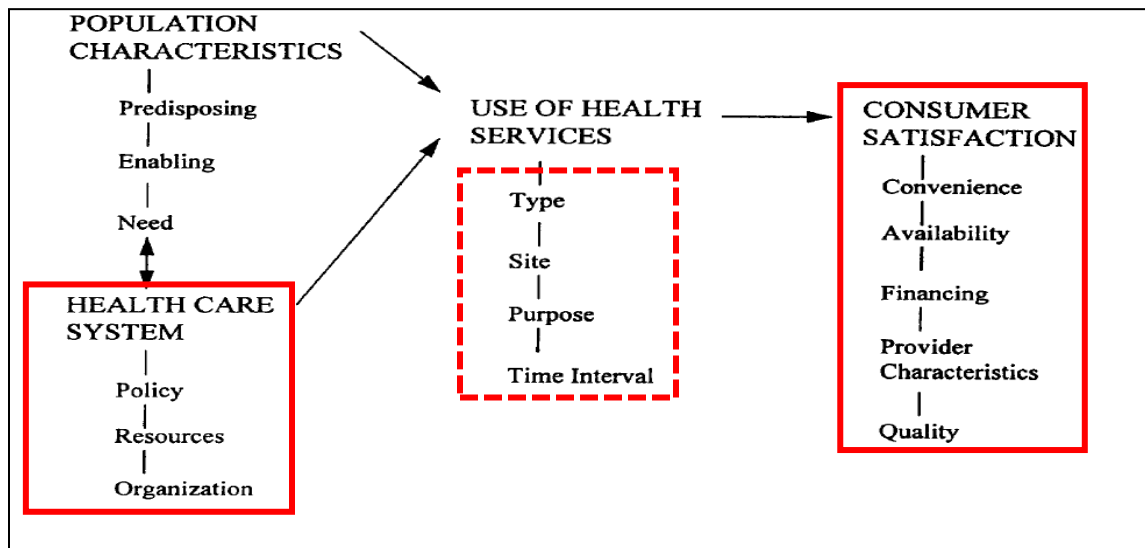


From Andersen, R. M. (1995). Revisiting the behavioral model and access to medical care: Does it matter? *Journal of Health and Social Behavior*, 36(1), 1–10.

In the 1970s and 1980s, other researchers worked with Andersen to create the second phase of the Andersen model (Aday & Andersen, 1974; Aday, Andersen, & Fleming, 1980; Aday, Andersen, Loevy, & Kremer, 1985; R. Andersen & Kravits, 1976; R. Andersen & Newman, 1973; R. Andersen, Smedby, & Andersen, 1970). The model was expanded to include health care system characteristics such as policy, resources and organization. In addition, the second model (Phase 2) further distinguished health care

service utilization by type (e.g., medication use), site (e.g., physician office), purpose (e.g., preventive, emergency), and time interval, in order to assess patterns of use over time. Lastly, Andersen and colleagues added consumer satisfaction with aspects of care such as convenience, availability, financing, provider characteristics, and quality (Figure 3).

Figure 3: The Behavioral Model of Health Services Utilization—Phase 2 (1970)

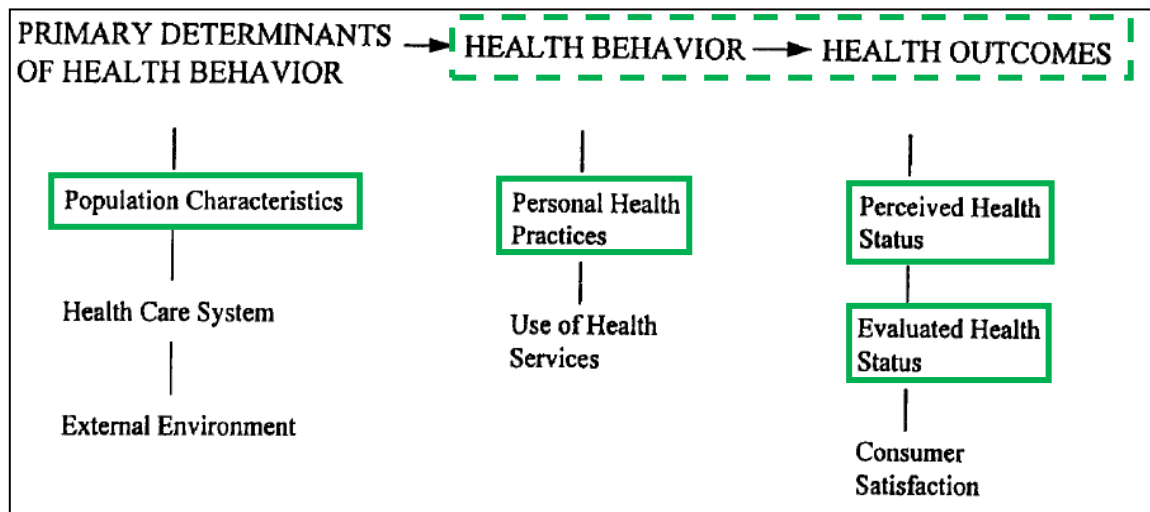


From Andersen, R. M. (1995). Revisiting the behavioral model and access to medical care: Does it matter? *Journal of Health and Social Behavior*, 36(1), 1–10.

The third phase of the model was published in 1994 and included the external environment (e.g., political and economic components such as the Affordable Care Act) as a primary determinant of health, along with population and health care system characteristics (previously included in Phase 2). In this version of the model, health behaviors not only included use of health care services, but also personal health practices such as self-management, diet, and exercise. Lastly, this version of the model described health outcomes not only in terms of consumer satisfaction (previously included in Phase 2) but also how patients perceive their own health and how health care providers evaluate

their health (Figure 4) (R. Andersen, Davidson, & Ganz, 1994; R. Andersen, Marcus, & Mahshigan, 1995).

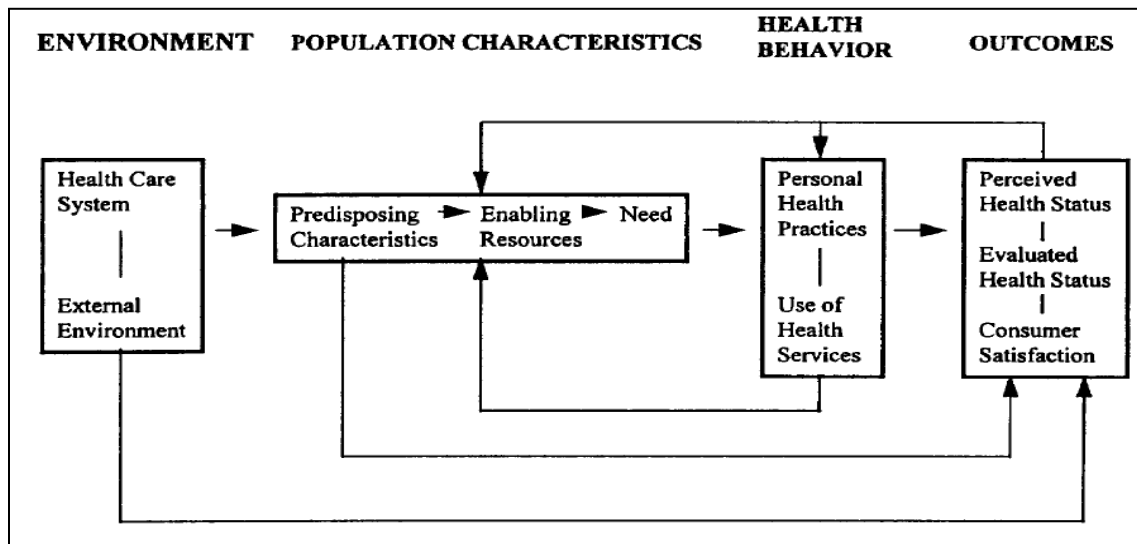
Figure 4: The Behavioral Model of Health Services Utilization—Phase 3 (1994)



From Andersen, R. M. (1995). Revisiting the behavioral model and access to medical care: Does it matter? *Journal of Health and Social Behavior*, 36(1), 1–10.

The next phase of the BMHSU was proposed in 1995 and it showed interactive relationships between the environment population characteristics, behaviors, and outcomes of health care utilization. This phase showed that there are multiple influences on health care utilization. Importantly, it showed that health outcomes can influence predisposing factors and their need for health care services. For example, a patient may enter the system with unique environmental and personal characteristics that impact both health behaviors and subsequent health outcomes. These outcomes can be positive or negative, and they can, in turn, modify a patient’s attitudes toward use of services and access to care (Figure 5) (R. Andersen, 1995).

Figure 5: The Behavioral Model of Health Care Services Use—Phase 4 (1995)



From Andersen, R. M. (1995). Revisiting the behavioral model and access to medical care: Does it matter? *Journal of Health and Social Behavior*, 36(1), 1–10.

3.2.3 The Behavioral Model for Vulnerable Populations (BMVP)

3.2.3.1 Vulnerable Populations

In 2000, Gelberge, Anderson, and other researchers observed that homeless people differed from the general population in terms of health care utilization. They perceived that the homeless had unique factors that limit their health care utilization such as hunger, lack of housing, income and insurance coverage, and difficult childhoods. Because the homeless are a type of vulnerable population, they created another phase of the model: the Behavioral Model for Vulnerable Populations (BMVP) (Gelberg et al., 2000).

Vulnerable populations have limited abilities to utilize health care services and have several factors that negatively affect their lives, which can lead to life-threatening conditions (Aday, 2002). These populations can be divided into three categories: the

physically vulnerable, the psychologically vulnerable, and the socially vulnerable. The physically vulnerable category includes individuals such as high-risk mothers and infants, the chronically ill and disabled, and patients with HIV. The psychologically vulnerable category includes people with chronic mental health diseases and those with a history of alcohol and/or substance abuse, or those who have attempted suicide. The socially vulnerable category includes people living in abusive families, the homeless, immigrants, refugees and racial or ethnic minorities, and the economically disadvantaged. The present study focused on the socially vulnerable factors associated with immigrants and ethnic minorities, as well as the economically disadvantaged because these factors are relevant to Muslims living in the U.S. (Aday, 2002).

3.2.3.2 Model Description

As mentioned in the first chapter in Section 2.3.1 (Figure 1), the BMVP includes predisposing, enabling, need, health behavior, and health outcomes factors. Under each factor, there are two domains: traditional and vulnerable domains. Traditional domains are included in Phase 4 (see Figure 5), and include factors that might affect the general population's health care use. Vulnerable domains are included in the BMVP (Figure 1) and include specific factors for vulnerable populations. Below is a brief review of studies that have used the BMVP, followed by a description of how this study utilized the model.

Studies that have used the BMVP primarily focused on the homeless (Currie, Patterson, Moniruzzaman, McCandless, & Somers, 2014; Doran et al., 2014; van den Berk-Clark & McGuire, 2014), minorities (H. M. Gonzalez et al., 2010; P. Gonzalez et al., 2012;

Graves et al., 2008; Haynes-Maslow et al., 2014; London et al., 2015; Varga & Surratt, 2014; S. L. Williams, 2014), immigrants (Graves et al., 2008; Harcourt et al., 2014; Nandi et al., 2008), and patients with HIV (Boyd et al., 2015; Tsuyuki & Surratt, 2015).

Primary dependent variables in studies that used the BMVP include medication usage (H. M. Gonzalez et al., 2010) or medication diversion (Tsuyuki & Surratt, 2015). Some studies focused on health care providers, such as physician visits (Currie et al., 2014), access to regular care (Nandi et al., 2008) and trust in health care providers (van den Berk-Clark & McGuire, 2014). The purpose of other studies was to identify factors affecting mental health care services (S. L. Williams, 2014), emergency room visits (Boyd et al., 2015; Doran et al., 2014; Nandi et al., 2008) and health screenings (P. Gonzalez et al., 2012; Graves et al., 2008; Harcourt et al., 2014). On the other hand, a few studies used the model to identify factors affecting participation in clinical trials (Haynes-Maslow et al., 2014; London et al., 2015).

The BMVP includes many factors (divided into predisposing, enabling, and need factors) that can explain health care utilization. Among the homeless population, predisposing factors that have been positively associated with health care utilization include: elderly, male, African American, low education, not working for the last 30 days, longer duration of homelessness, prison history, and recreational drug use (Currie et al., 2014; Doran et al., 2014; Gelberg et al., 2000; Weinreb, Perloff, Goldberg, Lessard, & Hosmer, 2006). Among enabling and need factors, having a regular source of care, less social support, poor health status, higher blood pressure, moderate to high level of pain, recent history of psychiatric hospitalization, and major depression disorder were positively

associated with health care utilization of the homeless (Currie et al., 2014; Doran et al., 2014; Gelberg et al., 2000; Weinreb et al., 2006).

Among minority and immigrant populations, the BMVP has been used to examine health care utilization of African American (Varga & Surratt, 2014), Hispanic (P. Gonzalez et al., 2012) and Asian (H. M. Gonzalez et al., 2010) populations. Among African Americans, having a regular source of care, health insurance coverage, depression symptoms, and transportation positively affected their health care utilization (Varga & Surratt, 2014). Regarding Hispanics, health care utilization (cancer screening) was positively associated with having insurance coverage and usual source of care (P. Gonzalez et al., 2012). Among Asians, the rate of antidepressant use was positively associated with age between 35-65, female gender, high acculturation, having health care insurance, having financial difficulties, high number of medical conditions and perceived depression (H. M. Gonzalez et al., 2010). Specifically among the immigrant population, the BMVP was used for Latino (Graves et al., 2008; Nandi et al., 2008) and African (Harcourt et al., 2014) immigrant populations in the U.S. Latino immigrants' access to a regular health care providers and emergency department care were positively associated with female gender, higher level of education, having health insurance coverage, higher income, higher social support, fewer children, arrival before 1997, poor health, and no reported discrimination (Nandi et al., 2008). In addition, Latinos' adherence to mammogram screening was positively associated with age 50 years and older, having insurance, high acculturation and higher breast cancer knowledge (Graves et al., 2008). For African immigrants to the U.S.,

health care utilization (breast and cervical cancer screening) was positively associated with years in the U.S. (Harcourt et al., 2014).

In summary, the BMVP has been used mostly to examine factors among populations such as the homeless and those with HIV. However, the studies that included minorities and immigrants revealed that the most common factors positively associated with health care utilization were: older age, female gender, high level of education, having insurance coverage, higher income, high acculturation, having depression or other mental health disease, having a regular source of care, high social support, long duration of resident in the U.S. and no reported discrimination (H. M. Gonzalez et al., 2010; Graves et al., 2008; Harcourt et al., 2014; Nandi et al., 2008; Varga & Surratt, 2014).

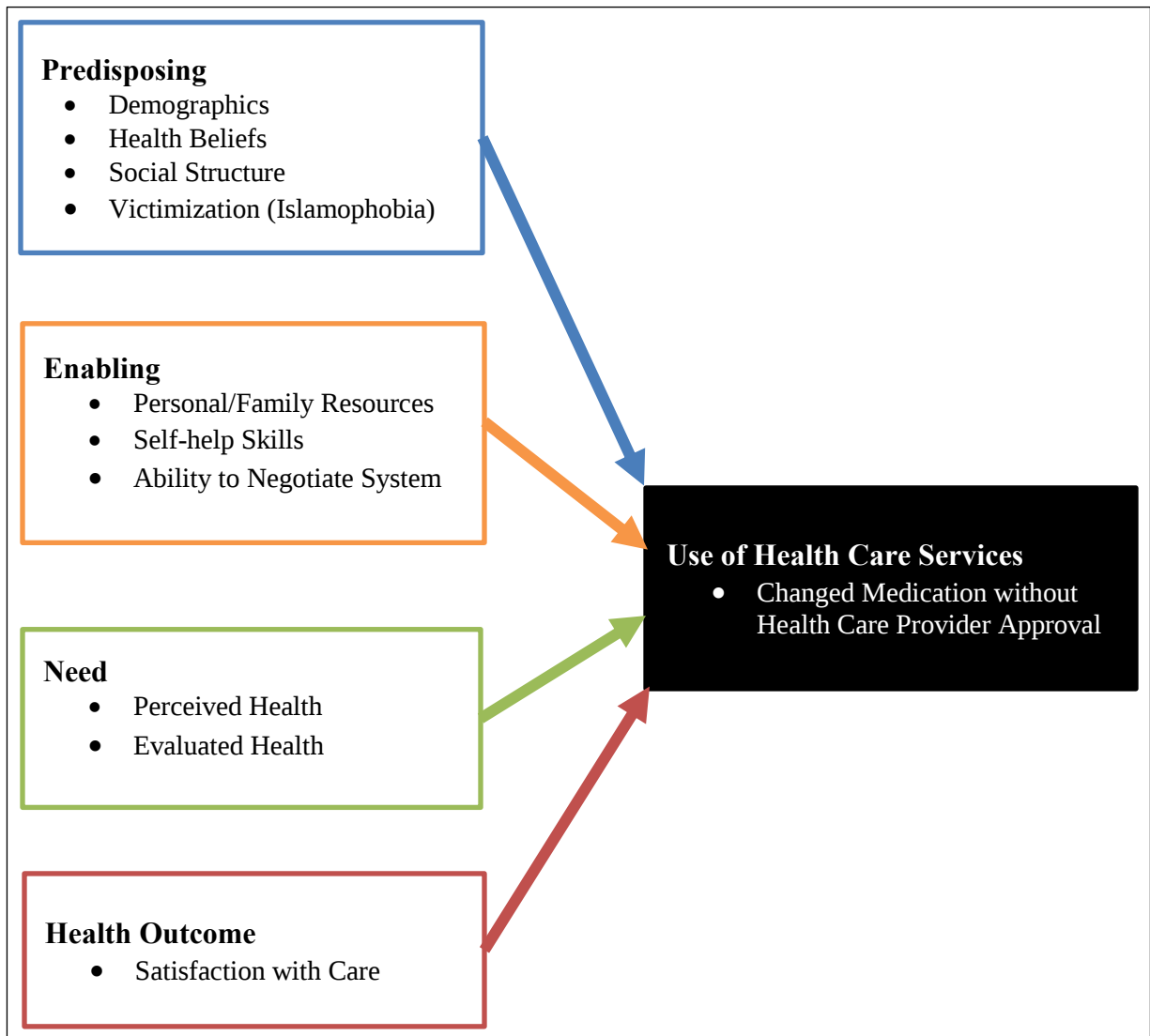
3.2.3.3 Adaptations to the model

The relationships in Andersen's behavioral model for vulnerable populations were presented in a way that was slightly different from the model relationships in the present study. The original model (Figure 1) showed that predisposing (e.g., education), enabling (e.g., income), and need (e.g., health perception) factors all together affect health behavior (e.g., use of health care services), which then affect health outcomes (e.g., satisfaction with care). In addition, it showed that the health outcome variables affect the health behavior, need, enabling, and predisposing variables. In the present study, the health behavior variable—specifically, use of health care services (e.g., changing medication use without a health care provider's approval)—was considered to be the study's dependent variable in the multivariate logistic regression (i.e., outcome variables), and the predisposing,

enabling, need and the outcome variables (i.e., satisfactions with care) were the study's predictor variables. For example, participants' levels of education (predisposing variable), income (enabling variable), diabetic perception (need variable), and satisfaction with the care received from their health care providers (e.g., pharmacists) might impact whether they changed their medications without a health care provider's approval.

In addition, the original model was primarily designed for a homeless population, so it included variables that are irrelevant to the present study population. For example, the model included criminal behavior variable, which only applies to a population with a high probability of being criminal. Therefore, only variables that were assumed to apply to the study population were included in the present study model. The study model and its relationships are shown in Figure 6.

Figure 6: Adapted Andersons' Behavior Model for Vulnerable Populations for Present Study



3.2.3.4 Summary

The degree to which Muslim patients generally utilize health care may impact their decisions about using medications or counseling from their health care providers during Ramadan. Patients might change their medications to facilitate fasting during Ramadan without consulting their health care providers, which might lead to health problems. Andersen's Behavioral Model for Vulnerable Populations provided a framework for understanding factors associated with medication use. The next section will discuss study instrument development.

3.3 THE STUDY INSTRUMENT

3.3.1 Overview

The instrument for the present study was constructed based on the Behavioral Model for Vulnerable Populations. The survey instrument included variables that were included in the BMVP (i.e., predisposing, enabling, need and satisfaction) to identify factors that affect Muslim patients' medication usage. More information about the study instrument is presented below.

3.3.2 Survey Instrument

The study instrument has three major parts (see Appendix C). **Part I** includes questions about patients' health practices during Ramadan. *Section 1* focuses on health beliefs regarding fasting during Ramadan, complications encountered during fasting, diabetes management and medication usage during Ramadan. In *Section 2*, patients were

asked if they receive support from their health care providers, relatives, and friends during Ramadan, and their perceptions of services that pharmacists could provide during Ramadan. **Part II** includes questions related to patients' general health and perceptions. *Section 1* focuses on diabetes and diabetes management (not specifically during Ramadan). In *Section 2*, patients are asked about general health, access to care, barriers to care, and their perceptions of pharmacists (i.e., general satisfaction with pharmacy services). **Part III** includes questions about patients' perceptions of U.S. culture and demographics. In *Section 1*, patients were asked about acculturation (level of adaptation to U.S. culture) and Islamophobia (how they feel Americans perceive Muslims). *Section 2* focuses on patients' religiosity level and sociodemographics (see Appendix C).

The survey was developed into two languages, English (see Appendix C) and Arabic (see Appendix D). The Arabic version was created by translating the survey from English into Arabic language by the primary researcher, and then translated back into English by an official translation office in Saudi Arabia. Both individuals speak and write both languages.

3.3.2.1 Study Variables

In this study, the dependent variables include patients' medication usage changes during Ramadan (Objective 3) and their perception of pharmacists' services during Ramadan (Objective 4). The independent variables include patients' predisposing, enabling, and need factors, and their satisfaction with pharmacy services. Those variables will be highlighted in the following sections.

3.3.2.1.1 Study Dependent Variables

3.3.2.1.1.1 Primary Dependent Variable

The study's primary dependent variable was medication usage changes during Ramadan (Objective 3 *To determine if predisposing, enabling, and need factors, and satisfaction with pharmacy services have an impact on diabetic Muslims' medication usage changes during Ramadan*). Muslims may change their medications to allow them to fast during Ramadan. In this study, medication usage was operationalized by calculating the percentage of medication usage changes *without provider approval* for oral diabetes medications and insulin as reported by the patient. Items for this variable were developed based on a study that examined how Muslim diabetic patients changed their medications during Ramadan (Pinelli & Jaber, 2011). Seven types of medication use changes were captured and they included: 1) changing medication time, 2) changing medication frequency, 3) changing medication dosage form, 4) increasing dose, 5) decreasing dose, 6) stopping medication, and 7) combining multiple doses. Patients were asked to check the box that represented their changes. Possible responses were "Yes", "No", or "Not Applicable" (see Table 7 example below and Appendix C, Part I, Section 1D).

Table 7. Example Medication Usage Items

During Ramadan, did you change any of the following <u>WITHOUT</u> your health care provider's approval?	Oral Medications			Insulin		
	Yes	No	Not applicable	Yes	No	Not applicable
1. I changed the timing of my diabetes medication(s).	☐	☐	☐	☐	☐	☐

Patients received 1 point if they checked “Yes” for either oral medications or insulin for any of the following six items: changing medication frequency, changing medication dosage form, increasing dose, decreasing dose, stopping medication, and combining multiple doses. On the other hand, if patients checked “No” for the previous six items, they received 0 points. If patients were using only an insulin pump or did not fast during the last Ramadan, their response was marked as “not applicable” and was counted as missing from the study analysis for that variable (see Table 8).

Table 8. Objective Three: Dependent Variable: Medication Utilization Changes During Ramadan without Health Care Provider’s Approval

Dependent Variable Items	Scoring Method
1. Changed medication time	0 = not applicable ^a 0 = no 0 = yes, without health care provider’s approval
2. Changed medication frequency	0 = not applicable 0 = no 1 = yes, without health care provider’s approval
3. Changed medications dosage form	
4. Increased medication dose	
5. Decreased medication dose	
6. Stopped using medications	
7. Combined multiple doses of the same medication	

^a “not applicable” will be counted as missing in the study bivariate and multivariate analysis

3.3.2.1.1.2 Secondary Dependent Variable

The study’s secondary dependent variable was perceptions of proposed pharmacist engagement services during Ramadan (Objective 4 *To describe Muslims’ perceptions of*

pharmacist engagement services regarding Muslims during Ramadan). It aimed to identify ways in which pharmacists can effectively engage and communicate with Muslims during Ramadan. Muslim patients might have different perspectives about how pharmacists can help them manage their medications during Ramadan. Some patients might have immigrated to the U.S., so their perceptions regarding pharmacists may differ from that of the U.S. general population. To address this objective, 17 items comprised of four domains (see Appendix C, Part I-Section 2B) were created based on the literature (Kim-Romo et al., 2014; Moczygemba et al., 2010) and two qualitative studies (Mygind et al., 2013; Peterson, Nayda, & Hill, 2012). The four domains of how pharmacists might engage Muslims included: 1) encouragement and support regarding fasting [N=4; Items 1-4], 2) understanding Islamic religious practices and culture [N=5; Items 5-9], 3) creating a Muslim-friendly and welcoming environment in the pharmacy [N=3; Items 10-12], and 4) modifying medications to facilitate fasting [N=5; Items 13-17]. For each item (N=17), participants were asked to select their level of agreement on a 5-point Likert scale (1 = *strongly disagree* to 5 = *strongly agree*) with a possible scale score range of 17-85. Higher scores mean that patients have more positive perceptions regarding pharmacists' ability to understand the importance of fasting and managing medications while fasting.

3.3.2.2 Study Independent Variables

The study's independent variables included predisposing, enabling, and need factors, and satisfaction with pharmacy services. The BMVP includes numerous factors; however, variables were selected for this study using the available literature regarding Muslims and medication usage during Ramadan. These variables are presented below.

3.3.2.2.1 Predisposing factors

The predisposing variables selected for the study included demographic variables (age, gender, marital status), health beliefs, social structure (race, education, employment, family size, religiosity level, country of birth, acculturation) and victimization (Islamophobia)). The rest of the BMVP's predisposing factors were not included in the study survey because they were primarily relevant for homeless populations (the primary population of BMVP) or not salient to Muslim populations in the U.S. The following sections provide more information about the patients' health beliefs, religiosity level, acculturation, and perceived Islamophobia. The remaining predisposing factors are included in the sociodemographic section (3.3.2.3).

3.3.2.2.1.1 Health beliefs

Patients' health beliefs included patients' values concerning health and illness, attitude toward health services, and knowledge about disease. Unfortunately, there were no valid and reliable survey measures regarding health beliefs of Muslim patients with diabetes during Ramadan. Therefore, two qualitative studies (Mygind et al., 2013; Peterson et al., 2012) were used to construct a scale to measure patients' beliefs (see Appendix C, Part I-Section 1A). This resulted in 12 items representing three domains to measure Muslims' health beliefs: 1) beliefs of being exempt from fasting during Ramadan due to diabetes [N=5; Items 1-5], 2) beliefs related to religious aspect and power [N=4; Items 6-9], and 3) beliefs related to the benefits of fasting [N=3; Items 10-12]. For each item (N=12), patients were asked to select their agreement level on a 5-point Likert scale

(1 = *strongly disagree* to 5 = *strongly agree*), with possible scale score range of 12-60. Higher scores reflect more positive health beliefs related to fasting during Ramadan.

3.3.2.2.1.2 Religiosity level

Patients' religion is the major factor that distinguishes the study population from the general U.S. population. Patients who are more religious may insist on fasting more than patients who are less religious. Sunni Muslim patients may practice or perceive the requirement of fasting differently from Shia Muslim patients. Therefore, it was important to identify Muslims who are Sunni by asking patients direct questions and allow them to select whether they are Sunni, Shia, or other, and then asking them to specify their religious group (Note: descriptive only, not included in the multivariate analysis). Then, patients' religiosity level was measured. Patients' religiosity was defined as "the degree to which an individual is committed to the values, beliefs, and practices of a particular religious tradition" (Hill & Hood, 1999). Two Islamic religiosity scales in the literature served as the basis for this construct. The first scale was that of Tiliouine and Belgoumidi (2009), which has four constructs, 60 items and a Cronbach's alpha reliability coefficient ranging from 0.71 to 0.81. Respondents were asked to indicate the strength/frequency of each item on a 5-point Likert scale, with 1 = *not at all* and 5 = *extremely* (or *always* in some statements). The second scale was that of Hill and Hood (1999), which has ten items and a Cronbach's alpha reliability coefficient of 0.80. The scale measures frequency of engaging in Islamic practices, such as how often Muslims: 1) donate money, 2) recite the Quran, 3) eat halal food, 4) pray, 5) read about Islam, 6) attend mosque, 7) practice fasting, 8) engage in free prayer, 9) dress according to Islam, and 10) engage in a remembering of

Allah session. The items are measured on a 6-point Likert scale with varying response choices (e.g., 1 = *never* to 6 = *everyday*; 1 = *never* to 6 = *almost every week in addition to Ramadan*) in which the minimum score was 10 and the maximum score was 60.

After reviewing both scales, the second scale, Hill and Hood (1999) scale, was selected because it had fewer items and a good reliability. Based on the graduate student's experience and after consultation with an imam, out of the selected scale, five items were deleted so only five were included in the survey. The five deleted items were: 1) donate money, 2) eat halal food, 3) read about Islam, 4) dress according to Islam, and 5) engage in a remembering of Allah session. These items were deleted to decrease the number of survey items and because they were determined to not strongly measure religiosity. The five included items were: 1) reciting the Quran, 2) praying, 3) attending services at the mosque, 4) practicing fasting, and 5) engaging in free prayer (see Appendix C, Part III-section 2A, Q2a-d, and f). For each item (N=5), patients were asked to select their agreement level on 6-point scale (with varying response choices), with possible scale score range of 5-30 (higher scores mean higher religiosity level). Although the response scales varied for each item, the original scale was validated using this format.

In this section, patients were also asked how many days they fasted during the previous Ramadan. Response options were: 1) no fasting or 2) number of days they fasted. This question provided descriptive information on the prevalent days of fasting among diabetic patients (see Appendix C, Part III-section 2A, Q2e).

3.3.2.2.1.3 Acculturation

The degree of engagement in the culture may affect patients' level of medication utilization. Muslim patients who are highly engaged in the U.S. culture (i.e., highly acculturated) may have a more positive relationship with health care providers and utilize medications as recommended during Ramadan. Therefore, measuring the acculturation level of Muslim patients is important, since they are highly likely to be immigrants.

Two acculturation scales were selected from the literature for consideration. The first scale was that of Barry (2005) which was designed to capture the acculturation of Arabs in the U.S. It has two constructs, separation/assimilation and integration/marginalization, and eight items with a Cronbach's alpha reliability coefficient equal to 0.71 and 0.73, respectively. Respondents were asked to indicate the strength/frequency of the described aspect in each item on a 7-point Likert scale, with 1 = *strongly disagree* and 7 = *strongly agree*. The second scale was that of Bagasra (2011), which has two constructs, Islamic identity and American norms, 16 items, and a Cronbach's alpha reliability coefficient equal to 0.79. Participants were asked to indicate how true each statement was in terms of their own attributes and behavior on a 5-point scale, with 1 = *not at all true of me* and 5 = *extremely true of me*. The two scale constructs were assumed to be negatively correlated, therefore the Islamic identity items were reverse coded.

After reviewing the two previous scales, the second scale was used in this study because it had slightly higher reliability than the first scale and was designed specifically

for Muslims. To decrease respondent burden, only six items were included in the survey to measure patients' acculturation (see Appendix C, Part III-Section 1A). The ten deleted items were: 1) self-identify as American, 2) wearing Islamic clothing, 3) hiding religion, 4) willing to marry non-Muslim, 5) work in prohibited jobs, 6) avoid alcohol parties, 7) eat with non-Muslim, 8) keep dogs inside home, 9) show patriotism, and (10) believe in human equalities. After consulting with the present study population, these items were identified as not relevant to themselves so they were deleted. The first domain, Islamic identity has 3 items (Items 1-3) and the second domain, American norms has 3 items (Items 4-6). All 6 items are measured on a 5-point scale where 1 = *not true at all true of me* and 5 = *extremely true of me*, with possible scale score range of 6-30 (higher scores = higher engagement in the U.S. culture).

3.3.2.2.1.4 Islamophobia

After September 11, 2001, Islamophobia increased in the U.S., and Muslims in the U.S. started to experience some degree of antagonism. Gottschalk and Greenberg (2008) defined Islamophobia as “a social anxiety towards Islam and Muslim cultures.” In this study, Islamophobia is defined as Americans' perceptions of Muslims. Unfortunately, Islamophobia has prevented some Muslims from utilizing health care services, so it was important to measure its relationship with Muslims' medication utilization during Ramadan.

This study used the Islamophobia scale developed by Kunst, Sam, and Ulleberg (2013) which has three constructs (general fear of Islam, fear of Islamization, and

Islamophobia in the media), and 12 items, with a reliability coefficient range from 0.86 to 0.91. The scale was first created in Germany and respondents are asked to indicate their level of agreement with the 12 items using a 6-point Likert scale rated from 1 (totally disagree) to 6 (totally agree). In the present study, fear of Islamization items (N=3) were omitted due to redundancy and to shorten the survey. Therefore, nine items were included in the study (see Appendix C, Part III-Section 1B), including general fear of Islam [N=6; Items 1-6] and Islamophobia in the media [N=3; Items 7-9]. For each item (N=9), patients were asked to select their agreement level on a 5-point Likert scale (1 = *strongly disagree* to 5 = *strongly agree*), with a possible scale score ranged of 9-45 (higher scores = higher perception of social anxiety in the U.S. towards Islam and Muslim cultures).

3.3.2.2.2 *Enabling Factors*

As mentioned above, not all the enabling factors of the BMVP were selected for the present study because the current study population is different from the populations of the original BMVP. The enabling factors included in this study were regular source of care, insurance, income, social support, perceived barriers to care, and self-help skills/ability to negotiate the system. The remaining variables were excluded because they were related to the homeless population and are not relevant to Muslims. The following section highlights the above factors (Note: Income is included in the sociodemographic section 3.3.2.3).

3.3.2.2.2.1 *Regular Source of Care*

Having a regular source of care is important in enabling patients to receive care in case of emergency or to obtain health information when they need it. To capture patients'

regular source of care, the study survey included four direct questions (see Appendix C, Part II, Section 2A, Questions 5-8). The first question asked patients to identify where they go to receive health care services. This question was to identify whether patients primarily utilized the emergency room or whether they sought medical care elsewhere (Note: descriptive only, not included in the multivariate analysis). Another set of three questions directly asked patients whether they had a physician whom they regularly visit for checkups and to receive treatment, whether they had a pharmacist whom they asked medication-related questions, and whether they had a community pharmacy where they usually received medications. These three questions were important to establish a full picture of patients' regular sources of care. These variables were used in the multivariate model. Patient source of care was divided into physician's care and pharmacist's care and usual source of care. For each of the 3 items, "Yes" received 1 point and "No" received 0 points. Compared to pharmacists, more emphasis was placed on physicians due to diagnosing, prescribing and managing patient's health. Thus, physician care received a higher weighting than pharmacists (2 vs. 1, respectively). The 3 items were summed to represent usual source of care and ranged from 0-4. Higher scores mean that patients had more access to health care services.

3.3.2.2.2 Insurance

Availability of insurance coverage enables patients to utilize health care services. In Muslim populations where many are immigrant, the likelihood of having insurance coverage is low. To capture patients' insurance coverage, one item asked patients how they usually pay for their medical care using the following categories: private insurance,

Medicare, Medicaid, no insurance, out of pocket, or other. (see Appendix C, Part II, Section 2A, Question 4). Insurance coverage was measured dichotomously, 1 = Yes, if they have any type of insurance coverage and 0= No, if they do not have coverage or if they paid out-of-pocket.

3.3.2.2.3 Social Support

Patients' relatives and friends often affect their medication utilization. During Ramadan, health care providers, religious leaders (imams), family, and friends may provide recommendations to patients about their ability to fast and how to manage their medications; however, patients may or may not value these recommendations. Therefore, it was important to clarify the impact of such advice on patients' ability to fast and manage their medication usage during Ramadan. To capture patients' social support, the survey asked patients to select from a list of individuals (family, friends, religious leaders (Imam)) and health care providers (physicians, pharmacists, or nurses) whose opinions they follow regarding: 1) whether to fast and 2) how to manage medications while fasting during Ramadan (see Appendix C, Part I, Section 2A). For each of the above items, social support was measured dichotomously: 1 = if the patient selected any of the health care providers listed, and 0= if the patient did not select any health care providers. The two items were summed and 0 was assigned if the score was 0 or no health care provider selected and 1 was assigned if the score was 0 or a health care provider was selected for at least one item. Thus, this construct could be operationalized as medical social support since only providers' advice receive credit.

3.3.2.2.4 Perceived Barriers to Care

Muslims patients often encounter barriers that prevent them from utilizing and managing their medications. These barriers may be related to cost, language, trust, health care providers' characteristics, and discrimination (see Appendix C, Part II, Section 2B, Questions 1-14). Cost barriers [N=3; Items 1-3] were adapted from Harcourt et al. (2014), and asked patients whether they agreed or disagreed about facing difficulties in paying for their physician visits, prescriptions medications, and over-the-counter medications. The language barriers items [N=3; Items 4-6] were modified from T. C. Davis et al. (1993) and asked patients about the difficulties they encountered in understanding medical information and reading and filling out medical forms. Trust barriers [N=3; Items 7-9] were measured by three items that were modified from Anderson and Dedrick (1990). Items included doctor consideration of religious needs in providing medical care, and trust in their doctor's and pharmacist's judgments. Those items were negatively worded; therefore the score for these items was reverse coded to determine participants' total score. Health care providers' characteristics barriers [N=4; Items 10-13] included health care providers of a different religion, different ethnicity, different gender, or speak a different language. The discrimination barrier item [N=1; Item 14] in the present study was derived from Krieger, Smith, Naishadham, Hartman, and Barbeau (2005). The discrimination item focused on discrimination because of being Muslim while getting medical care. For each item (N=14), patients were asked to select their agreement level on 5-point Likert scale (1 = *strongly disagree* to 5 = *strongly agree*), with possible scale score range of 14-70 and higher scores were associated with more perceived barriers.

3.3.2.2.2.5 Self-Help Skills and Ability to Negotiate the Health Care System

Immigrant patients may have difficulties in utilizing health care because of their lack of skills, such as lack of ability to make an appointment or lack of understanding aspects of the health care system such as knowing whom to ask or where to seek care in case of an emergency. Muslims in the U.S. may face such difficulties since the majority of them are immigrants. To capture this variable, four items were modified from Harcourt et al. (2014). These items asked patients to indicate how strongly they agree or disagree regarding the difficulties they encounter in making appointments with health care providers, going to the emergency room, asking pharmacists about medications, and lastly whom they would ask if they had questions about their health (see Appendix C, Part II, Section 2B, Questions 15-18). For each item (N=4), patients were asked to select their agreement level on 5-point Likert scale (1 = *strongly disagree* to 5 = *strongly agree*), with possible scale score range of 4-20 and higher scores mean higher perceived ability to utilize health care.

3.3.2.2.3 Need Factors

Patients' need for health care services is one of the factors that drive utilization of such services. Patients' need was divided into how patients themselves perceive their health and how their health care providers evaluate their health. Diabetic patients perceived health was operationalized by how they perceived their diabetes. Diabetic patients evaluated health was operationalized by their diabetes complications.

This study focused on: 1) patient's perceived need using a score for diabetes-related health status and 2) diabetes complications using a summary score created from various measures of diabetes complexity. Perceived diabetes health status (see Appendix C, Part II, Section 1A, Q1) was assessed using the following response scale: 5 = *excellent*, 4 = *very good*, 3 = *good*, 2 = *fair*, and 1 = *poor*. For the second part of the need variable, diabetes complications, a composite summary score was developed using nine items that were deemed to be important in predicting whether a patient would be likely to seek provider approval regarding diabetes medication changes during Ramadan. The summary score was also created to reduce the number of variables included in the multivariate model. All nine variables are included in Table 9 under "need factors" along with their respective scoring rubrics. The first six variables in the diabetes complications summary score can be found in Appendix C, Part I, Section 1A, Questions 3-8. Patients were also asked about years since being first diagnosed with diabetes (see Appendix C, Part II, Section 1A, Q2); however, this was not included in the summary score. Question 3 asked about type of diabetes: type 1 received 1 point and type 2 or other diabetes received 0 points. Question 4 asked patients how they managed their diabetes including medications and lifestyle changes. For the composite score, patients who used 'insulin with injection' received 1 point and those who did not use 'insulin with injection' received 0 points. Question 5 asked about the frequency of their medication use before Ramadan. Those who were on once/day regimens (i.e., 'every morning' or 'every evening') received 0 points, while those who took their medications more than once/day received 1 point. Question 6 assessed diabetes-related complications including problems with nerves, eye, kidneys, feet/leg, or other. Each

of the above checked problems received 1 point for a score range of 0-5. If the patient checked ‘no complications’ s/he received 0 points. Question 7 asked about the number of hospitalizations and Question 8 asked about the number of hospitalization and emergency department visits during the last year due to their diabetes. The composite score included a weight multiplier for hospitalizations of 2 and emergency room visits of 1.5. In addition, to capture diabetic patients’ perceived health *during Ramadan*, three questions asked how many times they experienced low blood sugar, severe low blood sugar, and high blood sugar (see Appendix C, Part I, Section 1B, Questions 1-3). The number of times for each item was added to the ‘diabetes complications’ summary score. Thus, nine items comprised the summary score of patient’s diabetes complications, where higher scores were associated with more diabetes complications.

3.3.2.2.4 Health Behavior

3.3.2.2.4.1 Personal Health Practices

Patients’ health care practices included diet, exercise, self-care, tobacco use, and adherence to care, which are important in diabetes management. In this study, the Diabetes Care Profile scale (James T Fitzgerald et al., 1996) was used to determine Muslim diabetic patients’ diet, exercise, self-care, and adherence to care. To measure patients’ personal practices before Ramadan, patients were asked how often they do the following: follow a meal plan specifically for diabetes, exercise for at least 30 minutes 3 days a week, check their blood glucose level with a monitor, take their oral medications, and use insulin as prescribed (see Appendix C, Part II, Section 1A, Question 9). To detect what changes

diabetic patients make during Ramadan, the same questions were asked, and patients had to select whether they increased, decreased, or made no changes to their personal health practices (see Appendix C, Part I, Section 1C). These detailed changes were not included in the multivariate analyses. Results were also reported descriptively to address Objective 2 *To describe Muslims' diabetes medication usage and diabetes management behaviors (diet, exercise, self-care) during Ramadan.*

3.3.2.2.5 Outcomes: Satisfaction with Care

Muslim patients' medication usage may be affected by their satisfaction with pharmacists. Satisfaction with care in the present study included 15 items covering five domains: general [N=2; Items 1-2], interpersonal [N=4; Items 3-6], communication [N=3; Items 7-9], accessibility [N=3; Items 10-12], and comprehensiveness [N=3; Items 13-15] (see Appendix C, Part II, Section 2C). The items were derived from published reliable and valid scales in the literature (Kim-Romo et al., 2014; Moczygemba et al., 2010; Worley & Schommer, 1999). For each item (N=15), patients were asked to select their agreement level on 5-point Likert scale (1 = *strongly disagree* to 5 = *strongly agree*), with possible scale score range of 15-75, and higher scores were associated with higher pharmacist satisfaction.

3.3.2.3 Patients' Sociodemographics

Patients' sociodemographic factors may impact medication usage during Ramadan and they also describe the study population (see Appendix C, Part III, Section 2B). The sociodemographic variables in the present study included the following:

1. Age: year of birth
2. Gender: male/female
3. Race/ethnicity: White, Black, Asian, Hispanic, or other, please specify
4. Country of birth: United States or other, please specify
5. Years in the U.S. (open-ended)
6. Marital status: married, divorced, separated, widowed, or never married
7. Education level: less than middle school; middle school graduate; high school graduate; some college; college graduate; graduate degree (master's or Ph.D.)
8. Income: <\$20,000, \$20,000–\$29,999, \$30,000–\$49,999, \$50,000–\$74,999, \$75,000–\$99,999, ≥\$100,000
9. Employment: full time employed, part time employed, unemployed looking for a job, unemployed not looking for a job; self-employed (own a business); student; retired
10. Family size: adults age 18 and older (open-ended) and children under age 18 (open ended)

3.4 SURVEY PRETEST

The survey was pretested to assess face validity and readability. In addition to five Health Outcomes graduate students and faculties, the survey was pretested with Muslim diabetes patients. The Arabic version survey was administered to three participants who spoke Arabic, and the English version survey to three participants who spoke English. These participants were from San Antonio and had different levels of education and

ethnicities. The participants completed the survey and provided their comments, which were incorporated into the final survey. The comments were mainly about wording changes for some items (e.g., changing “while fasting” to “if I decide to fast” in items 12 -17 in perception of pharmacist potential services (see Appendix C, Part I-Section 2B)) and adding a skip option for some questions (e.g., allowing participants who use insulin pumps to skip answering questions regarding medication changes (see Appendix C, Part I, Section 1D)).

3.5 DATA COLLECTION

The study utilized a survey that included items and constructs from Andersen’s Behavioral Model of Health Services Utilization for Vulnerable Populations (Gelberg et al., 2000). The survey was administered after Ramadan (July 17, 2015). To cover all four mosques and to maximize sample size, data was collected between November 2015 and July 2016. The surveys were distributed and responses were collected in several ways. First, the survey was distributed in the MCECC clinic, which offers free treatment for low-income patients. Diabetic patients in the waiting area were asked to fill out the survey before seeing their doctors. Second, during two Friday prayers (*Jumuah*), the imams of the two mosques (the ICSA and the MCECC) asked worshipers with diabetes to fill out the survey. Participants received a \$25 gift card for completing the survey. After collecting the surveys, several statistical analyses were performed, as discussed below.

3.6 DATA ANALYSIS

The following section provides the statistical analysis that was performed for each objective.

3.6.1 Objective One

To describe the predisposing (demographic characteristics, health beliefs, and social structure), enabling (personal and family resources) and need factors, and satisfaction with pharmacy services of Muslim patients with diabetes.

Descriptive statistics (i.e., frequency, mean, standard deviation, and range) were utilized.

3.6.2 Objective Two

To describe Muslims' diabetes medication usage and diabetes management behaviors (diet, exercise, self-care) during Ramadan

Descriptive statistics (i.e., frequency, mean, standard deviation, and range) were utilized.

3.6.3 Objective Three

To determine if predisposing, enabling, and need factors, and satisfaction with pharmacy services have an impact on diabetic Muslims' medication usage changes during Ramadan.

Multivariate logistic regression analysis was used to address this objective. All hypotheses related to this objective used the dependent variable medication usage changes during Ramadan (see Table 8 Section 3.3.2.1.1.2.) and had up to 21 independent variables (see Table 9). To limit the number of independent variables, bivariate (unadjusted) analyses were used. The independent variables that showed a relationship (p value <0.05) with the dependent variable was included in the final multivariate model.

Table 9: Objective Three: Independent Variables Related to Medication Usage Changes During Ramadan

INDEPENDENT VARIABLES	MEASUREMENT LEVEL	ACTUAL RECODES
Predisposing factors		
Age (years)	Continuous	
Gender	0 = female 1 = male	N/A
Marital status	1 = married, 2 = divorced, 3 = separated, 4 = widowed, 5 = never married	0 = not married 1 = married
Health belief	Continuous 9- items; 5-point scale ^a	Summary score Range 9-45
Race/ethnicity	1 = White, 2 = Black, 3 = Asian, 4 = Hispanic, 5 = other	0 = Non-White 1 = White
Education	1 = less than middle school, 2 = middle school graduate, 3 = high school graduate, 4 = some college, 5 = college graduate, 6 = graduate degree (Master's or Ph.D.)	0 = high school graduate or less 1 = Some college degree or higher
Employment	0 = No, I do not want to work, 1 = No, I am student, 2 = No, I am retired 3 = No, I am looking for work, 4 = Yes, Part time, 5 = Yes, Full time	0 = Non-full-time employed 1 = Full-time employed
Family size (# of adult)	Continuous	Summary score Total number combined
Family size (# of children)	Continuous	
Years in the U.S.	Continuous	N/A
Religiosity level	Continuous 5-items; 6-point scale with varying responses	Summary score Range 5–30
Country of birth	0 = outside United States 1 = United States	N/A
Acculturation level	Continuous 5- items; 5-point scale; 1 = not true at all of me, 5 = extremely true of me	Summary score Range 5-25
Islamophobia	Continuous 9- items; 5-point scale ^a	Summary score Range 9-45
Enabling factors		

Table 9 (continued)

Regular source of care (physician)	0 = No 1 = Yes (weighted (X 2))	Summary score Total number combined Range 0-4
Regular source of care (pharmacist)	0 = No 1 = Yes	
Regular source of care (community pharmacy)	0 = No 1 = Yes	
Insurance	0 = no insurance, 1 = pay out-of-pocket, 2= Medicaid, 3= Medicare, 4 = private insurance	0 = Uninsured (no insurance/pay out-of-pocket) 1 = Insured (any)
Income	Ordinal 1= <20,000 to 6= ≥100,000	0 = < 30,000 1 = ≥ 30,000
Social support (follow opinions of... <i>whether to fast</i>)	Non-health care provider: 1 = family, 2 = friends, 3 = imam, Health care provider: 4 = physicians, 5 = pharmacists, 6 = nurses	0 = did not follow health care provider opinion if <i>only</i> check non-health care provider 1 = followed health care provider opinion if checked for at least one item
Social support (follow opinions of.... <i>how to manage medications</i>)	Non-health care provider: 1 = family, 2 = friends, 3 = imam, Health care provider: 4 = physicians, 5 = pharmacists, 6 = nurses	
Barriers (Discrimination + Cost + Language + Trust + Health care provider's characteristics + discrimination)	Continuous 14- items; 5-point scale ^a	Summary score Range 14-70
Self-help skills/ability to negotiate system	Continuous 4- items; 5-point scale ^a	Summary score Range 4-20
Need factors		
Perceived diabetes health	Ordinal 1 item: 1 = poor, 2 fair, 3 good, 4= very good, 5 = excellent	0 = Poor and fair 1 = excellent, Very good, Good.
<i>Composite Diabetes Complications Score (shaded items below)</i>		
Diabetes type	1 = type 1, 2 = type 2, 3 = Other	0 = type 2 or Other 1 = type 1
Diabetes management	1 = oral medications, 2 = exercise, 3= glucose testing, 4 = insulin injections, 5 =	0 = non-insulin injection

	diet, 6 = none, 7 = insulin with pump, 8 = other	1 = insulin injection
Medication schedule (oral/insulin)	0 = do not use, 1 = every morning, 2 = every evening, 3 = twice/day, 4 = 3 times/day, 5 = 4+ times/day	For either oral or insulin 0 = once/day 1 = > once/day
Diabetes-related complications	1 = nerve, 2 = kidney, 3= feet/legs, 4 = eye, 5 = other, 0 = none	Continuous (total number checked) 0-5
Hospitalizations	Continuous Number of times	Weighted (# of times X 2)
Emergency room visits	Continuous Number of times	Weighted (# of times X 1.5)
Low blood sugar	Continuous Number of times	N/A
Severe low blood sugar	Continuous Number of times	N/A
High blood sugar	Continuous Number of times	N/A
Composite Diabetes Complications Score	Continuous	Sum of shaded items Range will vary
Satisfaction		
Satisfaction with pharmacy services	Continuous 15- items; 5-point scale ^a	Summary score Range 15-75

^a5-point Likert scale (1 = strongly disagree, 5 = strongly agree)

3.6.3.1 Multivariate logistic Regression Test Assumptions

There are four assumptions to be met before multivariate logistic regression can be used. These assumptions are 1) dichotomous dependent variable, 2) one or more of continuous or categorical independent variables, 3) linearity between continuous independent variables and the logit transformation of the dependent variable, 4) and independence of the observation (Stevens, 2012). The first assumption was met since the study dependent variable was dichotomized. The second assumption was also met since the model has three independent continuous variables. Linearity between the model independent variable and the logit transformation of the dependent variable was met using

a scatter plot, which tested the departure of variables from linearity. The fourth assumption is the independence of observation, which was met by inspecting the overall model's result plots.

3.6.3.2 Power Analysis

The study's power analysis is important to detect the study sample size needed. Calculating the needed sample size is important to ensure the adequacy of the study's power and avoiding Type II error, which can lead to incorrectly accepting the null hypothesis. There are two ways to calculate the sample size needed. First, the general rule of thumb for determining the sample size needed for a regression analysis is 10 to 20 study participants per independent variable. The preliminary number of independent variables in our study was 21, which was before conducting bivariate (unadjusted) analyses to determine the actual number of independent variables included in the multivariate regression model. If all variables were included, the 'rule of thumb' estimate was from 210 – 420 subjects. Another method to calculate the needed sample size was by using a formula, which requires: 1) the critical p -value, alpha (α); 2) the study power; and 3) the study effect size. Prior to conducting the study, the three components were determined as following: alpha (α) equal to 0.05, power equal to 0.80, and a medium effect size ($R^2 = 0.13$) based on conventional values. Based on the formula in Figure 7 and with 21 independent variables (Polit & Beck, 2008), the total required sample size is 150. The formula below takes into account the model's R^2 , which was anticipated to be moderate. Additionally, it was not expected that all 21 variables would be included in the model. Based on the two

sample size calculations, the range of subjects needed was between 150-420. Thus, it was anticipated that a sample size of 200 was adequate.

Figure 7 Formula for Calculating Multivariate Regression Sample Size

$$N = (L/\gamma) + k + 1 \quad \gamma = \text{effect size} = R^2/(1-R^2)$$

N = estimated sample size

L = tabled value for the desired α and power

K = number of predictors

γ = estimated effect size

R^2 = percent of variance explained by the model

3.6.4 Objective Four

To describe Muslims' perceptions of pharmacist engagement services regarding Muslims during Ramadan

Descriptive statistics (i.e., frequency, mean, standard deviation, and range) was utilized.

CHAPTER FOUR: RESULTS

This chapter presents the study's results. Data collection and study inclusion criteria are described first, followed by the independent and dependent variables of the study's objectives. Lastly, the results of the study's objectives and hypotheses are provided.

4.1 DATA COLLECTION AND INCLUSION CRITERIA

The present study collected data from two mosques in San Antonio, Texas. These mosques and their scheduled religious and community events were targeted for recruitment and data collection. These events were either weekly Friday events, which included *Jumu'ah* prayer (a prayer service held around noon every Friday) and evening lectures, or other events, such as a religious conference. In each mosque, two weekly Friday events, both religious and community events, were utilized to distribute surveys and collect data. A week before the first Friday in the assigned mosque, the research poster, which was designed in two languages; English (see Appendix F) and Arabic (see Appendix G), was displayed at the men's and women's entrances to the mosque and they remained there for three weeks to advertise the research. On the first and second Friday, both the religious events, as mentioned previously, the *Jumu'ah* prayer service and the evening lecture, were utilized for data collection. During the *Jumu'ah* prayer service, the mosque's imam made an announcement about the research and explained the study's inclusion criteria and compensation. After the prayer service, the primary researcher distributed flyers to individuals who might meet the study's inclusion criteria (e.g., who were above 18 years old) and asked them to participate in the study. At the evening lecture, the imam again

made an announcement about the research, and the primary researcher distributed flyers at the mosque entrances and asked those present to participate. Mosque attendees who agreed to participate received the study survey, in Arabic or in English, and were asked to fill it out immediately. Inside the mosque, participants spent around 20 minutes to completely fill out the survey. Participants who did not have time to fill out the survey on site were asked to fill it out and bring it back the following Friday. On the following two consecutive Fridays, completed surveys were collected and new surveys were distributed to new participants. On the last Friday, participants, who decided to fill out the survey and return them later, met the primary researcher on their preferred time and location to return the survey. In addition, one religious conference organized by one of the two participating mosques was used to collect data.

4.1.1 Inclusion criteria

The study inclusion criteria were detailed on the study flyer (Appendix C). All diabetic Sunni Muslims 18 years old or older who used medication(s) daily to treat their diabetes were eligible to participate in the study. There were 78 participants who responded to the surveys, but two surveys were omitted because one was not completed by a Sunni and the other one was only half completed. Therefore, a total of 76 usable responses comprised our study sample ($N = 76$).

4.2 INDEPENDENT VARIABLES

Descriptive analyses (e.g., means, standard deviations (*SD*), and frequencies) were used to describe all the study variables. This type of analysis is important to detect various

types of errors in a study, such as data entry errors, abnormalities, and outliers. Descriptive analysis is also important to provide an overview of the study variables, so that they can be compared with the literature. Below, the variables are described in the order of the study model (Andersen's behavioral model for vulnerable populations; see Figure 6 in Chapter 3).

4.2.1 Predisposing variables

The predisposing variables include two sections—traditional variables and variables for vulnerable populations. The traditional variables include demographic factors (i.e., age, gender, and marital status), health beliefs, and social structure factors (i.e., race/ethnicity, education, employment, family size, and religion). The vulnerable variables include social structure factors (i.e., country of birth and acculturation) as well as a victimization factor (i.e., Islamophobia).

4.2.1.1 Traditional Variables

4.2.1.1.1 Demographics

The average age of the participants was 56.5 (± 13.8); the youngest participant was 27 years old and the oldest was 88 years old. The majority were male (54.7%) and married (80%). Tables 10, 11, and 12 detail the means and frequency distributions of these variables.

Table 10: Mean and Frequency Distribution of Participants' Age ($N = 73$)¹

Age	Number	Percent (%)
27 – 44	14	19.2
45 – 54	20	27.4
55 – 64	20	27.4
65 – 88	19	26.0
Total	73¹	100.0
Mean age ($\pm SD$): 56.5 (± 13.8)		

¹ Three respondents did not answer this question.

Table 11: Frequency Distribution of Participants' Gender ($N = 75$)¹

Gender	Number	Percent (%)
Male	41	54.7
Female	34	45.3
Total	75¹	100.0

¹ One respondent did not answer this question.

Table 12: Frequency Distribution of Participants' Marital Status (N = 75)¹

Marital status	Number	Percent (%)
Married	60	80.0
Not Married	15	20.0
Divorced	7	9.3
Widowed	6	8.0
Separated	1	1.3
Never Married	1	1.3
Total	75¹	100.0

¹ One respondent did not answer this question.

4.2.1.1.2 Health beliefs

The 12-item scale was divided into the following three domains: beliefs of being exempt from fasting during Ramadan due to diabetes (items 1–5), beliefs related to religious aspects and self-efficacy (items 6–9), and beliefs related to the benefits of fasting (items 10–12). Three items (1, 2, and 5) were negatively worded and were reverse coded (see Table 13). The scale reliability was 0.85, which was very good. However, the reverse coded items 2, and 5, and item 3 were negatively correlated with other items (i.e., 1, 5, 7, 8, 9, 10, and 11), which was counterintuitive. To measure the relationship between health belief and medication usage changes during Ramadan, items 2, 3, and 5 were deleted from the scale, which increased the reliability to 0.89.

The study participants' health beliefs related to Ramadan were found to be slightly above neutral, so they slightly agreed toward fasting above engaging in activities related to their diabetes. The overall mean health belief scale score was 3.4 (± 0.7), which was slightly above neutral in the scale's range. The following paragraph describes what the participants believed in each domain.

The participants' average belief level of being exempt from fasting due to diabetes was 2.9 (± 0.7), so their beliefs of being exempt were almost neutral. Thirty participants (40.5%) agreed to strongly agreed that diabetic patients are exempt from fasting, while 28 participants (37.9%) disagreed to strongly disagreed that diabetic patients are exempt from fasting. Among the items in this domain, the majority of participants (86.5%) agreed or strongly agreed that diabetic patients should break their fast if they did not feel well. However, the majority (75.6%) agreed or strongly agreed that diabetics should try to fast before considering themselves exempt from fasting. Over one-half of the respondents agreed or strongly agreed that fasting is safe even though they have diabetes (60.3%) and that they thought about how fasting affected their diabetes (63.0%).

The second domain measured participants' beliefs in Allah's help in managing fasting and in their self-efficacy in fasting. The average of participants' beliefs in this domain was high at 3.9 (± 0.9), which showed that participants agreed that Allah's help and their self-efficacy would help them manage their diabetes while fasting. The majority of participants (80.8%–82.4%) agreed or strongly agreed that Allah would help them to fast and control their diabetes. Moreover, 79.9% of participants agreed to strongly agreed that believing in their own self-efficacy would make them able to fast. Lastly, 66.2% of

participants agreed to strongly agreed that their faith strengthened them to fast even when they had a problem with their diabetes.

The last domain measured participants' belief in the benefits of fasting. The participants' average belief level was 3.6 (± 1.1), which means that they agreed that fasting was a healthy practice and that fasting would help them enjoy Ramadan. More than half of participants agreed to strongly agreed with individual items in this domain. Forty-seven participants (65.2%) agreed to strongly agreed that they needed to fast to enjoy Ramadan, 45 participants (61.6%) agreed or strongly agreed that fasting is a healthy practice, and 54 participants (75.0%) believed that they would get used to fasting after the first week. Table 13 details the responses for each item and domain.

Table 13: Mean and Frequency Distribution of Participants' Health Beliefs Related to Fasting During Ramadan ($N = 76$)

Items	Mean ($\pm SD$)	Frequency ¹ n (%)				
		Strongly Disagree	Disagree	Unsure	Agree	Strongly Agree
First Domain: Beliefs of being exempt from fasting during Ramadan due to diabetes						
Diabetic patients are exempt from fasting. ^{2,3}	3.0 (± 1.2)	9 (12.2)	19 (25.7)	16 (21.6)	22 (29.7)	8 (10.8)
Diabetic patients should break their fast if they do not feel well. ^{2,3}	1.9 (± 0.8)	2 (2.7)	0 (0.0)	8 (10.8)	39 (52.7)	25 (33.8)
Diabetic patients should try to fast first before they consider themselves exempt from fasting. ³	3.9 (± 1.1)	4 (5.4)	3 (4.1)	11 (14.9)	32 (43.2)	24 (32.4)
Fasting is safe for me even though I have diabetes. ⁴	3.4 (± 1.2)	6 (8.2)	15 (20.6)	8 (11.0)	30 (41.1)	14 (19.2)
I always think about how fasting affects my diabetes. ^{2,4}	2.4 (± 1.2)	4 (5.5)	13 (17.8)	10 (13.7)	29 (39.7)	17 (23.3)
Domain Total	2.9 (± 0.7)					
Second Domain: Beliefs related to religious aspects and self-efficacy						
I believe Allah will help me manage my diabetes while fasting. ³	4.0 (± 1.1)	3 (4.1)	6 (8.1)	4 (5.4)	33 (44.6)	28 (37.8)

Table 13 (continued)

Fasting for Allah helps me feel my power and ability to control diabetes. ⁴	4.0 (±1.0)	3 (4.1)	4 (5.5)	7 (9.6)	32 (43.8)	27 (37.0)
In order to fast, I have to believe that I have the power to fast. ³	4.0 (±1.1)	3 (4.1)	9 (12.2)	3 (4.1)	32 (43.2)	27 (36.5)
My faith strengthens me to complete my fasting even when I have problems with my diabetes. ³	3.6 (±1.2)	5 (6.8)	11 (14.9)	9 (12.2)	30 (40.5)	19 (25.7)
Domain Total	3.9 (±0.9)					
Third Domain: Beliefs related to the benefits of fasting						
I need to fast to enjoy Ramadan. ⁵	3.6 (±1.4)	7 (9.7)	15 (20.8)	3 (4.2)	24 (33.3)	23 (31.9)
Fasting is a healthy practice for diabetic patients. ⁴	3.7 (±1.1)	4 (5.5)	6 (8.2)	18 (24.7)	26 (35.6)	19 (26.0)
I get used to fasting after the first week. ⁵	3.8 (±1.1)	5 (6.9)	5 (6.9)	8 (11.1)	32 (44.4)	22 (30.6)
Domain Total	3.6 (±1.1)					
Overall Scale Total	3.4 (±0.7)	Cronbach's alpha = 0.89				

¹ Response scale: 1 = strongly agree to 5 = strongly disagree

² Item was reverse coded (i.e., only the mean was reverse coded, frequencies shown in the table were not reverse coded).

³ Two participants did not answer this question.

⁴ Three participants did not answer this question.

⁵ Four participants did not answer this question.

4.2.1.1.3 Social structure

The participants' social structure included factors that represented a participant's characteristics within his or her community. It included race/ethnicity, education, employment, family size, and religion. These variables are highlighted below.

4.2.1.1.3.1 Race/ethnicity

The majority of participants' race/ethnicity was White (50.7%), followed by Asian (25.3%), and Black (20%), while a few (4%) were Hispanic. Table 14 details the participants' Race/ethnicity.

Table 14: Frequency Distribution of Participants' Race/Ethnicity (N = 76)

Race/ethnicity	Number	Percent (%)
White	38	50.7
Asian	19	25.3
Black	15	20.0
Hispanic	3	4.0
Total	75¹	100.0

¹ One participant did not answer this question.

4.2.1.1.3.2 Level of education

The majority of the participants' highest degree was high school (30.7%), followed by some college (24.0%), and college graduates (21.3%). In comparing the highest degree to the lowest degree, 10 participants (13.3%) had graduate degrees and six participants

(8.0%) had less than a middle school degree (i.e., no formal education degree or elementary degree). Table 15 details the participants' level of education.

Table 15: Frequency Distribution of Participants' Level of Education ($N = 76$)

Level of Education	Number	Percent (%)
Less than middle school	6	8.0
Middle school	2	2.7
High school graduate	23	30.7
Some college	18	24.0
College graduate	16	21.3
Graduate degree	10	13.3
Total	75¹	100.0

¹ One participant did not answer this question.

4.2.1.1.3.3 Employment

Participants' employment level was divided into employed and unemployed, retired, and student. The employed category was divided into full-time and part-time, while the unemployed category was divided into those who were not looking for a job and those who were looking for a job. The majority of participants (38.4%) were employed, and followed by equal percentages were unemployed or retired (28.8%). Although not shown in the table, 11% of participants were self-employed (i.e., owned their own businesses). Table 16 details participants' employment status.

Table 16: Frequency Distribution of Participants' Employment Status ($N = 76$)

Employment status	Number	Percent (%)
Employed		
Full-time	21	28.7
Part-time	7	9.6
Total	28	38.4
Unemployed		
Not looking for a job	13	17.8
Looking for a job	8	11.0
Total	21	28.8
Retired	21	28.8
Student	3	4.1
Total	73¹	100.0

¹ Four participants did not report their employment status.

4.2.1.1.3.4 Family size

Participants' family size was measured by summing the number of adults and the number of children who lived with participants in the same house during the study implementation period. The mean participant family size was 3.6 (± 2.1). Fourteen participants (19.2%) lived alone, while 59 participants (80.9%) lived with another adult and/or children (see Table 17). More specifically, Table 18 details the number of adults

and children who lived with participants in the same house. Twenty-three participants (31.9%) did not live with adults, 19 participants (26.4%) lived with one adult, and 30 participants (41.6%) lived with more than one adult. Thirty participants (42.3%) did not live with children, 13 participants (18.3%) lived with one child, and 28 participants (39.5%) lived with more than one child.

Table 17: Mean and Frequency Distribution of Participants' Family Size ($N = 73$)¹

Family size	Number	Percent (%)
1	14	19.2
2	10	13.7
3	14	19.2
4	16	21.9
≥ 5	19	25.8
Total	73¹	100.0
Mean Family size ($\pm SD$): 3.6 (± 2.1)		

¹Three participants did not answer this question.

Table 18: Frequency Distribution of Numbers of Adults and Children Living with Participants in the Same House ($N = 76$)

Number of adults and children	Number	Percent (%)
Living with adults		
No adults	23	31.9
One adult	19	26.4
Two adults	16	22.2
> Two adults	14	19.4
Total	72¹	100.0
Living with children		
No children	30	42.3
One child	13	18.3
Two children	19	26.8
> Two children	9	12.7
Total	71²	100.0

¹ Four participants did not answer how many adults lived with them in the same house.

² Five participants did not answer how many children lived with them in the same house.

4.2.1.1.3.5 Religion

Islam is the primary factor that distinguishes this study population from the overall U.S. population. However, Muslims do not practice their religion the same way. Some are more religious than others, and some interpret Islam principles differently than others.

Muslims' interpretations and misunderstanding of Islam might affect their health, and specifically, their medication utilization.

This research focused only on Sunni Muslims. Participants were asked to select whether they were Sunni, Shia, or 'other.' Participants who selected 'other' were asked to specify how they would describe their religion. Only one participant identified him- or herself as Shia, so that person's responses were not included in the study data. The majority of the participants (89.5%) identified themselves as Sunni, while the remainder (10.5%) identified themselves as 'other.' Those who selected 'other' identified themselves as just Muslims. The idea of dividing Muslims into Sunni and Shias is not accepted by some Muslims, so they just describe themselves as just Muslims. However, since the survey was distributed in Sunni mosques, participants who described themselves as just Muslims were assumed to be affiliated with Sunni rules and thus were included in the study. This item was only used to describe the study population and to increase likelihood that only Sunnis were included in the study.

The average participant's religiosity level was 4.6 (± 0.8). Among the five religious activities, praying the prescribed prayers (i.e., *Salat*) was the most often performed religious activity by participants (5.8 ± 0.9), followed by reciting the Quran (5.1 ± 1.3), whereas fasting on the prescribed days (i.e., the month of Ramadan) and the voluntary days throughout the years was the least often performed activity by participants (3.1 ± 1.2). Cronbach's alpha was 0.45. Since the variable had low reliability coefficient, and removing some items, which were less correlated, did not increase the reliability coefficients above

0.50, the variable was not included in the bivariate analysis. The next paragraph details how often participants performed each religious activity.

Reciting the Quran was the first item that measured participants' religiosity, and the survey showed that 62.2% recited the Quran every day, whereas only 2.7% never recited the Quran. Praying the prescribed prayers five times a day was agreed on by the vast majority of participants (94.6%), while only two participants (2.7%) did not pray at all. All participants went to a mosque or another gathering of Muslims at least once or twice a year, while 32 participants (43.2%) went once a week and 17 participants (23.0%) went every day. Fasting was one of the most important factors in this scale; the results showed that 10 participants (13.5%) never fasted, 10 (13.5%) fasted some days of Ramadan, 25 participants (33.8%) fasted only during the whole month of Ramadan, and 29 participants (39.3%) went beyond fasting only during Ramadan and fasted on additional days during the year. The last item measured how often participants engaged in free prayer. More than half of participants engaged in free prayers more than once a day (53.3%), while only three participants (4.0%) never engaged in free prayer.

Another question asked participants how many days they were able to fast during the previous Ramadan. This question was added to better understand whether participants were able to fast or not and to distinguish between the responses of those who fasted and those who could not. Of the 71 participants who answered this question, their average number of days of fasting was 21.3 (± 12.0). Only 13 participants (18.3%) were not able to fast any day during the last Ramadan, and half of the participants (49.3%) fasted for the whole month of Ramadan.

Table 19: Mean and Frequency Distribution of Participants' Religiosity Scale ($N = 76$)

Religious activity	Mean (±SD)	Frequency ¹ n (%)					
		1	2	3	4	5	6
Recite Quran							
How often do you read or recite the Quran? ²	5.1 (±1.3)	Never	Two or three times a year	About once a month	Once a week	More than once a week	Every day
		2 (2.7)	2 (2.7)	7 (9.5)	8 (10.8)	9 (12.2)	46 (62.2)
Praying the prescribed prayers							
How many times do you pray <i>salat</i> each day? ²	5.8 (±0.9)	0 time	1 time	2 times	3 times	4 times	5 times
		2 (2.7)	0 (0.0)	0.0 (0.0)	1 (1.4)	1 (1.4)	70 (94.6)
Attending services at the mosque							
How often do you go to the mosque or Islamic Center, or attend Muslim gatherings? ²	4.6 (±1.0)	Never	Once or twice a year	More than a month	About once a week	More than once a week	Everyday
		0 (0.0)	4 (5.4)	1 (1.4)	32 (43.2)	20 (27.0)	17 (23.0)
Practicing fasting							
How often do you fast? ²	3.1 (±1.2)	Never	During Ramadan, but not the entire month	Only during Ramadan, for the entire month	Several times a year in addition to Ramadan	About once a month in addition to Ramadan	Almost every week in addition to Ramadan
		10 (13.5)	10 (13.5)	25 (33.8)	23 (31.1)	3 (4.1)	3 (4.1)
Engaging in free prayer							
How often do you engage in free prayer outside of the prescribed	4.8 (±1.7)	Never	I do, but not frequently	On about a monthly basis	At least once a week	At least once a day	More than once a day
		3 (4.0)	15 (20.0)	0 (0.0)	1 (1.3)	16 (21.3)	40 (53.3)

Table 19 (continued)

five daily prayers? ³							
Overall Scale Total	4.6 (±0.8)	Cronbach's alpha =0.45					

¹ Response varied across scale: 1 = never performed to 6 = more often performed

² Two participants did not answer this question.

³ One participant did not answer this question.

4.2.1.2 Vulnerability variables

4.2.1.2.1 Social structure

4.2.1.2.1.1 Country of birth

Participants who were born outside the U.S. might utilize health care differently than those who were born in the U.S. In the present study, only 14 participants (18.7%) were born in the U.S., whereas 61 participants (81.3%) were born outside the U.S., of which nine were born in Palestine (12%), eight in Iraq (10.7%), seven each in Pakistan (9.3%) and Sudan (9.3%), and five each in Bangladesh (6.7%) and Saudi Arabia (6.7%), while 20 participants were from other countries (see Table 20). In broader categories, 44 (58.7%) participants were born in the Middle East and Arab countries, 16 in South Asia, 14 in the U.S., and one in Europe (see Table 21). Regarding participants' amount of time in the U.S., the average number of years living in the U.S. was 23.8 (±19.3), with a plurality (37.8%) having lived in the U.S. between one and 11 years (see Table 22).

Table 20: Frequency Distribution of Participants' Country of Birth (N = 76)

Country of Birth	Number	Percent (%)
United States	14	18.7
Palestine	9	12.0
Iraq	8	10.7
Pakistan	7	9.3
Sudan	7	9.3
Bangladesh	5	6.7
Saudi Arabia	5	6.7
Others ¹	20	27.8
Total	75²	100.0

¹ Others = 4 in Jordan, 4 in Morocco, 3 in India, 2 in Somalia, 2 in Syria, 1 in Afghanistan, 1 in Algeria, 1 in Egypt, 1 in Germany, and 1 in Tunisia.

² One participant did not answer this question.

Table 21: Frequency Distribution of Participants' Region of Birth ($N = 76$)

Country	Number	Percent (%)
Arab and Middle East ¹	44	58.7
South Asia ²	16	21.3
United States	14	18.7
Europe ³	1	1.3
Total	75⁴	100.0

¹ Arab and Middle East = 9 in Palestine, 8 in Iraq, 7 in Sudan, 5 in Saudi Arabia, 4 in Jordan, 4 in Morocco, 2 in Syria, 2 in Somalia, 1 in Algeria, 1 in Tunisia, and 1 in Egypt.

² South Asia = 7 in Pakistan, 5 in Bangladesh, 3 in India, and 1 in Afghanistan.

³ Europe = 1 in Germany.

⁴ One participant did not answer this question.

Table 22: Mean and Frequency Distribution of Participants' Number of Years in the U.S.
($N = 74$)¹

Years in the U.S.	Number	Percent (%)
1 – 11 years	28	37.8
12 – 30 years	23	31.1
31 – 81 years	23	31.1
Total	74¹	100.0
Mean length in U.S. ($\pm SD$): 23.8 (± 19.3)		

¹ Two participants did not answer the question.

4.2.1.2.1.2 Acculturation

To measure acculturation, the study utilized a scale of six items with a 5-point Likert scale (1 = *not at all true of me*, 5 = *extremely true of me*). The scale was divided into two domains: Islamic identity and American norms. The scale total score ranged from 6 to 30 and mean scores ranged from 1 to 5. The scale reliability coefficient was acceptable, but low at 0.62. The last item of the scale measured participants involvement in political system, and since the majority of participants were born outside the U.S., this item may not have applied to them. As this was surmised only after data collection was complete, this item was removed for inferential analyses. The new scale reliability increased to 0.67 with this modification. The next paragraph provides participant's overall average score and the average score of each domain.

Participants' acculturation level was 2.2 (± 0.6), which indicated a lower acculturation level (i.e., lower scores were related to lower acculturation) (see Table 23). Among the two scale constructs, Islamic identity and American norms, the average scores were different. Participants' Islamic identity average score was reverse coded, so the lower score means that participants agreed that they adhered to their Islamic identities, whereas a high score would mean the opposite. The results showed that participants felt that Islam represented their identity, which translated into their low average score (1.8 ± 0.6). Similarly, affiliation with American norms was also low (2.6 ± 1.0).

The Islamic identity domains included three items measuring participants' having close affiliations with Muslims, maintaining Islamic practices, and raising children as

Muslims. Participants moderately agreed that the majority of their friends were Muslims, which translated into an average score of 2.8 (± 1.3). Among the participants, 44.0% agreed that it was very true or extremely true that the majority of their friends were Muslims, whereas 26.7% said it was not at all or slightly true that the majority of their friends were Muslims. Participants strongly endorsed practicing Islam and raising their children to be Muslim, which was represented in their low average scores of 1.5 (± 0.6) and 1.3 (± 0.6) on those items, respectively. In terms of maintaining Islamic practices, 68 participants (94.4%) agreed that maintaining their Islamic practice in everyday life was very true or extremely true of them. In addition, in terms of raising their children to be Muslim, 72 participants (96.0%) agreed that raising their children to be Muslim was very true or extremely true of them.

Affiliation with American norms included items measuring participants' comfort with shaking hands with the opposite sex, celebrating American holidays, and participating in the American political system. In comparing the average score of the three items, the highest agreement was found for participating in the U.S. political system (3.3 ± 1.6), followed by shaking hands with members of the opposite sex (2.7 ± 1.3), and celebrating American holidays (e.g., Valentine's Day, Thanksgiving, 4th of July, and Halloween) (1.9 ± 1.1). For shaking hands with the opposite sex, 18 participants (37.8%) disagreed that feeling comfortable shaking hands with members of the opposite sex was not at all or slightly true of them. In terms of celebrating American holidays, only six participants (8.2%) said it was very or extremely true of them that they always celebrated American

holidays. Finally, almost half (48.7%) of the participants believed it was very or extremely true that they felt it important to participate in the American political system.

Table 23: Mean and Frequency Distribution of Participants' Acculturation Scale (N = 76)

Items	Mean ($\pm SD$)	Frequency ¹ n (%)				
		Not at all true of me	Slightly true of me	Moderately true of me	Very true of me	Extremely true of me
Islam Identify						
The majority of my friends are Muslim. ^{2,3}	2.8 (± 1.3)	11 (14.7)	9 (12.0)	22 (29.3)	17 (22.7)	16 (21.3)
It is very important for me to maintain Islamic practices in my everyday life. ^{2,4}	1.5 (± 0.6)	0 (0.0)	0 (0.0)	4 (5.6)	27 (37.5)	41 (56.9)
It is very important for me to raise my children as Muslims. ^{2,3}	1.3 (± 0.6)	0 (0.0)	1 (1.3)	2 (2.7)	13 (17.3)	59 (78.7)
Domain Total	1.8 (± 0.6)					
American norms						
I feel comfortable shaking hands with members of the opposite sex. ⁵	2.7 (± 1.3)	18 (24.3)	10 (13.5)	25 (33.8)	15 (20.3)	6 (8.1)
I always celebrate American holidays such as Valentine’s Day, Thanksgiving, 4th of July, and Halloween. ⁵	1.9 (± 1.1)	38 (51.4)	15 (20.3)	15 (20.3)	3 (4.1)	3 (4.1)
I feel it is important to participate in the American political system by voting in local and federal elections. ^{5,6}	3.3 (± 1.6)	18 (24.3)	6 (8.1)	14 (18.9)	11 (14.9)	25 (33.8)

Table 23 (continued)

Domain Total	2.6 (±1.0)	
Overall Scale Total	2.2 (±0.6)	Cronbach's alpha = 0.67⁵

¹ Response scale: 1 = not at all true of me to 5 = extremely true of me

² Item was reverse coded (i.e., only the mean was reverse coded; frequencies shown in the table were not reverse coded).

³ One participant did not answer the question.

⁴ Four participants did not answer the question.

⁵ Two participants did not answer the question.

⁶ This item was deleted from the scale, but is shown for descriptive purposes and it is not included in the alpha value.

4.2.1.2.2 Victimization

4.2.1.2.2.1 Islamophobia

The presence of Islamophobia can change how a society reacts to Muslims. Islamophobia can also prevent Muslims from engaging with society and utilizing available health care services such as medications. To measure Islamophobia, a scale of nine items divided into two constructs—general fear of Islam and Islamophobia in the media—was utilized. Items 3, 4, and 5 were negatively worded, so the responses to those items were reverse coded. The total score ranged from 9 to 45 and the average score ranged from 1 to 5, where the high score meant that the participant's perception of Islamophobia was high. The scale reliability coefficient was high at 0.88.

In general, participants were unsure about the presence of Islamophobia, which was represented in their average score of 3.1 (±0.8). Specifically, participants were unsure whether the fear of Islam was present in the general population (2.9 ± 0.8). The participants' highest average score reflected that they were unsure about most Americans felt safe among Muslims (2.8 ± 0.9) and only a few Americans are afraid of Islam (2.8 ±

1.0) (Note: these two item was reverse coded, so the average scores were reverse coded, so their actual scores were $3.2 (\pm 0.9)$ and $3.2 (\pm 1.0)$, respectively). The participants' lowest average scores were that they thought many Americans (i.e., non-Muslim Americans) avoid Muslims (2.9 ± 1.1) and get nervous in the presence of Muslims (2.9 ± 0.9). Regarding the frequency distribution of participants' agreement level to each item, a high percentage of participants (49.3%) agreed or strongly agreed that only a few Americans are afraid of Islam, followed by 41.3% who agreed or strongly agreed that most Americans feel safe among Muslims. The presence of Islamophobia in the media was another construct that was moderately agreed upon (3.6 ± 1.1) by participants. This construct included items to measure participants' agreement level about whether the American media presents Muslims as dangerous people, whether the media presents Islam as a threat to American culture, and whether the media spreads fear of Muslims and Islam. The item regarding media spreading fear of Muslims and Islam was the highest agreed upon item by participants (3.7 ± 1.2), followed by the media's presenting Muslims as dangerous people (3.6 ± 1.2) and presenting Islam as a threat to American culture (3.4 ± 1.3). Forty-two participants (56%) agreed or strongly agreed that the media presents Muslims as dangerous people and Islam as a threat to American culture, while 48 participants (64%) agreed or strongly agreed that the media spread the fear of Muslims and Islam. Table 24 shows the average score and frequency distribution of each item.

Table 24: Mean and Frequency Distribution of Participants' Perception of Islamophobia
(*N* = 76)

Items	Mean (±SD)	Frequency ¹ n (%)				
		Strongly Disagree	Disagree	Unsure	Agree	Strongly Agree
General Fear of Islam						
Many Americans avoid Muslims. ³	2.9 (±1.1)	3 (4.0)	30 (40.0)	19 (25.3)	16 (21.3)	7 (9.3)
Americans are suspicious of Muslims. ³	3.1 (±1.1)	3 (4.0)	21 (28.0)	24 (32.0)	18 (24.0)	9 (12.0)
In general, Americans trust Muslims. ^{2,4}	2.9 (±1.0)	5 (6.8)	15 (20.3)	27 (36.5)	24 (32.4)	3 (4.1)
Overall, only a few Americans are afraid of Islam. ^{2, 3}	2.8 (±1.0)	3 (4.0)	16 (21.3)	19 (25.3)	34 (45.3)	3 (4.0)
Most Americans feel safe among Muslims. ^{2,3}	2.8 (±0.9)	1 (1.3)	20 (26.7)	23 (30.7)	28 (37.3)	3 (4.0)
Many Americans get nervous in the presence of Muslims. ³	2.9 (±0.9)	3 (4.0)	22 (29.3)	31 (41.3)	17 (22.7)	2 (2.7)
Domain Total	2.9 (±0.8)					
Islamophobia in Media						
American media always presents Muslims as dangerous people. ³	3.6 (±1.2)	3 (4.0)	12 (16.0)	18 (24.0)	22 (29.3)	20 (26.7)
Islam is always presented as a threat to American culture in media. ³	3.4 (±1.3)	7 (9.3)	13 (17.3)	13 (17.3)	26 (34.7)	16 (21.3)
American media spreads a lot of fear of Muslims and Islam. ³	3.7 (±1.2)	4 (5.3)	12 (16.0)	11 (14.7)	27 (36.0)	21 (28.0)

Table 24 (continued)

Domain Total	3.6 (±1.1)	
Overall Scale Total	3.1 (±0.8)	Cronbach's alpha = 0.88

¹ Response scale: 1 = strongly agree to 5 = strongly disagree

² Item was reverse coded.

³ One participant did not answer the question.

⁴ Two participants did not answer the question.

4.2.2 Enabling variables

Participants in general have factors that help enable them to utilize health care services, including medications. Similar to the predisposing variables, the enabling variables include two sections, traditional variables and vulnerable variables. The traditional variables include having a regular source of care, insurance, income, social support, and perceived barriers to care, while the vulnerable variables include self-help skills and ability to negotiate the system. The following paragraphs describe these results.

4.2.2.1 Traditional variables

4.2.2.1.1 Regular source of care

Patients need a source of care that allows them to receive health care as needed. When this source of care is regularly accessible, patients' health can improve. Participants were asked to select which of the following sources they usually utilized to receive their health care services: a doctor's office, a free or community health care clinic, an emergency room, a hospital, and 'other.' The results showed that the most common source of care used was a doctor's office (80.3%), whereas hospitals, free or community clinics, and

emergency rooms were less utilized, at 19.7%, 9.2%, and 5.3%, respectively (see Table 25).

Table 25: Frequency Distribution of Participants' Source of Health Care (N = 76)

Health care place	Number	Percent (%)¹
A doctor's office	61	80.3
Hospital	15	19.7
Free or community clinic	7	9.2
Emergency room	4	5.3
Other ²	3	3.9

¹ Percent >100 due to check that all apply

² Two participants wrote "VA" and one wrote "self-care" (i.e., that participant was a physician).

The majority of participants (84.2%) had a primary care physician and a community pharmacy, and around half of the participants (48.7%) had a pharmacist whom they asked about medications regularly (see Table 26). The total score of a participant's source of care ranged from 0 to 4 (physician weighted as 2). The results showed that the average score of participants' source of care was 3.0 (± 1.3), which meant that participants on average had at least two sources of care.

Table 26: Frequency Distribution of Participants' Regular Source of Care (N = 76)

Regular source of care	Number	Percent (%)¹
Primary care physician	64	84.2
Community pharmacy	64	84.2
Pharmacist	37	48.7

¹ Percent >100 due to check that all apply

4.2.2.1.2 Insurance

Having health care insurance enables participants to pay for their physician visits and their prescription medications.

In this study, participants were asked to select how they paid for their health care expenses (see Table 27). Around two-thirds of participants (62.7%) had at least one form of health care insurance coverage, while the remainder (37.3%) had no insurance coverage. The participants who had health insurance coverage had one or more of the following kinds of insurance coverage: private insurance (30.7%), Medicare (24.0%), and Medicaid (21.3%). The participants who did not have health care insurance paid out-of-pocket (16.0%), had Carelink (12.0%), and/or had unknown support (16.0%). The Carelink program is a financial assistance program for Bexar County residents who have no health care insurance coverage.

Table 27: Frequency Distribution of Participants' Health Care Insurance Coverage (N = 75¹)

Health care insurance	Number	Percent (%)²
Health care insurance³		
Private health insurance	23	30.7
Medicare	18	24.0
Medicaid	16	21.3
Total	47	62.7
No health care insurance⁴		
Out of pocket	12	16.0
Unknown	12	16.0
Carelink ⁵	9	12.0
Total	28	37.3

¹ One participant did not answer these questions.

² Percent >100 due to check that all apply

³ Participants may have had one or more forms of health care insurance.

⁴ Participants had no health care insurance if they did not have Medicare, Medicaid, or private health insurance. Participants may have had Carelink or paid out of pocket.

⁵ A financial assistance program for Bexar County residents who have no health insurance.

4.2.2.1.3 Income

Participants were asked to select a range to represent their household income before taxes (see Table 28). Only 65 participants reported their income, of which 26 participants (40.0%) had a household income of less than \$20,000, and 39 participants (60.0%) had an income of \$20,000 or more. Twenty-seven participants had an income of between \$20,000

and \$49,999, while of the remaining 12 participants, six (9.2%) had an income between \$50,000 and 99,999, and six (9.2%) had a high household income $\geq$ \$100,000.

Table 28: Frequency Distribution of Participants' Household Income (N = 76)

Household income	Number	Percent (%)
< \$20,000	26	40.0
\$20,000 – \$29,999	15	23.1
\$30,000 – \$49,999	12	18.5
\$50,000 – \$74,999	3	4.6
\$75,000 – \$99,999	3	4.6
$\geq$ \$100,000	6	9.2
Total	65¹	100.0

¹ Eleven participants did not answer this question.

4.2.2.1.4 Social support

Diabetic participants' social circle may impact their health care behaviors and utilization during Ramadan. Social support was measured by the source of advice and extent to which they followed the advice on whether to fast and how to modify medications. Participants were asked to select one or more of the health care providers and non-health care providers whose advice they followed. The next paragraph details participants' social support in regards to fasting ability and medication management.

Participants' fasting ability was impacted by their health care providers and non-health care providers at varying levels. The results showed that 43 participants (61.4%)

followed the opinions of at least one of their health care providers, and 36 participants (51.4%) followed the opinions of at least one non-health care provider. Among health care providers, physicians' opinions were followed by most participants (60.0%), compared to nurses' opinions (7.1%) and pharmacists' opinions (5.7%). Among non-health care providers, family members' (31.4%) opinions were followed the most by participants, compared to imams' (24.3%) and friends' opinions (11.4%). Regarding how to manage medications during fasting, more than three-fourths of the participants (75.4%) followed the opinions of their health care providers, while only one-third of the participants (33.3%) followed the opinions of non-health care providers. Among health care providers, physicians' opinions (73.9%) were again the most followed, compared to pharmacists' opinions (7.3%) and nurses' opinions (7.3%). Among non-health care providers, family members' opinions were the most followed (31.9%) compared to friends' opinions (4.4%) and imams' opinions (2.9%). For both fasting ability and medication management, more participants (81.4%) followed their health care providers' opinions than non-health care providers' opinions (42.9%). The results showed that participants relied on their health care providers' advice more than non-health care providers, both on the issue of whether to fast and on how to manage medications. Additionally, participants relied on their health care providers for managing medications more than they relied on them for whether to fast.

Table 29: Frequency Distribution of Participants' Adherence to Their Social Support on Whether to Fast and How to Manage Medications During Ramadan (N = 76)

Types of support	Frequency (n) (%)					
	Non-health care providers			Health care providers		
Fasting ability ¹	36 (51.4)			43 (61.4)		
	Family	Friends	Imams	Physicians	Pharmacists	Nurses
	22 (31.4)	8 (11.4)	17 (24.3)	42 (60.0)	4 (5.7)	5 (7.1)
Medication management ²	23 (33.3)			52 (75.4)		
	Family	Friends	Imams	Physicians	Pharmacists	Nurses
	22 (31.9)	3 (4.4)	2 (2.9)	51 (73.9)	5 (7.3)	5 (7.3)
Fasting ability and medication management³	30 (42.9)			57 (81.4)		

¹ Six participants did not answer this question.

² Seven participants did not answer this question.

³ Six participants were not included in the total.

4.2.2.1.5 Perceived barriers to care

Barriers to care are factors that can negatively impact patients' ability to utilize health care services and medications. This study included five barriers: those related to health care cost, language, trust, health care providers' characteristics, and discrimination.

The following sections detail each type of perceived barrier and conclude with the total perceived barriers (see Table 30).

4.2.2.1.5.1 Cost barriers

Barriers related to health care cost were divided into costs related to physician visits, prescription medications, and over-the-counter medications (N= 3 items). The average score of participants' perceived barriers related to health care cost was 2.9 (± 1.1). The barriers related to the cost of prescription medications was perceived to be higher (3.0 ± 1.2) than those related to the cost of physician visits (2.9 ± 1.2) and over-the-counter medications (2.8 ± 1.2). When comparing the frequency distributions, 46.0% of participants agreed or strongly agreed that it had been difficult for them to pay for their prescription medications, as compared to physician visits (42.1%) and over-the-counter medications (37.4%). The means showed that participants were somewhat uncertain as to whether cost was a barrier to receiving health care services.

4.2.2.1.5.2 Language barriers

Participants' perceived barrier related to language was measured by three items. These items measured participants' difficulties encountered in understanding medical information and reading and filling out medical forms. The majority of participants did not perceive that they had barriers related to language, since participants' average score was 2.6 (± 1.0). Among the measured language barriers, the majority of participants perceived a higher barrier related to filling out medical forms (2.7 ± 1.2), than for reading medical forms (2.6 ± 1.2), while understanding written medical information had the lowest mean

(2.5 ± 1.1). In terms of frequency distribution, 39.2% of participants agreed or strongly agreed that they had difficulties in filling out medical forms, 36.8% had difficulties in reading medical forms, and 27.7% had difficulties in understanding written medical information. The low domain average of participants' difficulties related to language indicated that participants seemed to have a moderately low level of health care barriers related to language.

4.2.2.1.5.3 Trust barriers

Participants who lack trust in their health care providers may not be willing to accept their recommendations and suggestions. Three items were used to measure participants' trust in their physicians' and pharmacists' health care recommendations. These items were negatively worded, so each item average was reverse coded. Therefore, a higher average score meant that participants lacked trust in their health care providers and a lower score meant the opposite. Participants were asked whether their physicians considered their religious needs and whether they trusted their physicians' and pharmacists' judgment in providing their health care. On average, participants rated their trust of their physicians' and pharmacists' provision of health care as 2.2 (± 0.7) out of 5, which means that participants primarily disagreed that they lacked trust in their health care providers (i.e., physicians and pharmacists). On the issue of considering participants' religious needs, participants' average score was 2.6 (± 1.0). This average again was reverse coded, which meant that, after positively rewording the item, they somewhat agreed (3.4 ± 1.0) that their physicians considered their religious needs in providing medical care. Comparing participants' trust of physicians versus pharmacists, participants trusted their physicians'

judgment slightly more than their pharmacists' judgment (2.1 ± 0.8 vs. 2.2 ± 0.7 , respectively). Among the participants, 87.9% agreed or strongly agreed that they trusted their physicians' judgments about medical care, while 80.0% and 60.9% agreed or strongly agreed that they trusted their pharmacists' decisions and their physicians' consideration of their religious needs in providing medical care, respectively.

4.2.2.1.5.4 Barriers related to health care providers' characteristics

Muslim health care providers are more likely to know Islamic religious practices than are non-Muslim health care providers; therefore, they might understand Muslims' health-related religious practices more than non-Muslims would. Thus, health care providers might have characteristics that could limit Muslims' health care utilization. Therefore, four health care provider characteristics were considered as possible barriers to participants. These barriers included health care providers being of a different religion, a different ethnicity, a different sex, or speaking a different language. Four items were used to determine participants' perceived barriers related to the four health care providers' characteristics.

In general, participants slightly disagreed (2.3 ± 1.0) that they perceived their health care providers' characteristics as a health barrier. Among the four health care characteristics, participants' highest level of disagreement was in considering health care providers' ethnicity (2.1 ± 1.1) as a barrier and their lowest level disagreement was in considering health care providers' speaking a different language (2.4 ± 1.4) as a barrier. Twenty-four participants (31.6%) agreed or strongly agreed that it was a problem for them

when their health care providers did not speak their language, while only 13 participants (17.3%) agreed or strongly agreed that it was a problem for them when their health care providers were not of the same ethnicity as them.

4.2.2.1.5.5 Discrimination barrier

Patients who are from a minority religion, such as Islam, and/or who have a minority race and ethnicity might be more likely to be discriminated against than others who represent the majority. Incidents of discrimination can happen in any area, including health care settings.

Only one item was included to measure participants' agreement or disagreement as to whether they perceived discrimination by health care providers as a barrier. Participants were asked how strongly they agreed or disagreed that they had often experienced discrimination because of being Muslim while receiving medical care. Participants slightly disagreed that they experienced discrimination while receiving medical care because of being Muslim (2.1 ± 1.0). Only 10 participants (13.1%) agreed or strongly agreed that they had often experienced discrimination because of being Muslim, whereas 59 participants (77.7%) disagreed or strongly disagreed.

4.2.2.1.5.6 Total perceived barriers to care

The total perceived barriers to care consisted of the total score for all four types of barriers. Participants' average perceived barriers score was low (2.4 ± 0.5). Overall, participants disagreed they had health care barriers. In comparing among the different barriers, participants' highest disagreement score was for perceived discrimination barriers

(2.1 ± 1.0), whereas they were unsure about barriers related to health care cost (2.9 ± 1.1).

In conclusion, participants perceived barriers to health care as low. The scale reliability was acceptable ($\alpha = 0.73$), indicating an acceptable correlation among all the items. Table 30 details the means and frequency distributions of participants' perceived barriers.

Table 30: Mean and Frequency Distribution of Participants' Perceived Barriers to Care
(N = 76)

Items	Mean ($\pm$ SD)	Frequency ¹ n (%)				
		Strongly Disagree	Disagree	Unsure	Agree	Strongly Agree
First domain: Health care cost						
It has been difficult for me to pay for <u>physician visits</u> .	2.9 ($\pm$ 1.2)	8 (10.5)	29 (38.2)	7 (9.2)	25 (32.9)	7 (9.2)
It has been difficult for me to pay for <u>prescription medications</u> .	3.0 ($\pm$ 1.2)	5 (6.6)	31 (40.8)	5 (6.6)	28 (36.8)	7 (9.2)
It has been difficult for me to pay for <u>over-the-counter medications</u> .	2.8 ($\pm$ 1.2)	8 (10.7)	33 (44.0)	6 (8.0)	23 (30.7)	5 (6.7)
Domain Total	2.9 ($\pm$ 1.1)					
Second Domain: Language						
I have difficulties understanding written medical information.	2.5 ($\pm$ 1.1)	12 (15.8)	37 (48.7)	6 (7.9)	18 (23.7)	3 (4.0)
I always have someone help me <u>read</u> medical forms.	2.6 ($\pm$ 1.2)	13 (17.1)	34 (44.7)	1 (1.3)	26 (34.2)	2 (2.6)
I always have someone help me <u>fill out</u> medical forms.	2.7 ($\pm$ 1.2)	11 (14.9)	34 (46.0)	0 (0.0)	27 (36.5)	2 (2.7)
Domain Total	2.6 ($\pm$ 1.0)					
Third Domain: Trust						
My doctor considers my religious needs in my medical care. ²	2.6 ($\pm$ 1.0)	3 (4.1)	13 (17.6)	13 (17.6)	38 (51.4)	7 (9.5)

Table 30 (continued)

I trust my doctor’s judgement about my medical care. ²	2.1 (±0.8)	3 (4.1)	3 (4.1)	3 (4.1)	56 (75.7)	9 (12.2)
I trust my pharmacist’s judgement about my medical care. ²	2.2 (±0.7)	1 (1.3)	4 (5.3)	10 (13.3)	54 (72.0)	6 (8.0)
Domain Total	2.2 (±0.7)					
Fourth Domain: Health care providers’ characteristics						
It is a problem for me when my health care providers <u>are not Muslim</u> .	2.3 (±1.3)	24 (31.6)	30 (39.5)	3 (4.0)	13 (17.1)	6 (7.9)
It is a problem for me when my health care providers <u>are not the same ethnicity</u> as I am.	2.1 (±1.1)	27 (36.0)	33 (44.0)	2 (2.7)	10 (13.3)	3 (4.0)
It is a problem for me when my health care providers <u>are not my same gender</u> .	2.3 (±1.2)	22 (29.0)	31 (40.8)	6 (7.9)	13 (17.1)	4 (5.3)
It is a problem for me when my health care providers <u>do not speak my language</u> .	2.4 (±1.4)	23 (30.3)	26 (34.2)	3 (4.0)	18 (23.7)	6 (7.9)
Domain Total	2.3 (±1.0)					
Fifth Domain: Discrimination						
While getting medical care, I have often experienced discrimination because of being Muslim.	2.1 (±1.0)	24 (31.6)	35 (46.1)	7 (9.2)	9 (11.8)	1 (1.3)
Domain Total	2.1 (±1.0)					
Overall Scale Total	2.4 (±0.5)	Cronbach’s alpha = 0.73				

¹ Response scale: 1 = strongly agree to 5 = strongly disagree

² Item was reverse coded.

4.2.2.2 Vulnerable variables

4.2.2.2.1 Self-help skills and ability to negotiate the health care system

After having personal and family resources (e.g., income), participants need to have the self-help skills and ability to access and utilize the health care system. In the present study, self-help skills were identified as the ability to make medical appointments, to go to the emergency room, to ask pharmacists about medications, and to know whom to ask or where to seek care in case of a medical emergency.

The results showed that participants had the ability to access health care and navigate the health care system, as their average score was 3.7 (± 0.8). The participants mostly agreed (3.9 ± 0.9) that they had the ability to ask pharmacists about medications, followed by knowing whom to ask when they had medical questions (3.8 ± 0.9), making appointments with doctors (3.7 ± 1.1), and going to the emergency room when sick (3.6 ± 1.1). The majority of participants (85.5%) agreed or strongly agreed that they were comfortable asking pharmacists about their medications, while slightly over seventy percent of the participants (70.7%) agreed or strongly agreed that they could make an appointment with their physician. The scale reliability was acceptable, as Cronbach's alpha was 0.76. In conclusion, most participants agreed that they could negotiate the health care system (see Table 31).

Table 31: Mean and Frequency Distribution of Participants' Perceived Barriers to Self-Help (N = 76)

Items	Mean ($\pm$ SD)	Frequency ¹ n (%)				
		Strongly Disagree	Disagree	Unsure	Agree	Strongly Agree
I am very comfortable with <u>making an appointment</u> with a doctor or other health care provider.	3.7 ($\pm$ 1.1)	2 (2.7)	14 (18.7)	6 (8.0)	39 (52.0)	14 (18.7)
I am very comfortable <u>going to the emergency room</u> when I am sick.	3.6 ($\pm$ 1.1)	4 (5.3)	11 (14.5)	6 (7.9)	43 (56.6)	12 (15.8)
I am very comfortable <u>asking pharmacists</u> about my medications.	3.9 ($\pm$ 0.9)	2 (2.6)	5 (6.6)	4 (5.3)	51 (67.1)	14 (18.4)
I know who to ask when I have questions about my health.	3.8 ($\pm$ 0.9)	0 (0.0)	9 (12.0)	7 (9.3)	46 (61.3)	13 (17.3)
Overall Scale Total	3.7 ($\pm$0.8)	Cronbach's alpha = 0.76				

¹ Response scale: 1 = strongly agree to 5 = strongly disagree

4.2.3 Need variables

Patients' health conditions, such as their chronic diseases, increase patients' demand for health care from health care providers and for medication use. In the present study, two need constructs were included: perceived and evaluated health condition. Each construct will be detailed in the following sections.

4.2.3.1 Perceived condition of participants' diabetes

How patients perceive their health can affect how they utilize medical care. Participants' average perceived diabetes health was 2.5 (± 0.9), which corresponds to between *fair* and *good* on the scale. No one perceived their diabetes health as excellent and nine participants (12.2%) perceived their diabetes health as poor. Most participants ($n = 29$, 39.2%) assessed their current diabetes condition as fair, and 24 (32.4%) and 12 participants (16.2%) perceived their diabetes condition as good and very good, respectively. Table 32 details participants' perceived diabetes condition.

Table 32: Mean and Frequency Distribution of Participants' Perceived Diabetes Condition (N = 76)

Diabetic condition	Number	Percent (%)
Excellent	0	0.0
Very good	12	16.2
Good	24	32.4
Fair	29	39.2
Poor	9	12.2
Total	74¹	100.0

¹ Two participants did not answer this question.

4.2.3.2 Evaluated condition of participants' diabetes

Patients are required to be clinically evaluated by their physicians to evaluate their disease condition and provide them with suitable treatment. Patients who know that their

diabetes is uncontrolled may strive to control their disease. The evaluated health condition included participants' evaluated general health condition and their evaluated diabetes condition. These evaluations will be highlighted in the following sections.

4.2.3.2.1 Evaluated general health conditions

Diabetic patients evaluated general health condition can be divided into two types of evaluations: the number and type of diagnosed diseases and the number of utilized prescription medications.

Participants were asked to select one or more from a list of most common diseases and write what other diseases they had. Participants disclosed the following diseases: diabetes (100.0%), hypertension (50.7%), arthritis (30.7%), obesity (28.0%), dyslipidemia (26.7%), heart disease (22.7%), depression (20.0%), gastrointestinal disorders (18.7%), chronic pain (16.0%), thyroid disorder (10.7%), and other conditions (6.7%). Table 33 shows the number and percentage of health conditions disclosed by the participants.

Table 33: Frequency Distribution of Participants' Evaluated General Health Condition (N = 75¹)

Disease	Number	Percent (%)²
Diabetes	75	100.0
Hypertension	38	50.7
Arthritis	23	30.7
Obesity	21	28.0
Dyslipidemia	20	26.7
Heart disease	17	22.7
Depression	15	20.0
Gastrointestinal disorders	14	18.7
Chronic pain	12	16.0
Thyroid disorder	8	10.7
Other ³	5	6.7

¹ One participant did not answer this question.

² Percent >100 due to check that all apply

³ Four participants had the following health conditions: carpal tunnel ($n = 1$), chronic orbital pseudotumor ($n = 1$), and prostatic enlargement ($n = 2$). One participant selected "other" but did not specify the health condition.

Utilizing medications was another part of participants' evaluated general health condition. Only one participant did not use any medication at all to treat his medical conditions, while the remaining used one or more medications. The majority of participants (63.2%) used 1–4 medications, while 17.1% used 5–6 medications, 7.9% used 7–8 medications, and 10.5% used 9 medications or more (see Table 34).

Table 34: Frequency Distribution of Participants' Number of Medications Utilized (N = 76)

Number of medications	Number	Percent (%)
0	1	1.3
1 – 2	23	30.3
3 – 4	25	32.9
5 – 6	13	17.1
7 – 8	6	7.9
≥ 9	8	10.5
Total	76	100.0

4.2.3.2.2 Evaluated diabetes condition

Participants' evaluated diabetes condition included diabetes type, diabetic management methods, medication schedule (oral/insulin), diabetes-related complications, number of hospital visits, number of emergency room visits, number of hypoglycemic incidents, number of severe hypoglycemic incidents, and number of hyperglycemic incidents. The following sections detail each type of evaluation.

4.2.3.2.2.1 Diabetes types

Diabetes mellitus is divided into different types: type 1, type 2, gestational diabetes, and others. The most common types of diabetes, type 1 and type 2, were explicitly listed in the survey, and participants were asked to write in any other type of diabetes they might have.

Type 2 diabetes is the most common type, as was seen in this study. Of the participants, almost three-quarters ($n = 55$) were type 2 diabetics and less than a quarter were type 1 diabetics ($n = 17$). Only two participants selected a different type of diabetes, which were dawn phenomenon diabetes and glucocorticoid-induced diabetes. The dawn phenomenon is an abrupt increase in blood glucose levels between 5 and 9 a.m. due to a physiological daily change in hepatic insulin sensitivity. This phenomenon can affect both type 1 and type 2 diabetics and even non-diabetic people (Bolli, De Feo, et al., 1984). Glucocorticoid-induced diabetes is defined as an abnormal increase in blood glucose associated with the use of glucocorticoids in a patient with or without a prior history of diabetes mellitus (Hwang & Weiss, 2014). The participants with dawn phenomenon and glucocorticoid-induced diabetes did not report whether they had type 1 or type 2 diabetes, so they were not assigned to either category (see Table 35).

Table 35: Frequency Distribution of Participants' Diabetic Type (N = 76)

Diabetes types	Number	Percent (%)
Type 1	17	23.0
Type 2	55	74.3
Other ²	2	2.7
Total	74¹	100.0

¹ Two participants did not answer this question.

² "Other" refers to dawn phenomenon and glucocorticoid-induced diabetes.

4.2.3.2.2.2 Years of being diagnosed with diabetes

Diabetic patients who are newly diagnosed with diabetes might be different in their medication utilization than patients who have been diagnosed for years. Participants were asked to write how many years they had been diagnosed with diabetes. Participants' average years of being diagnosed with diabetes was 11.8 (± 9.5). One-quarter of participants (25%) had been diagnosed with diabetes between one and four years, 22.1% between five and nine years, 26.5% between 10 and 15 years, 22.1% between 16 and 25 years, and only 4.4% 26 years or longer (see Table 36).

Table 36: Mean and Frequency Distribution of Participants' Years of Being Diagnosed with Diabetes ($N = 68$)¹

Years of being diagnosed with diabetes	Number	Percent (%)
1–4	17	25.0
5–9	15	22.1
10–15	18	26.5
16–25	15	22.1
≥ 26 ²	3	4.4
Total	68¹	100.0
Mean number of years being diagnosed with diabetes ($\pm SD$): 11.8 (± 9.5)		

¹ Eight participants did not answer this question.

² One participant had been diagnosed with diabetes for 40 years, one for 44 years, and one for 50 years.

4.2.3.2.2.3 Diabetes management

Diabetes management refers to the methods that patients use to manage their diabetes mellitus. Patients may use medications, such as oral diabetes medications or insulin, lifestyle modification, such as diet and exercise, and blood glucose-self-testing. Patients may also use other methods such as herbal supplements or nothing at all. Knowing whether patients manage their diseases and what methods they use to manage their diabetes indicates the severity of patients' diabetes and their health monitoring behaviors.

In this study, we asked participants to select what method(s) they used to manage their diabetes. Participants were asked to select one or more of the following: oral medications, insulin by injection, insulin by pump, exercise, diet, blood sugar (glucose) testing, none, and other. Among the participants, oral medication was the most common method of diabetes management, as 57 participants (75%) used oral diabetes medications to manage their diabetes, followed by 15 participants (19.7%) who used insulin by injection, and only five participants (6.6%) who used insulin by pump. Around half of the participants (47.4%) performed exercise to manage their diabetes, and more than half of the participants (64.5%) followed a healthy diet. Knowing whether their blood glucose level was high or low was also important for more than half of the participants (56.6%). Two participants said they used alternative methods to manage their diabetes. One was drinking herbal tea and spices (the participant did not mention what kind of spices), and one mentioned using fasting as a method to manage his/her diabetes. Lastly, one participant did not use any method to manage his/her diabetes (see Table 36).

Table 36: Frequency Distribution of Participants' Methods of Diabetes Management ($N = 76$)

Diabetes Management	Number	Percent (%)¹
Medication Management		
Oral medications	57	75.0
Insulin by injection	15	19.7
Insulin by pump	5	6.6
Lifestyle Modification		
Exercise	36	47.4
Diet	49	64.5
Glucose Monitoring		
Blood glucose testing	43	56.6
Other Monitoring		
Other ²	2	2.6
None	1	1.3

¹ Percent >100 due to check that all apply

² One participant drank tea and used spices and another participant used fasting.

4.2.3.2.2.4 Medication schedule

Diabetic patients' medication schedules indicate the severity of their diabetic condition, and thus their need for medication utilization. In the present study, participants were asked to select how often they used their oral diabetes medications and insulin. Participants who had an insulin pump were asked to skip the question. Patients who were

using more than one oral medication or insulin were asked to select how many of each medication they took. The following paragraph will highlight their medication regimens.

As mentioned in the last section, 57 participants were using oral medications and 15 were using insulin injections. Out of all participants who used oral medications ($N = 57$), 59.6% were using an oral diabetes medication every morning, 45.6% were using medication every evening, 38.6% were using medication twice a day, 7.0% three times a day, and no one used an oral diabetes medication four or more times a day (see table 37). Regarding insulin injection, six participants (40.0%) and three participants (20.0%) used insulin every evening and every morning, respectively, while four participants (26.7%) used insulin twice a day, and two (13.3%) and one participant (6.7%) used insulin three times a day and four times, respectively (see Table 38).

Table 37: Frequency Distribution of Participants' Oral Diabetes Medications Frequency ($N = 57$)¹

Oral Diabetes Schedule	Number	Percent (%) ²
Every morning	34	59.6
Every evening	26	45.6
Twice a day	22	38.6
Three times a day	4	7.0
Four or more times a day	0	0.0

¹ 19 participants did not use oral diabetes medications

² Percent >100 due to check that all apply

Table 38: Frequency Distribution of Participants' Insulin Subcutaneous Medications
Frequency ($N = 15$)¹

Insulin Schedule	Number	Percent (%) ²
Every morning	3	20.0
Every evening	6	40.0
Twice a day	4	26.7
Three times a day	2	13.3
Four or more times a day	1	6.7

¹ 61 participants did not use insulin subcutaneous medications

² Percent >100 due to check that all apply

4.2.3.2.2.5 Diabetes-related complications

Diabetes-related complications occur due to elevated blood glucose and its effects on patients' organs. Uncontrolled diabetic patients can face diabetes-related complications affecting their nerves, kidneys, feet/legs, and eyes, as well as possibly other organs. In this study, participants were asked to select what complication(s) they had due to their diabetes. Table 39 represents these complications and the next paragraph describes the findings.

Around one-third of the participants (32.9%) had no diabetes-related complications, whereas over two-thirds of the participants had at least one problem related to diabetes complications. The most common complications were feet and leg problems, which accounted for 41.4% of participants, followed by eye problems (34.3%) and nerve problems (21.4%), while the least common problem was kidney problems (7.1%). Other

problems, such as hand problems, heart problems and heart bypass, thirst, back pain, weight gain, stress, and urine crystals, occurred for eight participants (11.4%).

Table 39: Frequency Distribution of Participants' Diabetes-Related Complications ($N = 70$)¹

Diabetes-related complications	Number	Percent (%)²
Feet/leg problems	29	41.4
Eye problems	24	34.3
Nerve problems	15	21.4
Kidney problems	5	7.1
Other ³	8	11.4
None	23	32.9

¹ Six participants did not answer this question.

² Percent >100 due to check that all apply

³ Other problems were hand, heart and heart bypass, thirst, back pain, weight gain, stress, and urine crystals.

4.2.3.2.2.6 Diabetes-Related Hospitalization and emergency room visits

Uncontrolled diseases can lead patients to be hospitalized or to visit the emergency room. Diabetic patients who have been admitted to the hospital and/or visited the emergency room have a greater need to control their diabetes than do those whose diabetes is well controlled.

In this study, participants were asked how many times they had been hospitalized or visited the emergency room in the preceding year due to diabetes. Hospitalization was not a common experience for the majority of participants: 59 participants (89.4%) had not been hospitalized in the preceding year. Only seven participants (10.6%) had been

hospitalized in the preceding year and the average number of hospitalizations in that year was 0.3 (± 1.1) (see Table 40).

Table 40: Mean and Frequency Distribution of Participants' Number of Diabetes-Related Hospital Admissions ($N = 66$)

Number of hospital admissions	Number	Percent (%)
0	59	89.4
1	1	1.5
2	3	4.6
3	1	1.5
4	0	0.0
5	1	1.5
6	1	1.5
Total	66¹	100.0
Mean number of hospital admission ($\pm SD$): 0.3 (± 1.1)		

¹ Ten participants did not answer this question.

Visiting the emergency room was also not a common experience for the majority of participants: 62 participants (91.2%) had not visited the emergency room in the preceding year. Participants' average number of emergency room visits was 0.2 (± 0.7). Only six participants (8.8%) had visited the emergency room 1 to 4 times because of their diabetic problems (see Table 41).

Table 41: Mean and Frequency Distribution of Participants' Number of Diabetes-Related Emergency Room Visits (N = 68)¹

Number of emergency room visits	Number	Percent (%)
0	62	91.2
1	2	2.9
2	1	1.5
3	2	2.9
4	1	1.5
Total	68¹	100.0
Mean number of emergency room visits ($\pm$SD): 0.2 ($\pm$0.7)		

¹ Eight participants did not answer this question.

4.2.3.2.2.7 The number of low and high blood glucose level incidents during the past Ramadan

Patients having incidents of high and/or low blood glucose levels mean that their diabetes is uncontrolled. Participants in the study were asked to indicate how many times they had hypoglycemia, severe hypoglycemia, and hyperglycemia during the past Ramadan.

More than half of participants had no incidents of hypoglycemia or hyperglycemia during the past Ramadan. Participants' average number of hypoglycemic incidents was 2.8 ($\pm$ 6.9). Thirty-five participants (59.3%) had no incidents of hypoglycemia during the last Ramadan, while 24 participants (40.8%) had at least one hypoglycemic incident during the last Ramadan. Fourteen participants (23.8%) had one to three incidents of hypoglycemia,

and ten participants (17.0%) had four or more incidents of hypoglycemia during the past Ramadan (see Table 42).

Table 42: Mean and Frequency Distribution of Participants' Number of Hypoglycemic Incidents during the past Ramadan ($N = 59$)¹

Number of hypoglycemic incidents	Number	Percent (%)
0	35	59.3
1	3	5.1
2	7	11.9
3	4	6.8
4	1	1.7
5	4	6.8
10	1	1.7
15	1	1.7
30	3	5.1
Total	59¹	100.0
Mean number of hypoglycemic incidents ($\pm SD$): 2.8 (± 6.9)		

¹ Seventeen participants did not answer this question.

Regarding severe hypoglycemia, participants' average number of severe hypoglycemic incidents was 1.2 (± 4.9) and 53 participants (86.9%) had no such incidents. Five participants (8.2%) had between one and two incidents of severe hypoglycemia, and

three participants had 14, 20, or 30 incidents of severe hypoglycemia, respectively (see Table 43).

Table 43: Mean and Frequency Distribution of Participants' Number of Severe Hypoglycemic Incidents during the past Ramadan ($N = 61$)¹

Number of severe hypoglycemic incidents	Number	Percent (%)
0	53	86.9
1	2	3.3
2	3	4.9
14	1	1.6
20	1	1.6
30	1	1.6
Total	61¹	100.0
Mean number of severe hypoglycemic incidents ($\pm SD$): 1.2 (± 4.9)		

¹ Fifteen participants did not answer this question.

The number of participants who had no severe hyperglycemic incidents ($n = 38$, 65.5%) during the past Ramadan was almost the same as the number of participants who had hypoglycemic incidents ($n = 35$, 59.3%). Participants' average number of severe hyperglycemic incidents was 2.5 (± 6.7). Ten participants (17.2%) had between one and three incidents of hyperglycemia, seven participants had between five and seven incidents hyperglycemia, and three had 30 incidents of hyperglycemia (see Table 44).

Table 44: Mean and Frequency Distribution of Participants' Number of Severe Hyperglycemic Incidents during the past Ramadan ($N = 58$)¹

Number of severe hyperglycemic incidents	Number	Percent (%)
0	38	65.5
1	5	8.6
2	4	6.9
3	1	1.7
5	4	6.9
6	1	1.7
7	2	3.5
30	3	5.2
Total	58¹	100.0
Mean number of severe hyperglycemic incidents ($\pm SD$): 2.5 (± 6.7)		

¹ Eighteen participants did not answer this question.

4.2.3.2.2.8 Composite diabetes Complication Score

Participants' composite diabetes complications score was represented by the sum of the following measures: diabetes type, diabetes management, oral and insulin medication schedule, diabetes-related complications, number of hospitalizations and emergency room visits due to diabetes, number of minor and major hypoglycemic incidents, and number of hyperglycemic incidents. These diabetes measures were coded as follows: diabetes type was coded as 1 if a participant had type 1 diabetes and as 0 if a participant had type 2 or another type of diabetes. Diabetes management was coded as 0 if

a participant used non-insulin injections and as 1 if a participant used insulin injections. Participants' oral and insulin medication schedules were coded as 0 if they used medication once a day and as 1 if they used diabetes medications more than once a day. Diabetes-related complications were represented by the sum of the total number of checked complications. The number of hospitalizations due to diabetes was multiplied by 2, while the number of emergency room visits due to diabetes was multiplied by 1.5. Finally, the number of minor hypoglycemic incidents, severe hypoglycemic incidents, and all hyperglycemic incidents were added to the other previous measures to form the total score for diabetes complications. Table 45 shows that the participants' average composite diabetes complication score was 7.9 (± 16.6), with over 70 percent of participants (72.4%) having a score of less than or equal to 4, and 14 participants (18.4%) having a score between 5 and 10, while among the remaining 12 participants, 6 participants (7.9%) had a score between 11 and 20 and another 6 participants had score above 20. For the bivariate and multivariate analysis, two outlier values were identified and modified, so the variable average score changed to 6.0 (± 8.6).

Table 45: Mean and Frequency Distribution of Participants' Composite Diabetes Complication Score ($N = 76$)

Composite diabetes complication score	Number	Percent (%)
0 – 1	25	32.9
2 – 4	25	32.9
5 – 10	14	18.4
11 – 20	6	7.9
>20	6	7.9
Total	76¹	100.0
Mean number of diabetes complication composite score ($\pm SD$): 7.9 (± 16.6)		

4.2.4 Health behavior variables

Health behavior variables were divided into two categories: general personal health behaviors and diabetics' personal health behaviors. General personal health behaviors included tobacco avoidance. Diabetics' personal health behavior included diet, exercise, self-care, and adherence to care.

4.2.4.1 General personal health behavior

Participants' general health behavior included tobacco avoidance, which represents a personal behavior that is not specific for diabetes patients. In this study, participants were asked whether they smoked cigarettes, hookahs (e.g., shishas), or any type of tobacco product currently or in the past. The result showed that eight participants (10.7%) were

currently smoking cigarettes, and 11 participants (14.7%) were former cigarette smokers, while the remaining participants ($n = 56$, 74.7%) had never smoked cigarettes. In regard to smoking hookah, only three participants (4.0%) were currently smoking hookahs, six were former smokers (8.0%), and the remaining participants ($n = 66$, 88.0%) had never smoked. Finally, one participant (1.3%) was currently smoking a pipe, while the remaining participants ($n = 74$, 98.7%) had never smoked a pipe (see Table 46).

Table 46: Frequency Distribution of Participants' Tobacco Product Usage ($N=75$)¹

Tobacco product	Currently smoke <i>n</i> (%)	Previously smoke <i>n</i> (%)	Never smoked <i>n</i> (%)
Cigarettes	8 (10.7)	11 (14.7)	56 (74.7)
Hookah	3 (4.0)	6 (8.0)	66 (88.0)
Pipe	1 (1.3)	0 (0.0)	74 (98.7)

¹ One participant did not answer this question.

4.2.4.2 Diabetic-related personal health behavior

Participants' diabetic-related personal health behaviors included exercise, diet, self-care, and adherence to care. These behaviors might be impacted by fasting during Ramadan and might not reflect participants' behavior outside of Ramadan. Therefore, it was important to know what participants' personal health behaviors were before Ramadan and whether these behaviors changed during Ramadan.

Participants were asked to report how often they followed their diet, performed exercise, checked their blood glucose, and adhered to their diabetic medication regimens

during the three months prior to Ramadan. Then, participants were asked to report whether they had increased, decreased, or changed these personal behaviors during Ramadan. The following paragraph will describe participants' behaviors before Ramadan and then during Ramadan.

In terms of lifestyle modification, participants revealed that they sometimes followed a healthy meal plan (2.4 ± 1.4) and exercised for at least 30 minutes (2.3 ± 1.4). In terms of self-care, participants often (3.1 ± 1.1) checked their blood glucose levels with a monitor every day. Participants who used oral diabetic medication almost always (3.8 ± 0.7) used their oral diabetic medication as prescribed by their health care providers. Similarly, patients who used insulin almost always (3.9 ± 0.3) used insulin as prescribed. In following a healthy meal plan, 55.3% of participants often or always followed a healthy meal plan, while 22.4% rarely or never followed a healthy meal plan. Similarly, more participants (42.1%) often or always exercised for at least 30 minutes, while fewer participants (27.6%) exercised rarely or never. Regarding checking blood glucose, 67.1% of participants often or always self-checked their blood glucose level. Among the oral medication users ($n = 57$) and insulin users ($n = 15$), using such medications as prescribed was always followed by the majority of oral medication users (85.4%) and insulin medication users (93.3%) (see Table 47).

Table 47: Mean and Frequency Distribution of Participants' Personal Health Behaviors in the Three Months Prior to Ramadan ($N = 76$)

Personal health behavior	Mean ¹ ($\pm SD$)	Frequency ² <i>n</i> (%)					
		Never	Rarely	Sometimes	Often	Always	N/A ³
Followed a meal plan specifically for diabetes	2.4 (± 1.4)	12 (15.8)	5 (6.6)	15 (19.7)	24 (31.6)	18 (23.7)	2 (2.6)
Exercised for at least 30 minutes	2.3 (± 1.4)	10 (13.2)	11 (14.5)	19 (25.0)	11 (14.6)	21 (27.6)	4 (5.3)
Checked blood glucose level	3.1 (± 1.1)	2 (2.6)	3 (3.9)	19 (25.0)	15 (19.7)	36 (47.4)	1 (1.3)
Used oral medications as prescribed ⁴	3.8 (± 0.7)	1 (1.8)	0 (0.0)	2 (3.6)	5 (9.1)	47 (85.4)	19 (25.7)
Used insulin as prescribed ⁵	3.9 (± 0.3)	0 (0.0)	0 (0.0)	0 (0.0)	1 (6.7)	14 (93.3)	61 (80.3)

¹ Mean and standard deviation do not include the N/A response.

² Response scale: 0 = never to 4 = Always

³ N/A = not applicable

⁴ Only 57 participant used oral medications, and two participants did not answer this question. Therefore, all the percentages were calculated from a total N of 55, except 'non applicable' were calculated from a total N of 75

⁵ Only 15 participants used insulin medications, so all the percentages were calculated from a total N of 15, except "not/applicable" was calculated from the total N of 76

Participants were asked whether, during Ramadan, they changed their personal health behavior when fasting. Half of the participants did not change following a meal plan specifically for diabetes, while 30.0% decreased and 20.0% increased their adherence to a diabetes meal plan. During Ramadan, exercising for 30 minutes was less often performed by 32 participants (49.2%) and more often performed by eight participants (12.3%), while 25 participants (38.5%) did not change their exercise frequency during Ramadan. Self-

checking of blood glucose levels was unchanged for 35 participants (51.5%), increased for 19 (27.9%), and decreased for 14 participants (20.6%). Nineteen participants (26.0%) did not use oral medications, so their responses were not applicable. Among participants who were on oral medications and reported how they used oral medications ($n = 54$), 31 participants (57.4%) did not change their oral medication usage during Ramadan, 13 increased (24.1%), and 10 (18.5%) decreased their usage. Similarly, 61 participants (80.3%) did not use insulin, so their responses were not applicable. Among the 15 participants who used insulin, two-thirds (10 participants, or 66.7%) did not change their insulin usage, while four participants (26.7%) increased and one participant decreased (6.7%) insulin usage (see Table 48).

Table 48: Participants' Personal Health Behaviors Distribution during Ramadan ($N = 76$)

Personal health behavior	Frequency n (%)			
	Increase	Decrease	No change	Not applicable
Followed a meal plan specifically for diabetes ¹	14 (20.0)	21 (30.0)	35 (50.0)	
Exercised for at least 30 minutes ²	8 (12.3)	32 (49.2)	25 (38.5)	
Checked blood glucose levels with a monitor ³	19 (27.9)	14 (20.6)	35 (51.5)	
Used oral medications as prescribed ⁴	13 (24.1)	10 (18.5)	31 (57.4)	19 (26.0)
Used insulin as prescribed ⁵	4 (26.7)	1 (6.7)	10 (66.7)	61 (80.3)

¹ Six participants did not answer this question, so percentages were calculated from a total N of 70.

² Eleven participants did not answer this question, so percentages were calculated from a total N of 65.

³ Eight participants did not answer this question, so percentages was calculated from a total N of 68.

⁴ Only 57 participants used oral medications, and three participants did not answer this question. Therefore, the percentages of increase, decrease, and no change were calculated from the total N of 54. The percentage of 'not applicable' were calculated from a total N of 76

⁵ Only 15 participants used insulin medications, so the percentages of increase, decrease, and no change were calculated from a total N of 15. The percentage of 'not applicable' were calculated from a total N of 76

4.2.5 Outcomes variables

4.2.5.1 Satisfaction with care

Satisfaction with care plays a role in how well patients adhere to their health care providers' medical decisions.

This study used 15 items on a 5-point Likert scale (1 = *strongly disagree*, 5 = *strongly agree*) to capture participants' satisfaction with their pharmacists' services. The

scale consisted of five domains: general, interpersonal, communication, accessibility, and comprehensiveness.

Participants' scores showed a high level of satisfaction with their pharmacists' services. Regarding pharmacists' general skills, participants' average score was $4.0 (\pm 0.6)$. This showed that participants agreed that they were satisfied with their pharmacists' general services. Only one participant strongly disagreed about being satisfied with the services they received from pharmacists and about valuing the services that the pharmacist provided, whereas 10 and 12 participants, respectively, said that they strongly agreed on those items.

Next, participants were unsure to agreeable (3.6 ± 0.5) that they were satisfied with pharmacists' interpersonal skills. In this domain, participants had a high average score in regard to pharmacists' always treating them with respect (4.0 ± 0.7) and a lower average score in regard to pharmacists' knowledge about their culture and religion (3.0 ± 0.5). Seventeen participants (23.1%) agreed or strongly agreed that there were times when their pharmacist seemed insincere. Twenty participants (27.4%) agreed or strongly agreed that pharmacists were knowledgeable about their culture and religion. On the last two items, the majority of participants agreed or strongly agreed that pharmacists always treated them with respect (89.2%) and pharmacists were trustworthy (82.2%).

Regarding pharmacists' communication skills, the participants' average score was $3.8 (\pm 0.7)$, which means that they mostly agreed about their satisfaction on that aspect. Participants' highest level of agreement (4.0 ± 0.6) was in regard to their pharmacists'

explaining things in a way they could understand, while they had a lower level of agreement that their pharmacists provided written information in a language that they understood (3.6 ± 1.0). In this domain, more than ninety percent of participants agreed or strongly agreed that pharmacists explained things in the way that they could understand (91.8%), understood what they were trying to say (86.3%), and provided written information in understandable language (69.9%).

Further, compared to all other constructs, the participants' lowest level of satisfaction was with pharmacists' accessibility (3.5 ± 0.7). Among items in this domain, participants' highest level of satisfaction was in regard to calling a pharmacist if they had a medication question (3.7 ± 1.0), followed by the ability to easily contact their pharmacist when they had questions (3.5 ± 1.0), and their lowest level of agreement was in regard to being rushed when they were speaking to pharmacists (3.4 ± 0.9) (note: this item mean was reverse coded, so before reverse coding, participants' agreement level was $2.6 (\pm 0.9)$). More than half of the participants agreed or strongly agreed that they were comfortable calling their pharmacist if they had a question (73.6%), and that they could easily contact a pharmacist if they had questions or concerns (65.8), while only 20.4% agreed or strongly agreed they always felt rushed when they spoke to a pharmacist.

The last domain measured participants' satisfaction in regard to pharmacists' comprehensiveness skills. Participants' average score was $3.7 (\pm 0.7)$, which means that they agreed that they were satisfied as regards pharmacists' comprehensiveness skills. Their highest agreement level was in regard to their satisfaction about pharmacists' adequately answering their questions (3.9 ± 0.6), while their lowest agreement level was

in regard to pharmacists' providing them with helpful information about their treatment goals (3.6 ± 0.9). Similar to the previous domains, more than half of the participants agreed or strongly agreed that pharmacists provided helpful information on their treatment goals (60.3%), provided them with information about what to do when experiencing side effects (68.5%), and adequately answered their questions (82.5%).

Overall, participants' agreement level was 3.6 (± 0.7), which means that they mostly agreed that they were satisfied with pharmacists' services and skills. The scale reliability was 0.91, which was acceptable. In conclusion, participants' satisfaction with pharmacists' health care services was found to be high on most of the items (see Table 49).

Table 49: Mean and Frequency Distribution of Participants' Satisfaction with Pharmacists' Services ($N = 76$)

Items	Mean ($\pm SD$)	Frequency ¹ n (%)				
		Strongly Disagree	Disagree	Unsure	Agree	Strongly Agree
General services						
I am very satisfied with the services I receive from pharmacists. ³	4.0 (± 0.6)	1 (1.3)	2 (2.7)	2 (2.7)	60 (80.0)	10 (13.3)
I value the services that the pharmacists provide me. ³	4.1 (± 0.6)	1 (1.3)	2 (2.67)	0 (0.0)	60 (80.0)	12 (16.0)
Subdomain Total	4.0 (± 0.6)					
Interpersonal skills						
There are times when pharmacists seem insincere. ^{2,4}	3.4 (± 1.0)	5 (6.8)	37 (50.0)	15 (20.3)	14 (18.9)	3 (4.1)
Pharmacists are knowledgeable about my culture and religion. ⁵	3.0 (± 1.0)	2 (2.7)	23 (31.5)	28 (38.4)	14 (19.2)	6 (8.2)
Pharmacists always treat me with respect. ⁴	4.0 (± 0.7)	0 (0.0)	3 (4.1)	5 (6.8)	52 (70.3)	14 (18.9)
Pharmacists are trustworthy. ⁵	3.9 (± 0.7)	0 (0.0)	4 (5.5)	9 (12.3)	50 (68.5)	10 (13.7)
Subdomain Total	3.6 (± 0.5)					
Communication skills						
Pharmacists explain things in a way that I am able to understand. ⁵	4.0 (± 0.6)	0 (0.0)	2 (2.7)	4 (5.5)	56 (76.7)	11 (15.1)
Pharmacists are able to understand what I am trying to say. ⁵	3.9 (± 0.7)	0 (0.0)	6 (8.2)	4 (5.5)	54 (74.0)	9 (12.3)
Pharmacists provide written information in a language that I can understand. ⁵	3.6 (± 1.0)	4 (5.5)	10 (13.7)	8 (11.0)	43 (58.9)	8 (11.0)

Table 49 (continued)

Subdomain Total	3.8 (±0.7)					
Accessibility						
I am comfortable calling the pharmacist if I have a medication question. ⁶	3.7 (±1.0)	2 (2.8)	10 (13.9)	7 (9.7)	42 (58.3)	11 (15.3)
I always feel rushed when I speak with the pharmacist. ^{2,5}	3.4 (±0.9)	2 (2.7)	41 (56.2)	15 (20.6)	12 (16.4)	3 (4.1)
I can easily contact a pharmacist when I have questions or concerns. ⁵	3.5 (±1.0)	2 (2.7)	13 (17.8)	10 (13.7)	40 (54.8)	8 (11.0)
Subdomain Total	3.5 (±0.7)					
Comprehensiveness skills						
Pharmacists provide helpful information on my treatment goals. ⁵	3.6 (±0.9)	1 (1.4)	8 (11.0)	20 (27.4)	37 (50.7)	7 (9.6)
Pharmacists provide me with information about what to do if I experience side effects from my medications. ⁵	3.7 (±0.8)	1 (1.4)	5 (6.9)	17 (23.3)	43 (58.9)	7 (9.6)
Pharmacists adequately answer my questions. ⁴	3.9 (±0.6)	0 (0.0)	4 (5.4)	9 (12.2)	54 (73.0)	7 (9.5)
Subdomain Total	3.7 (±0.7)					
Overall Scale Total	3.6 (±0.7)	Cronbach's alpha = 0.91				

¹ Response scale: 1 = strongly agree to 5 = strongly disagree² Item was reverse coded.³ One participant did not answer this question.⁴ Two participants did not answer this question.⁵ Three participants did not answer this question.⁶ Four participants did not answer this question.

4.3 DEPENDENT VARIABLES

In this study, there was one dependent variable associated with the study's main objectives, which was medication changes. The second dependent variable was the

participants' perception of pharmacists' engagement activities during Ramadan. The next section will discuss these objectives in detail.

4.3.1 Medication changes during Ramadan

During Ramadan, patients may change their medication usage patterns or even stop using their medications completely. Therefore, it was important to know how participants modified their medication usage. Only participants who fasted during Ramadan and took their oral diabetes medications or insulin subcutaneous were asked to answer this question.

To detect those who fasted during Ramadan, participants were asked to report how many days they fasted during the last Ramadan. The average number of fasting days was 21.3 (± 12.0). Only 13 participants did not fast during the last Ramadan, and the rest of the participants' fasting varied between fasting on some days ($n = 23$) and fasting during the whole month ($n = 35$) (see Table 50).

Table 50: Frequency Distribution of Participants' Number of Fasting Days During Ramadan ($N = 71$)¹

Number of days	Number	Percent (%)
0	13	18.3
1 – 10	3	4.2
11 – 20	7	9.9
21 – 25	7	9.9
26 – 29	6	8.5
30	35	49.3
Total	71¹	100.0
Mean days of fasting ($\pm SD$): 21.3 (± 12.0)		

¹ Five participants did not answer this question.

Seven items were used to capture participants' medication changes. These items were 1) changing medication time, 2) changing medication frequency, 3) changing medication dosage form, 4) increasing the dose, 5) decreasing the dose, 6) stopping medication, or 7) combining multiple doses. In each medication change category, participants were asked to select *Yes*, *No*, or *Not Applicable* (N/A). Participants who selected *N/A* for oral drugs or insulin meant that they were not using that form of medication, and therefore their responses were not included under that medication category (see Table 51).

Using oral diabetes medications was common (75%, $n = 57$) among the study participants. Among participants who were oral diabetes medication users, 11 participants

did not fast during the last Ramadan, so they skipped answering this question and their answers were counted as missing. Therefore, only 46 participants selected *Yes* or *No* regarding whether they changed their medication use or not. Among the 46 participants, changing the medication time without health care providers' approval was the most common change and was performed by more than half of the participants (65.2%). Changing medication frequency was the second most common change and was performed by more than one-third of the participants (39.1%). The remaining changes were as follows: decreasing the medication dose (19.6%), stopping the use of medication (13.0%), combining multiple doses (13.0%), increasing the medication dose (6.5%), and changing the medication dosage form (2.2%).

On the other hand, among participants who were insulin users ($n = 15$), four participants did not fast during Ramada. Only 11 participants who used insulin and fasted during the last Ramadan selected either *Yes* or *No* in regard to whether they changed their medications or not. Among the insulin users who fasted during the last Ramadan ($n = 11$), 18.2% of participants changed their insulin time and frequency and increased their insulin dose, 9.1% changed the dosage form and changed by stopping the use of insulin, and no one decreased insulin doses or combined multiple doses.

Table 51: Frequency Distribution of Participants' Medications Usage Modification During Ramadan without Health Care Providers' Approval ($N = 76$)

Type of medication modification	Oral diabetes medications ($n = 46$) ¹		Insulin medications ($n = 11$) ²	
	Yes n (%) ³	No n (%) ³	Yes n (%) ⁴	No n (%) ⁴
Changed medication time	30 (65.2)	16 (34.8)	2 (18.2)	9 (81.8)
Changed medication frequency	18 (39.1)	28 (60.9)	2 (18.2)	9 (81.8)
Changed medication dosage form	1 (2.2)	45 (97.8)	1 (9.1)	10 (90.9)
Increased medication dose	3 (6.5)	43 (93.5)	2 (18.2)	9 (81.8)
Decreased medication dose	9 (19.6)	37 (80.4)	0 (0.0)	11 (100.0)
Stopped using medication	6 (13.0)	40 (87.0)	1 (9.1)	10 (90.9)
Combined multiple doses	6 (13.0)	40 (87.0)	0 (0.0)	11 (100.0)

¹ Fifty-seven participants used oral diabetes medications: 46 participants fasted during the last Ramadan and 11 participants did not fast during the last Ramadan.

² Fifteen participants used insulin medications: 11 participants fasted during the last Ramadan and four participants did not fast during the last Ramadan.

³ Percentage of eligible participants (those who used oral diabetes medications and fasted during the last Ramadan).

⁴ Percentage of eligible participants (those who used insulin medications and fasted during the last Ramadan).

4.3.2 Participants' perception of proposed pharmacist engagement activities during Ramadan

Pharmacists, like other health care providers, need to understand their patients' culture in order to build good relationships with them and use those relationships to

encourage them to maintain good healthcare practices. With regards to Muslim patients, pharmacists need to learn about Ramadan to be better prepared to provide them with health care recommendations.

Seventeen items were utilized to identify participants' perceptions of proposed pharmacist engagement activities. These items included five domains: encouragement and support regarding fasting, understanding Islamic religious practice and culture, creating a Muslim-friendly and welcoming environment in the pharmacy, and modifying medications to facilitate fasting. In the next section, the average score of each domain and the overall scale will be detailed.

The first domain was encouragement and support regarding fasting. In this domain, participants' average score showed that they mostly agreed (3.8 ± 0.7) that it would be good if pharmacists supported and encouraged them regarding fasting. Participants had a high level of agreement (4.2 ± 0.7) that pharmacists provide them with information about what they could do if they experienced medication side effects during fasting. In the same domain, participants' lowest level of agreement was regarding whether pharmacists should support them in fasting first before advising them not to fast (3.5 ± 1.2). More than half of the participants agreed or strongly agreed that they would like their pharmacists to support them in fasting before advising them not to fast (58.7%), develop a specific plan with them to avoid drug-related problems (72.0%), refer them to other health care providers to enable them to fast (68.0%), and provide them information about what to do if they experience medication side effects (92.0%).

Compared to the importance of pharmacists' encouragement and support during fasting, participants had a slightly higher level of agreement about the importance of pharmacists' understanding Islamic religious practice and culture (3.8 ± 0.7 vs. 3.9 ± 0.8). In this domain, participants' highest agreement level was related to pharmacists' knowing the importance of Ramadan and fasting (4.2 ± 0.9), and their lowest agreement was related to pharmacists' providing a consultation in a private area (3.7 ± 1.0). In this domain, more than 20% of the participants strongly agreed that they would like pharmacists to understand their culture (26.7%), respect their preference not to shake hands (25.3%), consult with them in a private area (22.7%), and have knowledge about Islam and Muslim practices (34.7%), while less than 5.0% of the participants strongly disagreed with these items.

The third domain was creating a Muslim-friendly and welcoming environment in the pharmacy. Among the domains in this scale, this domain had the lowest overall mean (3.7 ± 0.8). Participants agreed about the importance of having pharmacists ask them if they had questions about using their medications (4.2 ± 0.7), and mostly agreed (3.8 ± 1.0) about the importance of pharmacists' placing a sign in the pharmacy asking them if they need help to manage their medications while fasting, but they were unsure (3.4 ± 1.1) that pharmacists needed to greet them with *As-salamu alaykum*. The highest percentage of participants who agreed or strongly agreed was in regard to having pharmacists ask them if they had any concerns (90.6%), followed by placing a sign in the pharmacy encouraging them to ask for help in managing medication while fasting (66.7%), and the lowest percentage was in desiring pharmacists to greet them with *As-salamu alaykum* (41.7%).

The last domain was modifying medications to facilitate fasting. Participants mostly agreed (3.8 ± 0.9) that they would like their pharmacists to modify their medications to facilitate fasting. Participants' highest level of agreement was in regard to having pharmacists provide them with suggestions about modifying medication times while fasting (3.9 ± 1.0) and having pharmacists follow up with them to ensure that their medications were managed properly (3.9 ± 1.0). Participants had less agreement with regards to having pharmacists suggest changes in medication frequency to enable them to fast (3.6 ± 1.1).

The overall scale average score for this scale was $3.8 (\pm 0.7)$ out of 5, which means that participants mostly agreed to the proposed pharmacist engagement activities. The scale had an excellent reliability score at 0.95. In conclusion, participants largely agreed about the importance of having pharmacists provide them with the proposed services, which in turn could help them manage their health during fasting (see Table 52).

Table 52: Mean and Frequency Distribution of Participants' Perceptions of Proposed Pharmacist Engagement Activities (PPPEA) During Ramadan ($N = 76$)

Items	Mean ($\pm SD$)	Frequency ² n (%)				
		Strongly Disagree	Disagree	Unsure	Agree	Strongly Agree
Encouragement and support regarding fasting						
Support me to fast first before advising me not to fast. ²	3.5 (± 1.2)	5 (6.7)	12 (16.0)	14 (18.7)	27 (36.0)	17 (22.7)
Develop a specific plan with me to avoid any drug-related problems. ²	3.8 (± 1.0)	2 (2.7)	6 (17.3)	13 (50.7)	38 (50.7)	16 (21.3)
Refer me to other health care providers (e.g., physicians and dietitians) to enable me to fast and manage my medications. ²	3.8 (± 1.0)	1 (1.3)	8 (10.7)	15 (20.0)	34 45.3)	17 (22.7)
Provide me with information about what to do if I experience side effects from my medications if I decide to fast. ²	4.2 (± 0.7)	1 (1.3)	2 (2.7)	3 (4.0)	46 (61.3)	23 (30.7)
Subdomain Total	3.8 (± 0.7)					
Understanding Islamic religious practices and culture						
Have an overall understanding of my culture. ²	3.9 (± 1.0)	1 (1.3)	7 (9.3)	14 (18.7)	33 (44.0)	20 (26.7)
Respect my preference to not shake hands with the opposite gender. ²	3.8 (± 1.1)	3 (4.0)	7 (9.3)	14 (18.7)	32 (42.7)	19 (25.3)
Provide me with consultation in a private area. ²	3.7 (± 1.0)	1 (1.3)	11 (14.7)	12 (16.0)	34 (45.3)	17 (22.7)
Know about the importance of Ramadan and fasting. ²	4.2 (± 0.9)	1 (1.3)	4 (5.3)	7 (9.3)	33 (44.0)	30 (40.0)

Table 52 (continued)

Have knowledge about Islam and Muslims practices. ²	4.0 (±1.0)	2 (2.7)	6 (8.0)	11 (14.7)	30 (40.0)	26 (34.7)
Subdomain Total	3.9 (±0.8)					
Creating a Muslim-friendly and welcoming environment in the pharmacy						
Greet me with “As-salamu alaykum.” ³	3.4 (±1.1)	2 (2.8)	13 (18.1)	27 (37.5)	17 (23.6)	13 (18.1)
Ask me if I have any concerns about using my medications. ⁴	4.2 (±0.7)	1 (1.4)	0 (0.0)	6 (8.1)	46 (62.2)	21 (28.4)
Place a sign in the pharmacy to encourage me to ask for help in managing my medications if I decide to fast. ²	3.8 (±1.0)	1 (1.3)	7 (9.3)	17 (22.7)	30 (40.0)	20 (26.7)
Subdomain Total	3.7 (±0.8)					
Modifying medications to facilitate fasting						
Provide suggestions about how to change (increase or decrease) my medication <i>dose</i> if I decide to fast. ²	3.8 (±1.0)	3 (4.0)	6 (8.0)	9 (12.0)	40 (53.3)	17 (22.7)
Provide suggestions about changing my medication <i>dosage form</i> (e.g., to sustained release) if I decide to fast. ⁵	3.7 (±1.0)	3 (4.1)	7 (9.6)	12 (16.4)	35 (48.0)	16 (21.9)
Provide suggestions about changing my medication <i>frequency</i> (e.g., from 2–3 times/day to 1 time/day) if I decide to fast. ⁴	3.6 (±1.1)	4 (5.4)	10 (13.5)	12 (16.2)	31 (41.9)	17 (23.0)
Provide suggestions about changing my medication <i>timing</i> (e.g., from morning or afternoon dose to before <i>Sohour</i> or	3.9 (±1.0)	2 (2.7)	6 (8.0)	9 (12.0)	40 (53.3)	18 (24.0)

Table 52 (continued)

after <i>Iftar</i>) if I decide to fast. ²						
Follow up with me to ensure that I am managing my medications properly if I decide to fast. ²	3.9 (±1.0)	1 (1.3)	8 (10.7)	12 (16.0)	33 (44.0)	21 (28.0)
Subdomain Total	3.8 (±0.9)					
Overall Scale Total	3.8 (±0.7)	Cronbach's alpha = 0.95				

¹ Response scale: 1 = strongly agree to 5 = strongly disagree

² One participant did not answer this question.

³ Four participants did not answer this question.

⁴ Two participants did not answer this question.

⁵ Three participants did not answer this question.

4.4 OBJECTIVES RESULTS

This study had four objectives and 20 hypotheses. Descriptive statistics were utilized to address the first, second, and fourth objectives, while bivariate and multivariate statistical analysis were used to address the third objective.

4.4.1 Objective One

This objective aimed to describe the predisposing (demographic characteristics, health beliefs, and social structure), enabling (personal and family resources), and need factors, and satisfaction with pharmacy services of Muslim diabetic patients. Descriptive statistical analysis was utilized to address this objective, and the results have been described in Chapter 4 (see the descriptive results for predisposing variables (section 4.2.1), enabling variables (section 4.2.2), need variables (section 4.2.3), and satisfaction variables (section 4.2.5.1)).

4.4.2 Objective Two

The second objective was to describe medication usage and diabetes management behaviors (i.e., diet, exercise, and self-care) during Ramadan. Descriptive statistical analysis was used to address this objective. The descriptive results of medication usage and diabetes management behavior were reported in Chapter 4 section 4.2.4.2.

4.4.3 Objective Three

This objective aimed to assess whether predisposing, enabling, and need factors, and satisfaction with pharmacy services have an impact on medication usage changes during Ramadan. First, 21 bivariate (unadjusted) analyses were conducted to test the relationship between each independent variable (i.e., the predisposing, enabling, need, and satisfaction variables) and the outcome variable (i.e., medication usage changes without a health care provider's approval during Ramadan). Before conducting the 21 bivariate analyses, the scale reliability coefficients of variables were reviewed. Variables with low reliability coefficients were considered to be removed. The religiosity scale reliability coefficient was 0.45 and did not improve even with deleting some of the scale items. Therefore, the religiosity scale was removed and the remaining 20 variables were included in the bivariate analyses.

The study independent variables differed in their measurement levels; some were continuous, such as age, and some were dichotomous, such as gender. Therefore, 20 different bivariate analyses were conducted. The study outcome variable was dichotomized into zero (i.e., participants who did not make any changes to their medication (oral or

insulin) or changed only the time of their medications), and one (i.e., participants who made changes other than the time of their medications). Only the statistical significant results of each bivariate analysis were included in the multivariate logistic regression analysis. The next section describes all 20 bivariate analyses and their results. Tables 52-54 show the results of the bivariate analyses. Then, all 20 hypotheses are described regarding the relationship between the dependent and independent variables., Only significantly related bivariate analyses were included in the multivariate analyses. Because of limited sample size, it was essential that a parsimonious multivariate model be constructed by conducting bivariate analyses first.

4.4.3.1 Independent variables

4.4.3.1.1 Age

The independent-samples *t*-test was used to identify the relationship between age and medication usage changes without a health care provider's approval during Ramadan. The *t*-test showed that there was no statistically significant relationship between the two variables ($t = 1.30$; $p = 0.198$) (see Table 53).

4.4.3.1.2 Gender

The chi-square test was used to identify the relationship between gender and medication usage changes during Ramadan without a health care provider's approval. The results showed that there was not a statistically significant relationship between the two variables ($\chi^2 = 1.95$, $p = 0.163$) (see Table 54).

4.4.3.1.3 Marital Status

Marital status was classified into two categories; married and not married, which included divorced, separated, widowed, and never married. A chi-square test was used to identify the relationship between marital status and medication usage changes during Ramadan without health care providers' approval. The results showed no statistically significant relationship between the two variables ($\chi^2 = 0.43$; $p = 0.510$) (see Table 54).

4.4.3.1.4 Health Beliefs

The two-independent-sample *t*-test showed there was no statistical significant relationship between health beliefs and medication usage changes during Ramadan ($t = -0.49$; $p = 0.628$) (see Table 53).

4.4.3.1.5 Race

Participants' race was dichotomized into White and non-White. Non-White races were Black, Asian, Hispanic, and others. A chi-square test was used to measure the relationship between race and medication usage changes during Ramadan. The results showed no statistically significant relationship between the two variables ($\chi^2 = 0.72$, $p = 0.379$) (see Table 54).

4.4.3.1.6 Level of education

Participants' education levels ranged from 'less than middle school' to 'graduate degree.' This variable was dichotomized into two groups based on their frequency distributions: high school graduates and less than a high school degree vs. some college

degree and above. A chi-square test was used to measure the relationship and the results showed that there was no statistical significant relationship between the two variables ($\chi^2 = 2.0, p = 0.158$) (see Table 54).

4.4.3.1.7 Level of employment

Participants' employment level was divided into full-time employed and non-full-time employed, which included those who were part-time employed, unemployed, students, and retired. The chi-square test was utilized to measure the relationship between participants' employment level and medication usage changes during Ramadan. The test showed that there was no statistically significant relationship between the two variables ($\chi^2 = 0.04, p = 0.846$) (see Table 54).

4.4.3.1.8 Family size

A two-independent-sample *t*-test showed that there was no statistically significant relationship between the two variables ($t = -0.66; p = 0.513$) (see Table 53).

4.4.3.1.9 Country of birth

Participants' country of birth was divided into two groups: participants born in the U.S. and participants born outside the U.S. Fisher's exact test was used to detect the relationship between participants' country of birth and their medication usage changes during Ramadan. The results supported the hypothesis and showed that there was no statistically significant relationship between the two variables (Fisher's Exact = 0.16, $p = 0.419$) (see Table 55).

4.4.3.1.10 Acculturation level

Less acculturated participants were previously assumed to change their medication usage during Ramadan without a health care provider's approval more than would highly acculturated participants. The last item in the survey was removed from the scale since the majority of participants were born outside the U.S., and so they might not be eligible to participate in the U.S. political system. A two-independent-sample *t*-test was used to detect the relationship between participants' country of birth and their medication usage changes during Ramadan. The results supported the hypothesis and showed there was no statistical significant relationship between the two variables ($t = 0.13$; $p = 0.895$) (see Table 53).

4.4.3.1.11 Perceived Islamophobia

Muslims' perceptions of Islamophobia in the U.S. were assumed to lead participants to modify their medications usage during Ramadan without their health care providers' approval. A two-independent-sample *t*-test was used to measure the above hypothesis and the results showed that there was no statistically significant relationship between the two variables ($t = -0.54$; $p = 0.598$) (see Table 53).

4.4.3.1.12 Regular source of care

Participants' sources of health care included having a primary care physician, a regular pharmacist, and a community pharmacy. A two-independent-sample *t*-test showed that there was no statistically significant relationship between the two variables ($t = -1.54$; $p = 0.130$) (see Table 53).

4.4.3.1.13 Insurance

Participants' insurance was divided into having insurance (i.e., Medicare, Medicaid, or private insurance) and no insurance (i.e., no insurance and paying out-of-pocket). Participants who had health insurance would be able to consistently pay their health care providers to manage their medication usage during Ramadan. This impact was studied by using a chi-square test, which concluded that there was no statistically significant relationship between the two variables ($\chi^2 = 0.03$, $p = 0.856$) (see Table 54).

4.4.3.1.14 Income

Patients with a good income will have the ability to pay for their health care providers to evaluate their disease condition and modify their medication usage during Ramadan. Patients' income was divided into income less than \$30,000 and income equal to and above \$30,000. A chi-square test showed that there was no significant relationship between income and medication usage change during Ramadan ($\chi^2 = 1.20$, $p = 0.273$) (see Table 54).

4.4.3.1.15 Social support

Patients' social support was divided into support from health care providers (i.e., physicians, pharmacists, nurses) and support from non-health care providers (i.e., family, friends, and imams). Fisher's exact test showed no statistically significant relationship between the two variables (Fisher's exact = 0.09, $p = 0.164$) (see Table 55).

4.4.3.1.16 Health care barriers

Participants' barriers were divided into five barriers: cost, language, trust, health care provider's characteristics, and discrimination. It was assumed that participants who had a higher perception of barriers would be more likely to change their medication usage without a health care provider's approval. A two-independent-sample *t*-test showed a statistically significant relationship between participants' perceived barriers and medication changes during Ramadan ($t = -4.16; p < 0.001$). The average level of perceived barriers in participants who did not change or changed only the time of their medication during Ramadan (2.2 ± 0.4) was lower than that of participants who changed aspects other than the time of their medication (2.7 ± 0.5) (see Table 53).

To determine which barriers affected participants' medication usage, the relationship between changing medication usage without a health care provider's approval and each individual barrier (i.e., cost, language, trust, provider characteristics, discrimination) was examined.

4.4.3.1.16.1 Cost barriers

Participants' cost barriers measured barriers related to the cost of physician visits and medications. A two-independent-sample *t*-test showed a statistically significant relationship between the two variables ($t = -3.22; p = 0.002$). Compared to those who did not change their medications, those who changed their medications without health care provider's approval had significantly higher perceived cost barriers (2.5 ± 1.0 vs. 3.3 ± 0.9), respectively (see Table 53).

4.4.3.1.16.2 *Language barriers*

Participants' English language skills could be a barrier that would prevent them from understanding written medical information, such as reading and filling out medical forms. A two-independent-sample *t*-test showed no statistically significant relationship ($t = -1.92$; $p = 0.061$) between the two variables (see Table 53).

4.4.3.1.16.3 *Trust barriers*

Participants' trust in their health care providers (i.e., physicians and pharmacists) can play a major role in their accepting providers' health care recommendations, especially during Ramadan. A two-independent-sample *t*-test showed that there was no statistically significant relationship ($t = -0.93$; $p = 0.356$) between the two variables (see Table 53).

4.4.3.1.16.4 *Health care providers' characteristics barriers*

Health care providers' characteristics included religion, ethnicity, gender, and language. These characteristics could be a barrier that would prevent participants from seeking or accepting providers' advice in regard to changes in medication usage during Ramadan. A two-independent-sample *t*-test showed a statistically significant relationship ($t = -2.12$; $p = 0.039$) between the two variables. Compared to those who did not change their medications, those who changed their medications without health care provider's approval had significantly higher perceptions of barriers related to health care providers' characteristics (2.0 ± 0.8 vs. 2.5 ± 1.0) respectively (see Table 53).

4.4.3.1.16.5 *Discrimination barriers*

In general, patients who perceive that they have been discriminated against while receiving medical care might not visit the same health care setting where they were discriminated against or might not return to see health care providers who discriminated against them. In this study, a discrimination barrier was assumed to negatively affect participants' changes in medication usage during Ramadan. An independent-samples *t*-test showed a statistically significant relationship ($t = -3.32$; $p = 0.002$) between the two variables. Compared to those who did not change their medications, those who changed their medications without health care provider's approval had significantly higher perceived discrimination barriers (1.7 ± 0.8 vs. 2.6 ± 1.2), respectively (see Table 53).

4.4.3.1.17 *Self-help/ability to negotiate the system*

It was assumed that participants who had a higher level of self-help and ability to negotiate health care system would be less likely to change their medication usage without a health care provider's approval. A two-independent-samples *t*-test showed that there was no statistical significant relationship between the two variables ($t = 0.76$; $p = 0.448$) (see Table 53).

4.4.3.1.18 *Perceived diabetic health status*

Participants who perceived their health as poor might make different changes in their medication usage compared to participants who perceived their health as excellent. Participants' perceived diabetic health status was divided into low and high categories. The low category included participants who ranked their health as fair or poor, whereas the high

category included those who ranked their health as excellent, very good, or good. A chi-square test showed that there was no statistically significant relationship between the two variables ($\chi^2 = 0.38$, $p = 0.536$) (see Table 54).

4.4.3.1.19 Composite diabetes complication score

Participants' composite diabetes complications score were represented by the sum of the following measures: diabetes type, diabetes management, oral and insulin medication schedule, diabetes-related complications, number of hospitalizations and emergency room visits due to diabetes, number of minor and major hypoglycemic incidents, and number of hyperglycemic incidents.

An independent-samples *t*-test showed a statistically significant relationship between the two variables ($t = -2.74$; $p = 0.009$). Compared to those who did not change their medications, those who changed their medications without health care provider's approval had significantly higher diabetes complications (1.5 ± 0.7 vs. 2.8 ± 2.2), respectively (see Table 53).

4.4.3.1.20 Satisfaction with care

Participants' level of satisfaction with pharmacists' services might influence their medication usage during Ramadan. An independent-samples *t*-test showed that there was a statistically significant relationship between the two variables ($t = 2.30$; $p = 0.027$).

Compared to those who did not change their medications, those who changed their medications without a health care provider's approval had significantly lower satisfaction with pharmacists services (3.8 ± 0.7 vs. 3.3 ± 0.9) respectively (see Table 53).

Table 53: Mean, *t*-values, and *p*-values for Age, Health Belief Level, Family Size, Years in the U.S., Religiosity Level, Acculturation Level, Islamophobia Level, Source of Care, Health Care Barriers (Total, Cost, Language, Trust, Health Care Providers' Characteristics, and Discrimination), Self-Ability, Diabetic Complication Score, and Satisfaction with Care

Variable		N	Mean (±SD)	t- Value	p- Value ^a
Age					
Medication usage change without health care provider's approvals	No / only time	25	59.8 (±15.2)	1.30	0.1983
	Yes other than time	26	54.6 (±12.9)		
Health beliefs					
Medication usage change without health care provider's approval	No / only time	25	3.8 (±0.8) ^b	-0.49	0.628
	Yes other than time	25	3.9 (±0.6) ^b		
Family size					
Medication usage change without health care provider's approval	No / only time	25	3.2 (±2.0)	-0.66	0.513
	Yes other than time	26	3.6 (±2.1)		
Years in the U.S.					
Medication usage change without health care provider's approval	No / only time	25	22.7 (±17.4)	0.12	0.902
	Yes other than time	26	22.1 (±17.4)		
Acculturation level					
Medication usage change without health care provider's approval	No / only time	26	2.0 (±0.6) ^b	0.13	0.895
	Yes other than time	25	2.0 (±0.6) ^b		
Islamophobia level					
Medication usage change without health care provider's approval	No / only time	26	3.0 (±0.6) ^b	- 0.54	0.598
	Yes other than time	25	3.1 (±0.9) ^b		

Table 53 (continued)

Source of care					
Medication usage change without health care provider's approvals	No / only time	26	3.0 (± 1.1)	-1.54	0.130
	Yes other than time	26	3.4 (± 0.9)		
Health care barriers (total barriers)					
Medication usage change without health care provider's approvals	No / only time	26	2.2 (± 0.4) ^b	- 4.16	< 0.001*
	Yes other than time	26	2.7 (± 0.5) ^b		
Cost barrier					
Medication usage change without health care provider's approval	No / only time	26	2.5 (± 1.0) ^b	- 3.22	0.002*
	Yes other than time	26	3.3 (± 0.9) ^b		
Language barrier					
Medication usage change without health care provider's approval	No / only time	26	2.4 (± 1.1) ^b	-1.92	0.061
	Yes other than time	26	2.9 (± 0.9) ^b		
Trust barrier					
Medication usage change without health care provider's approval	No / only time	26	2.2 (± 0.7) ^b	- 0.93	0.356
	Yes other than time	26	2.4 (± 1.0) ^b		
Health care provider characteristics barrier					
Medication usage change without health care provider's approval	No / only time	26	2.0 (± 0.8) ^b	-2.12	0.039*
	Yes other than time	26	2.5 (± 1.0) ^b		
Discrimination barrier					
Medication usage change without health care provider's approval	No / only time	26	1.7 (± 0.8) ^b	-3.32	0.002*
	Yes other than time	26	2.6 (± 1.2) ^b		
Self-help/ability					

Table 53 (continued)

Medication usage change without health care provider's approval	No / only time	26	3.8 (±0.9) ^b	0.76	0.448
	Yes other than time	26	3.6 (±0.7) ^b		
Diabetic complications composite score					
Medication usage change without health care provider's approval	No / only time	26	1.5 (±0.7)	- 2.74	0.009*
	Yes other than time	26	2.8 (±2.2)		
Satisfaction with care					
Medication usage change without health care provider's approval	No / only time	26	3.8 (±0.6) ^b	2.30	0.027*
	Yes other than time	25	3.3 (±0.9) ^b		

^a Significant at $p < 0.05$ ^b Scale 1 = strongly disagree, 2 = disagree, 3 = Unsure, 4 = Agree, 5 = strongly agree

Table 54: Chi-Square Results for Gender and Marital Status, Race, Level of Education, Level of Employment, Country of Birth, Insurance, Income Level, Social Support, and Perceived Diabetic Health Status

Independent variable	Medication usage change without health care provider's approval		Chi-square	p-value ^a
	No / only time	Yes, other than time		
Gender				
Male	17 (65.4%)	12 (46.2%)	1.95	0.163
Female	9 (34.6%)	14 (53.9%)		
Marital status				
Married	21 (80.8%)	19 (73.1%)	0.43	0.510
Not married	5 (19.2%)	7 (26.9%)		
Race				
White	14 (53.9%)	17 (65.4%)	0.72	0.397
Non-White	12 (46.2%)	9 (34.6%)		
Level of education				
≤ High school graduate	13 (50.0%)	18 (69.2%)	2.0	0.158
≥ Some college degree and above	13 (50.0%)	8 (30.7%)		
Level of Employment				
Full-time employed	8 (33.3%)	8 (30.7%)	0.04	0.846
Non-full-time employed	16 (66.7%)	18 (69.2%)		
Insurance				
Insured	16 (61.5%)	16 (64.0%)	0.03	0.856
Not Insured	10 (38.5%)	9 (36.0%)		
Income				

Table 54 (continued)

≥ \$30,000	7 (31.8%)	11 (47.8%)	1.20	0.273
< \$30,000	15 (68.2%)	12 (52.2%)		
Perceived diabetic health status				
Excellent, very good, or good	14 (53.9%)	15 (62.5%)	0.38	0.536
Fair or poor	12 (46.2%)	9 (37.5%)		

^a Significant at $p < 0.05$

Table 55: Fisher's Exact Test Results for Country of Birth and Social Support

Independent variable	Medication usage change without health care provider's approval		Fisher's Exact	<i>p</i> -value ^a
	No / only time	Yes, other than time		
County of birth				
In the United States	2 (7.7%)	5 (19.2%)	0.16	0.419
Not in the United States	24 (92.3%)	21 (80.7%)		
Social support				
Health care providers' support	23 (88.5%)	17 (70.8%)	0.09	0.164
Non-health care providers' support	3 (11.5%)	7 (29.2%)		

^a Significant at $p < 0.05$

4.4.3.2 Multivariate logistic regression analysis

Multivariate logistic regression analysis was used to address the study's third objective, which was to examine whether the predisposing, enabling, and need factors, and

satisfaction with pharmacy services have an impact on Muslim diabetics' medication usage changes during Ramadan. After conducting a bivariate (unadjusted) analysis, only the variables that were statistically significant were included in a multivariate logistic regression analysis. Table 56 provided the 20 hypothesis that explore the relationship between each independent variable and the dependent variable and whether this relationship was found statically significant or not in the previous 20 bivariate analyses. Table 57 provided five hypothesis that explore the relationship between the five constructs of health care barriers and the dependent variable, and whether this relationship was significant in the previous five bivariate analyses.

Table 56: The Twenty Hypothesis Relationship between The Study Independent and Dependent Variable, and Whether This Relationship was Found Statically Significant in The Appropriate Bivariate Analysis

Hypothesis	Bivariate Analysis Result
There is no significant relationship between age and medication usage changes during Ramadan while controlling for covariates	Not statistically significant
There is no significant relationship between gender and medication usage changes during Ramadan while controlling for covariates	Not statistically significant
There is no significant relationship between marital status and medication usage changes during Ramadan while controlling for covariates	Not statistically significant
There is no significant relationship between health beliefs and medication usage changes during Ramadan while controlling for covariates.	Not statistically significant
There is no significant relationship between race and medication usage changes during Ramadan while controlling for covariates	Not statistically significant
There is no significant relationship between level of education and medication usage changes during Ramadan while controlling for covariates.	Not statistically significant
There is no significant relationship between level of employment and medication usage changes during Ramadan while controlling for covariates.	Not statistically significant
There is no significant relationship between family size and medication usage changes during Ramadan when controlling for covariates.	Not statistically significant
There is no significant relationship between country of birth and medication usage changes during Ramadan while controlling for covariates.	Not statistically significant
There is no significant relationship between acculturation level and medication usage changes during Ramadan when controlling for covariates.	Not statistically significant

Table 56 (continued)

There is no significant relationship between perceived Islamophobia and medication usage changes during Ramadan when controlling for covariates.	Not statistically significant
There is no significant relationship between regular source of care and medication usage changes during Ramadan when controlling for covariates.	Not statistically significant
There is no significant relationship between insurance and medication usage changes during Ramadan when controlling for covariates.	Not statistically significant
There is no significant relationship between income and medication usage changes during Ramadan when controlling for covariates.	Not statistically significant
There is no significant relationship between social support and medication usage changes during Ramadan when controlling for covariates.	Not statistically significant
There is no significant relationship between health care barriers and medication usage changes during Ramadan when controlling for covariates.	Statistically significant
There is no significant relationship between self-help/ability to negotiate the system and medication usage changes during Ramadan when controlling for covariates.	Not statistically significant
There is no significant relationship between participants' perceived diabetic health status and medication usage changes during Ramadan when controlling for covariates.	Not statistically significant
There is no significant relationship between composite diabetes complications score and medication usage changes during Ramadan when controlling for covariates.	Statistically significant
There is no significant relationship between satisfaction with care (i.e., satisfaction with pharmacists' services) and medication usage changes during Ramadan when controlling for covariates.	Statistically significant

Table 57: The Five Hypothesis Relationship between The five constructs of Health Care Barriers and The Dependent Variable, and Whether This Relationship was Found Statically Significant in The Appropriate Bivariate Analysis

Hypothesis	Bivariate Analysis Result
There is no significant relationship between health care cost barriers and medication usage changes during Ramadan when controlling for covariates.	Statistically significant
There is no significant relationship between language barriers and medication usage changes during Ramadan when controlling for covariates.	Not statistically significant
There is no significant relationship between trust barriers and medication usage changes during Ramadan when controlling for covariates.	Not statistically significant
There is no significant relationship between health care providers' characteristics barriers and medication usage changes during Ramadan when controlling for covariates.	Statistically significant
There is no significant relationship between discrimination barriers and medication usage changes during Ramadan when controlling for covariates.	Statistically significant

Three variables were found to have a statistically significant relationship with medication usage changes without a health care provider's approval during Ramadan (see Table 56). These variables were health care barriers, diabetic complications, and satisfaction with care. Health care barriers included five constructs: cost, language, trust, health care providers' characteristics, and perceived discrimination. During the analysis, it appeared meaningful to examine the relationship of these five constructs with participants' medication usage changes without a health care provider's approval. Only barriers related to health care cost, health care providers' characteristics, and perceived discrimination

were found to have a statistically significant relationship with medication usage changes during Ramadan without a health care provider's approval (see Table 57). Therefore, two multivariate logistic regression models were utilized. The first one measured the impact of health care barriers (total score), diabetic complications, and satisfaction with care on participants' medication usage changes during Ramadan without a health care provider's approval. The next model measured the impact of health care cost barriers, health care providers' characteristics barriers, perceived discrimination barriers, diabetic complications, and satisfaction with care on participants' medications usage changes without a health care provider's approval during Ramadan.

4.4.3.2.1 Multivariate logistic regression model (first model)

The first multivariate logistic regression model included all three variables that had a statistically significant relationship with medication usage changes without a health care provider's approval during Ramadan. The test null hypothesis was that there was no relationship between health care barriers, diabetic complications, and satisfaction with care and medication usage changes during Ramadan without a health care provider's approval. The results showed that the overall null hypothesis was rejected and that there was a statistically significant relationship between the above variables ($\chi^2(3, 51) = 20.57, p < 0.001$). In addition, the results showed that only the health care barriers had a statistically significant relationship with medication usage changes during Ramadan without a health care provider's approval (Wald chi-square = 5.71, $p = 0.017$). As the score for health barriers increased by one unit, the odds of changing medication usage without a health care

provider's approval increased by 7.20 (OR = 7.20, 95% CI = 1.43 – 36.35, $p = 0.017$) (see Table 58).

4.4.3.2.2 *Multivariate logistic regression model (second model)*

The second model examined the relationship between the significant constructs of health barriers *expanded*, diabetic complications, and satisfaction with care and medication usage changes during Ramadan without a health care provider's approval. The test null hypothesis was that there was no relationship between health care cost barriers, health care providers' characteristics barriers, perceived discrimination, diabetic complications, and satisfaction with care and medication usage changes during Ramadan without a health care provider's approval. The test rejected the null hypothesis and showed that there was a statistically significant relationship between the variables ($\chi^2 (5, 51) = 22.46, p < 0.001$). The results showed that only the health care cost barriers had a statistically significant relationship with medication usage changes during Ramadan without a health care provider's approval (Wald chi-square = 4.37, $p = 0.037$). As the health care cost barriers increased by one unit, the odds of changing medication usage without a health care provider's approval increased by 2.23 (OR=2.23, 95% CI = 1.05 – 4.72, $p = 0.037$) (see Table 59).

Table 58: Multivariate Logistic Regression for Health Care Barriers, Diabetic Complications and Satisfaction with Care on Medication Usage Changes without Health Care Providers' Approval during Ramadan (First Model) (N= 51)^a

Independent variables	Coefficient β	Standard Error	Wald Chi Square	P-Value ^b	Odds Ratio	95% Confidence Interval
Health care barriers	1.97	0.83	5.71	0.017*	7.20	1.43 – 36.35
Diabetic complications	0.40	0.33	1.47	0.226	1.49	0.78 – 2.85
Satisfaction with care	– 0.77	0.60	1.65	0.200	0.46	0.14 – 1.50

Model $\chi^2 = 20.57$, $df = 3$, $p < 0.001$

^a Total dose not equal 76 because of missing responses or patients were not fasting or using only insulin pump

^b Significant at $p < 0.05$

Table 59: Multivariate Logistic Regression for Health Care Cost Barriers, Health Care Providers' Characteristics Barriers, Discrimination, Diabetic Complications and Satisfaction with Care on Medication Usage Changes without Health Care Providers' Approval during Ramadan (Second Model) (N= 51)^a

Independent variables	Coefficient β	Standard Error	Wald Chi Square	P-Value ^b	Odds Ratio	95% Confidence Interval
Health care cost barriers	0.80	0.38	4.37	0.037*	2.23	1.05 – 4.72
Health care providers' characteristics barriers	0.00	0.50	0.00	0.998	1.00	0.38 – 2.67
Discrimination	0.66	0.50	1.73	0.189	1.92	0.73 – 5.06
Diabetic complications	0.43	0.34	1.60	0.206	1.54	0.79 – 3.02
Satisfaction with care	– 0.95	0.64	2.20	0.138	0.39	0.11 – 1.36

Model $\chi^2 = 22.46$, $df = 5$, $p < 0.001$

^a Total dose not equal 76 because of missing responses or patients were not fasting or using only insulin pump

^b Significant at $p < 0.05$

4.4.4 Objective Four

The last objective was to describe Muslims' perceptions of pharmacists' engagement services regarding Muslim patients during Ramadan. Descriptive statistical analysis was used to address this objective and the results have been reported above in Chapter 4 section 4.3.2.

CHAPTER FIVE: DISCUSSION AND CONCLUSION

This chapter summarizes the study findings and compares them to those of related studies. The chapter begins with an overview of the research questions, followed by the objectives, limitations, conclusion, and lastly, suggestions for future research.

5.1 OVERVIEW OF THE RESEARCH QUESTIONS

5.1.1 Background

The Muslim population in the U.S. is the fastest growing minority group. In 2010, at 2.6 million, Muslims represented 0.8% of the U.S. population, and in 2030 they are estimated to account for 1.7% (or 6.2 million) of the U.S. population. Knowing the health care practices of this minority population and what factors affect their health are important to better serving this population and to help promote better healthcare management practices.

In Islam, Muslims who are post-pubescent and sane are required to fast from sunrise to sunset during the month of Ramadan. Muslims are required to abstain from eating, drinking, and using oral medications during their fasting. Although Islam exempts Muslims with health issues from fasting, the majority of Muslims with health issues choose to fast. Diabetic patients are one of the groups who are exempt from fasting. However, 42.8% of type 1 diabetics and 78.7% of type 2 diabetics fast during Ramadan (Salti et al., 2004). Some Muslims consult their health care providers before they fast (Pinelli & Jaber, 2011), while others do not, as they may believe that fasting is a private matter that should not be

discussed with health care providers (Mygind et al., 2013). Diabetic patients who fast during Ramadan have modified their medications with or without their health care providers' approval (Aslam & Assad, 1986).

Modifying medications without a health care provider's approval could lead to serious health care problems. Incidence of hypoglycemia in diabetic patients who fast are 1.6 times that of patients who do not fast (Loke, Rahim, Kanesvaran, & Wong, 2010). In some cases, these episodes can be severe and lead to hospitalizations (Salti et al., 2004). For this reason, knowing what factors affect the changes that Muslim diabetic patients make in their medication usage during Ramadan without a health care provider's approval is very important.

5.1.2 The present study

The present study aims to understand the factors that lead Muslim diabetic patients to modify their medication usage during Ramadan without their health care provider's approval. Knowing these factors can help health care providers target patients with these identified factors for more health care counseling. The Andersen's behavioral model of health services utilization served as the framework for this study. A comprehensive survey was created on the basis of this framework. The survey was used to identify whether participants' predisposing, enabling, and need factors, and their satisfaction with care affected changes in their diabetes medication usage during Ramadan without a health care provider's approval.

Another objective of the study was to describe Muslim diabetic patients' sociodemographics, health beliefs, social structure, personal and family resources, perceived diabetic health status, evaluated diabetic health, diabetic medication usage, diabetes management behaviors, and satisfaction with pharmacy services. It is hoped that the knowledge gained in these areas would provide health care providers with information about American Muslims' health care utilization. The last objective of the study was to identify the perceptions of American Muslim diabetics regarding pharmacists' prospective services during Ramadan. Knowing patients' perspectives will help pharmacists better understand Muslims' preferred services and will also help pharmacy colleges train students for service provision.

5.2 STUDY RESEARCH OBJECTIVES

Four objectives were included in this study. The results of these objectives will be highlighted and then compared with the related literature.

5.2.1 A description of participants' predisposing, enabling, and need factors, and their satisfaction with care

This represents the study's first objective. Participants' predisposing factors included their demographics, health beliefs, social structure, and perceived victimization. Participants' enabling factors represent their personal and family resources and included having a regular source of care, health insurance, income, social support, perceived barriers, personal self-help skills, and ability to negotiate the health care system. Participants' need factors represent participants' perceived diabetic health status and their

evaluated diabetic health status (diabetic complications). Participants' satisfaction refers to their satisfaction with pharmacists' services. The following section will highlight the results and compare each factor with the literature.

5.2.1.1 Participant demographic

The average age of participants in the study was 56 (± 13.8), and the majority were male (54.7%) and married (80%). The average age of participants was expected since diabetes is very common in middle-aged and elderly people and very common in elderly Muslim populations. The percentage of males in the present study was similar to Pew Research Center findings, which showed that in 2011, 55% of the Muslim population in the U.S. were male. Having a high percentage of married participants was also expected in this population. First, Allah asked Muslims to get married as soon as they find the right person and granted them bounties from His Grace and Mercy for doing so (Quran 24.32–33). Second, it is common to find that with increased age, individuals are more likely to be married.

5.2.1.2 Health Beliefs

Participants' health beliefs related to Ramadan assessed whether participants were more inclined to focus on health management or to fast during Ramadan. The results showed that participants' health beliefs in general were above neutral, which means that they cared more about fasting than about managing their diabetes.

The three scale constructs were found to be similar to those in the literature. In the first construct, participants were not sure (2.9 ± 0.7) whether they were exempt from fasting

or not due to their diabetes. Participants' diabetic condition varied—some had severe diabetic complications and needed to take medication during the fasting period, whereas some had their diabetes well controlled and were not required to use their diabetic medication during their fasting period (i.e., during the day). This difference may have influenced the results. In Denmark, a quantitative study found that diabetic patients knew that diabetics were exempt, but they chose to fast anyway (Mygind et al., 2013). In the present study, the majority of participants agreed or strongly agreed that diabetic patients should try to fast first before considering themselves exempt and to only stop fasting when they experience side effects. This was similar to the findings in another study that focused on diabetic Muslims in Australia and Denmark (Mygind et al., 2013; Peterson et al., 2012).

In the second domain, participants agreed or strongly agreed (3.9 ± 0.9) that Allah, followed by their own self-ability, would help them manage their diabetes while fasting. Relying on Allah is expected from all Muslims and would be more expected from people who adhere to their Islamic practice (e.g., attending mosque, as were this study's population). Muslims in general believe that diseases are Allah's decisions, and that they have to say "*al-hamdu-lilllah*" (praise to Allah) for whatever happens to them. Although Allah has not asked Muslims to fast if they have a disease, Muslims might believe that this disease is under Allah's control and they should not be concerned about it (Inhorn & Serour, 2011). One participant in a qualitative study commented: "You know what you can do and what you cannot do, and you do the best that you can do" (Peterson et al., 2012). This showed that Muslim diabetics believe in their self-ability to manage their diabetes while fasting. Another participant said, "To break the fast means that I am not strong

enough... I am not firm enough.... Maybe the others are stronger than me.... Maybe I am the weakest in the group of believers because I have to do it day by day.” This shows that Muslims’ fasting during Ramadan has been impacted by their religious aspect and self-power.

The third domain measured participants’ beliefs related to the benefits of fasting. Participants were neutral to agreeable (3.6 ± 1.1) that fasting is a healthy practice for diabetics and a way to enjoy Ramadan. Almost two-thirds of the participants (65.2%) agreed or strongly agreed that they needed to fast to enjoy Ramadan. Fasting during Ramadan was a life practice for Muslims before being diagnosed with diabetes and it was viewed as contributing to increased wellbeing during Ramadan (Mygind et al., 2013; Peterson et al., 2012). Moreover, 61.6% of participants agreed or strongly agreed that fasting is a healthy practice for diabetics. Eating healthy food before and after fasting during Ramadan was one reason that diabetics think fasting is a healthy practice (Mygind et al., 2013). In addition, another study reported a decrease in hemoglobin A1C for diabetics who fasted during Ramadan (Mafauzy et al., 1990; Sulimani et al., 1991). In contrast, however, another study found that diabetics’ hemoglobin A1C levels increased during Ramadan and returned to normal levels after Ramadan (Uysal et al., 1998). Diabetics’ diet during Ramadan could explain the different findings of these two studies. Diabetics who fast and adhere to a healthy diet would be likely to have low hemoglobin A1C levels, while those who eat sweet foods (e.g., dates) after breaking the fast may be more likely to have high hemoglobin A1C levels. Three-quarters of participants agreed or strongly agreed that they acclimated to fasting after the first week. Participants in a

previous study stated that they had difficulties during the first week of fasting due to being dehydrated and then having headaches (Mygind et al., 2013). Because of the limited evidence, it is inconclusive regarding whether Muslims view fasting as a healthy practice. However, in the present study, over 60% agreed that fasting is a healthy practice.

5.2.1.3 Social Structure

Participant social structure included race/ethnicity, education, employment, family size, and religion. Half of the participants were White (50.7%), which could be the result of how some Middle Easterners identify themselves. According to the U.S. Census, people from Middle East are identified as White, whereas most Americans might not view them as White (Tehrani, 2007). However, not all Middle Easterners identify as White; they might identify themselves as “other.” In 2011, Pew Research estimated that 30% of Muslims in the U.S. were White and 19% were other/mixed race. Because of the variability in how Muslims self-identify, it is unclear if the present study had a higher proportion of Whites compared to national estimates (50.7% vs. 30%, respectively).

Study participants’ level of education was only slightly different than the level of education of U.S. Muslims overall. The results of the present study showed that 30.7% had a high school diploma, whereas in 2011, 40% of Muslims in the U.S. had a high school diploma (Pew Research Center, 2011). However, the Pew Research Center found that the highest level of education of 34% of Muslims in the U.S. who were born outside the U.S. was a high school degree (Pew Research Center, 2011). This would be similar to our result since the majority of our sample was born outside the U.S. (81.3%). Over one-half of the

study participants (58.6%) had a some college and higher, while Pew Research found that only 51% of Muslims in the U.S., who were immigrants, had some college and higher (Pew Research Center, 2011). Thus, the educational level of the present study sample and national estimates were similar.

Regarding their level of employment, 38.4% of participants were employed either part- or full-time. The population of the present study was associated with chronic illness, which tends to be more common among middle-aged and elderly people, so the study's employment findings were slightly different from those of Muslims in the U.S. in general, of whom 59% were estimated to be employed either part- or full-time (Pew Research Center, 2016). Having a full-time job may enable participants to have financial resources and health care insurance to cover their health care utilization expenses.

The participants' average family size was 3.6 (± 2.1), which is higher than the U.S. family size of 3.1 (Census, 2016). This could be explained as American Muslim women have a higher birth rate than do non-Muslim women (Pew Research Center, 2016). Muslim women in the U.S. reported having had an average of 2.9 children each, compared to 2.2 children among all U.S. women. Therefore, Muslims have more family members than non-Muslim in the U.S. (Pew Research Center, 2017). In the present study, the average of family size represented the number of adults and children living with participants in the same house. Therefore, family members who lived outside of the home were not included. As a result, the average of participant's family size might be more than 3.6 (± 2.1), which will make the difference compared to the U.S. family size much larger. In summary,

participant's family size was found to be larger than the average family size of the U.S. populations, which may be due to Muslim women's higher fertility rate.

Regarding religion, participants' average religiosity scale was moderately high (4.6 $\pm$ 0.8; scale range: 1 (low) to 6 (high)). This was expected since the data was collected from mosques. Thus, participants are likely to be more religious than Muslims who do not go to the mosque. Pew Research showed that 29% of Muslim respondents showed a high level of religious commitment in response to a question about mosque attendance, daily prayer, and the importance of their religion in their lives. Comparing U.S. Muslims to U.S. Christians, Pew found that 69% of Muslims indicated that religion was very important aspect of their lives, as did 70% of Christians (Pew Research Center, 2011). Note that the scale reliability for this construct was low and thus it was not included in the multivariate analyses. However, individual item comparisons follow. Among the five measures of religious activities in the present study, praying the prescribed daily prayers had the highest average score. This was not surprising, since Muslims are required to pray five times a day, and the majority of participants in the study were surveyed while they were at a mosque praying one of the five prayers. The least performed religious activity was practicing fasting. However, there are two reasons that could explain the low score. First, this item measures a combination of required fasting, such as Ramadan, and optional fasting, such as fasting every week. Therefore, the average of 3.1 ($\pm$ 1.2) may indicate that participants fasted during the whole month of Ramadan, which is the required fasting period. Another reason could be that since 13 participants did not fast at all during the last Ramadan, which could be due to their diabetes, they might select "never" in answer to the question about

practicing fasting. In summary, participants' religiosity level was found to be moderately high, which could be expected for people who attend religious places (e.g., mosques). Collecting data from participants in different settings such as clinics may show different religiosity levels.

Regarding country of birth, the majority of the participants ($n = 61$, 81.3%) were born outside the U.S., which means that they were immigrants, compared to a national study, which showed that 63% of Muslims in the U.S. in 2011 were immigrants (Pew Research Center, 2011). Of participants who were born outside the U.S., 44 (72.1%) were born in Arab and Middle Eastern countries. This percentage was higher than those found in a national study (72.1% vs. 26%) (Pew Research Center, 2011). One reason for this could be that Middle Easterners and Arabs represented the majority of the mosque members in San Antonio. Although 81.3% participants were born outside the U.S., the average number of years that participants had been in the U.S. was 23.8 (± 19.3), which may indicate that the majority of participants had American citizenship. In summary, the majority of participant's country of birth was primarily from the Middle East and North Africa, which was probably directly related to the characteristics of Muslims in the study sites.

The last factor was acculturation, and participants seemed to have a low level of acculturation (2.2 ± 0.6). The scale had two constructs, one measuring participants' Islamic identity, and the other measuring participants' adherence to American norms. Participants agreed that they adhered to their Islamic identity, which means that they had a low score on their acculturation level. As mentioned before, Pew Research found that 69% of

Muslims in the U.S. believed that Islam was very important for their lives, compared to 70% of Christians in the U.S. Religious adherence, therefore, might not be an indicator of less acculturation. In fact, the original study from which the scale was adapted assumed that adhering to Islamic identity would be negatively correlated with adhering to American norms. However, researchers found no significant correlation between the two constructs (Bagasra, 2011). In adhering to American norms, the study found that participants were less agreeable on this construct. In this construct, the average agreement level about participating in the American political system was 3.3 (± 1.6). This item should theoretically only apply to participants with American citizenship; however, it is possible that non-citizen study participants answered this question, or they may have selected “not at all true of me” or select “moderately true of me.” The item was removed from the scale prior to conducting multivariate analysis for the following reasons: 1) this item did not apply to all participants; 2) appropriate filter questions were not included in the survey; and 3) removal of the item increased the scale reliability. In summary, participants showed a high agreement level regarding their Islamic identity construct and moderate agreement level regarding American norms construct. Participants might agree with different American norms that do not contradict their Islamic identities. In addition, being in San Antonio, which might be considered a high enclave community, could contribute to participants’ low acculturation level.

5.2.1.4 Perceived Victimization

5.2.1.4.1 Perceived Islamophobia

Perceived Islamophobia was the last variable representing predisposing variables. The results showed that the participants were generally unsure about the presence of Islamophobia in the U.S. However, although participants were unsure of the presence of fear of Islam among non-Muslims Americans (2.9 ± 0.8), they were more agreeable about the presence of Islamophobic content in the U.S. media (3.6 ± 1.1). After the crisis of September 11, 2001 (9/11), hostility rose in the U.S. against Muslims and Islam (Howell & Shryock, 2003; Shah et al., 2008). A study found that there were five times more hate crimes against Muslims in the U.S. after 9/11 than there were before 9/11. Although the study showed that the crime rate in the U.S. generally dropped in 2014, the hate crimes against Muslims increased by 14% (Federal Bureau of Investigation, 2015). Compared to participants' uncertainty about the presence of fear of Islam in the U.S., they mostly agreed about the presence of Islamophobia in the U.S. media. The reason for this difference could be that participants have a low level of interaction with non-Muslim Americans, so they do not notice the presence of the fear of Islam, but in watching and listening to various media sources, they may observe the presence of Islamophobia.

5.2.1.5 Participants' personal and family resources

Participants' personal and family resources included having a regular source of care, health insurance, a higher level of income, social support, a lower level of perceived barriers, personal self-help skills, and the ability to negotiate the health care system.

Having a regular source of care would enable participants to have better access to continuous health care services. The results showed that the majority of participants tended to go to a doctor's office to receive health care. Going to a doctor's office (e.g., a primary care physician) instead of an emergency room or hospital would help participants to receive health care from a physician who will likely have better knowledge of their health condition and history. In addition, the study showed that more than three-quarters of participants had a primary care physician and a community pharmacy. However, less than half of the participants had a regular pharmacist in whom they could visit with if they had questions. Similar to the percent of study participants who have a primary care physician, in 2015, 72% of men and 83% of women in the U.S have a personal physician (Kaiser Family Foundation 2015). Pharmacists in community pharmacies may have varying work schedules, so it may be more challenging to see the same pharmacist on a consistent basis. Going to the same community pharmacy may provide pharmacists with more complete medication profiles, which can lead to more effective medication and disease state management. In summary, the present study participants had regular sources of care, which would increase their access to health care services during Ramadan.

Health insurance enables participants to access health care at no or low cost. The results of the present study showed that more than one-third of the participants (37.3%) had no health insurance. In 2011, 29% of Muslims in the U.S. were either unemployed or part-time employed, which increases their likelihood of being uninsured (Pew Research Center, 2011). Based on this assumption, 29% of Muslims in the U.S. in 2011 could be uninsured, which is lower than the proportion (37.3%) in the present study. This could be

because participants in the present study included a high percentage of immigrants, who are not eligible for Medicare or Medicaid. In summary, since around more than one-third of participants had no insurance, they may be more likely to have difficulties in managing their health, including during Ramadan.

More than one-third of the participants in the present study had incomes of less than \$20,000, which is close to the 2017 poverty line for one person (the U.S. Department of Health and Human Services, 2017). Importantly, 63.1% of the present study participants had incomes of less than \$30,000. While in 2011, Pew researchers found that 45% of Muslims in the U.S. had incomes of less than \$30,000, compared to 35% of the general U.S. population. Thus, the present study's population seemed to have lower income levels compared to national estimates of Muslims and general U.S. population, which may negatively impact health care utilization and contribute to increased health care cost barriers.

Social support measured who participants consulted regarding whether to fast and how to modify their medication use. In general, participants followed the advice of their health care providers (e.g., physicians, pharmacists, or nurses) more than the advice of non-health care providers (e.g., family, friends, or imams) (81.4% vs. 42.9%). Even on the question of whether to fast or not, more participants followed the advice of their health care providers (61.4%) over non-health care providers (51.4%). This is similar to a study which found that 67% of U.S. Muslim diabetic patients received counseling from their health care providers in regard to whether or not to fast (Pinelli & Jaber, 2011) and to a study in France, which found that 64% of diabetic Muslim patients stated that they consulted with their

health care provider regarding fasting (Bénédicte Gaborit et al., 2011). These findings are counter to one qualitative study in Denmark, where two diabetic women study participants mentioned that they asked their relatives who had diabetes whether or not to fast during Ramadan. They indicated that health care providers did not know anything about fasting, so they did not ask them (Mygind et al., 2013). In *managing their diabetes while fasting*, approximately three-quarters of the participants in the present study (75.4%) depended on their health care providers for help, while one-third (33.3%) depended on non-health care providers. Health care providers should have the ability to manage patients' medication during Ramadan. Unfortunately, a study found that 46% of Muslim diabetics who fasted during Ramadan did not receive any education on medication usage during fasting (Pinelli & Jaber, 2011). While study participants relied on healthcare providers over non-health care providers for both fasting and managing diabetes advice, it is interesting to note that health care provider advice reliance was only 10 percentage points (61.4% vs. 51.4%, respectively) higher regarding whether or not to fast vs. 42.1 percentage points (75.4% vs. 33.3%, respectively) higher regarding managing diabetes. Thus, study participants relied only slightly more on their health care providers for more religious-related advice (i.e., whether or not to fast) and significantly more on health care providers for health-related advice. Muslims patients should be encouraged to consult their health care providers and then their religious authorities regarding whether or not to fast. However, they should be strongly encouraged to consult their health care providers regarding medication management during Ramadan.

In the present study, barriers to health care were the only significant factors influencing participants' medication usage changes during Ramadan. Barriers to health care were divided into barriers related to cost, language, trust, health care providers' characteristics, and perceived discrimination. Regarding health care barriers related to cost, participants were unsure whether they had difficulties paying for their physician visits and medications (2.9 ± 1.1). The reasons could be that almost two-thirds of the participants (62.7%) had health care insurance, and of the participants without health care insurance ($n = 28$), 42.9% were enrolled in a financial assistance program that helped them gain access to health care services at a lower cost. These two reasons could lead participants to be unsure if they had barriers related to the cost of health care. Perceiving health care cost as a barrier could prevent Muslim patients from visiting their health care providers and refilling medications during Ramadan.

The second barrier was related to language. Participants either disagreed or were unsure whether (2.6 ± 1.0) they had barriers related to language. Because participants' average number of years in the U.S. was 23.8 (± 19.3), they may have had good English-speaking skills and little difficulty reading and writing in English.

The third barrier was health care provider trust. Being in the U.S., where Muslims are a minority, the likelihood of having a health care provider who is knowledgeable about Ramadan and the importance of fasting is very low. Thus, non-Muslim health care providers' recommendations related to Ramadan might be questionable and untrustworthy by Muslims. However, the results showed that more participants generally disagreed (2.2

± 0.7) that they lacked trust in their health care providers. They were however unsure (3.4 ± 1.0) that their physicians considered their religious needs in providing medical care. A previous study found that health care providers whose religion differed from that of their patients tended to provide suboptimal health care services (Simpson & Carter, 2008). Fortunately, this was not the perception of the participants in the present study. However, it is unknown whether or not the study participants' health care providers were Muslim. Both Muslim patients and their health care providers need to build a trusting relationship, which may help with identifying effective solutions for health-related issues during Ramadan.

Regarding the fourth barrier, health care provider characteristics, participants disagreed (2.3 ± 1.0) that this was a barrier for them. Participants disagreed that they had problems when their health care provider was not Muslim. Muslim patients may perceive that their health care provider's religion was not a barrier in general, but one study indicated that it was a barrier for patients who needed consultation regarding Ramadan (Mygind et al., 2013). Also, participants disagreed (2.3 ± 1.2) that having a health care provider of the same gender was a barrier. Previous researchers found that Muslim women preferred to be seen by female health care providers (Hammoud et al., 2005), and in some cases Muslim women refused to be examined by male physicians (Ilkilic, 2002; Yosef, 2008), which is likely due to modesty (McKennis, 1999). Muslims patients need to find a health care provider whom they feel comfortable with to discuss their health care problems especially during Ramadan.

Lastly, regarding discrimination, most participants disagreed (2.1 ± 1.0) that they experience discrimination because of being Muslim. One study showed that Muslim women who wore a hijab experienced discrimination from their health care providers (Shah et al., 2008). Another study showed that health care providers whose religion differed from their patients' tended to provide suboptimal health care services (Simpson & Carter, 2008). Muslim men, especially those who do not wear cultural dress, may not experience this type of discrimination. Based on the definition of Islamophobia, facing discrimination because of being Muslim is one form of Islamophobia (Ali et al., 2011). Since participants in our study were not sure about the presence of Islamophobia in the U.S. culture, they may be less likely to be discriminated because of being Muslims. In addition, since the majority of participants are immigrant, they might tend to receive their health care services from Muslim health care providers, which could make them less likely to perceive discrimination.

Regarding the overall barriers to health care scale, participants' mean perception level was $2.4 (\pm 0.5)$, which means they disagreed or were unsure about having barriers to health care. Although the majority of participants were immigrants (81.3%), had household incomes of less than \$30,000 (63.1%), and over one-third of them had no health insurance (37.3%), their perceptions regarding barriers to health care were relatively low. Perhaps participants had additional resources that enabled them to access health care services. For example, 42.9% of the uninsured participants ($n = 28$) received health care through Carelink, which is a program that subsidizes health care services so that participants can receive them at low cost. Also, 9.2% of participants reported that they received health care

from a free or community clinic, one of which may have been affiliated with the mosques where the study data was collected. Additionally, if services were received in the mosque, participants also had access to a health care provider who was Muslim or who spoke the same language. Thus, this may have also resulted in lower perceived barriers related to health care professional race/ethnicity or culture.

Self-help ability and ability to negotiate the health care system were the last enabling factors examined in this study. The average scale score for participants' was 3.7 (± 0.8), which means that most participants agreed that they were able to negotiate the health care system. More than two-thirds of the participants agreed or strongly agreed about their ability to negotiate health care system. As mentioned previously, use of Carelink (i.e., subsidies health care services) and having clinics housed in their mosques may have contributed to this finding.

5.2.1.6 Participants' Perceived Diabetic Health Status

How participants perceived their diabetic health might affect their health care utilization. In general, people who perceive their health as poor have been found to be more likely to use health care services (Dhingra et al., 2010) and medications (de Boer et al., 1997; Goldman et al., 2004; Wolinsky et al., 1995). Participants in the present survey were asked to report what they thought about their diabetes-related health, while other items were used designed to rate their overall health. Participants' average perceived diabetes health status was 2.5 (± 0.9), which translates to fair to good. Another study had slightly higher perceptions regarding diabetic, which was 2.9 (± 1.1) (1 = poor to 5 = excellent)

(Lange & Piette, 2005). In this study, patients were asked to rate their diabetic control, which could be different from the present study where participants asked to report on their diabetes health status. Ability to speak English may also have affected participants' perceived health. For example, Abdulrahim and Baker, 2009, found that Arab Americans who had limited English speaking skills perceived their health as poor compare to those who had good English language skills. In the present study, it was interesting that no participants perceived their diabetes to be excellent, while 12.2% perceived their diabetes to be poor. Compared to the general U.S. population, 55% and 16% perceived their overall health (i.e., not their diabetic health status) as excellent to very good and as fair to poor; consequently, (Dhingra et al., 2010), while in the present study, 16.2% and 51.4% of the participants perceived their diabetes health as very good and as fair to poor; consequently. In summary, the present study showed that participants' perceptions regarding their diabetes health status was lower than general diabetic U.S. population perception regarding diabetes condition and general U.S. population perception regarding general health.

5.2.1.7 Evaluated condition of participants' diabetes

Participants' evaluated diabetes condition was divided into their evaluated general health condition, which included number and type of diagnosed diseases and number of prescription medications utilized, and their evaluated diabetic conditions.

5.2.1.7.1 Evaluated general health conditions

Having diabetes increases the possibility of having other chronic diseases especially when diabetes is uncontrolled. The most frequently reported disease state in the

present study was hypertension (50%), followed by arthritis (30.7%) and dyslipidemia (26.7%). The prevalence of hypertension in diabetic patients was expected, as a study found that hypertension is 1.5–2.0 times higher in diabetics than in nondiabetic populations (Simonson, D. C., 1988). Dyslipidemia is also common among diabetic patients because insulin resistance and deficiency affect key enzymes and pathways in lipid metabolism, which leads to dyslipidemia (Taskinen, 2002). In terms of the number of medications used, the present study found that the majority of participants (63.2%) used between one and four medications, while, in other studies, only 46.9% used between one and four prescription medications. In the present study, participants were asked to report the number of prescription and nonprescription medications used (Grant, Devita, Singer, and Meigs, 2003). Therefore, a lower percentage than 63.2% might use prescription medications only.

5.2.1.7.2 Evaluated diabetes conditions

Evaluated diabetes conditions included diabetes type, diabetic management methods, medication schedule (oral/insulin), diabetes-related complications, number of hospital visits, number of emergency room visits, number of hypoglycemic incidents, number of severe hypoglycemic incidents, and number of hyperglycemic incidents.

Among participants in the present study, type 2 diabetes was the most common type of diabetes (74.3%) and 23.0% had type 1 diabetes. Compared to the present study, the overall U.S. diabetic population has a higher proportion (~95%) of type 2 diabetics and a lower proportion (5%) of type 1 diabetics (Centers for Disease Control and Prevention, 2014). Next, participants' average number of years since diabetes diagnosis was 11.8

(± 9.5). In terms of years since diagnosis, almost one-fourth of the participants comprised each of the following categories: 1–4 years, 5–9 years, 10–15 years, and 16–25 years; only 4.4% had been diagnosed with diabetes 26 years ago or more, which means that three-quarters of participants had diabetes between one and 15 years. Similarly, three-quarters of the general U.S. adult diabetic population had a duration of diabetes between 1 and 15 years (Centers for Disease Control and Prevention, 2014).

In the present study, regarding diabetes management, three-quarters of participants used oral medications, and 20% and 6.6% used insulin by injection and by insulin pump, respectively. Using insulin medications is acceptable during Ramadan, so over one-quarter of participants would be able to fast during Ramadan without modifying their medications. However, in the present study, out of nine participants, who used only insulin, 2 participants did not fast at all, 3 participants fasted the whole month, and the rest fasted some days during Ramadan. Half of the participants performed exercise and followed a healthy diet to manage their diabetes. This management is helpful for diabetic patients in controlling their disease. In regards to their medication schedule, 45.3% of participants used medication every morning and 34.7% used it every evening. Participants who were using only one type of oral diabetic medication once a day might not need to contact their health care provider to change their medication schedule. Among the participants, 5.3% were using oral medications three times a day. In this case, participants need to consult a health care provider before they decide to change their medication schedule in order to fast. With regards to using insulin medications, out of 15 participants who were using insulin, six used insulin every evening and four used it twice a day. Using insulin every day during

Ramadan is acceptable; however, some diabetic patients prefer not to use it since it will lower their blood glucose levels even more while they are fasting. Therefore, a study found that 50% of insulin users adjusted their insulin administration time (Pinelli & Jaber, 2011). Diabetic complications are the result of uncontrolled diabetes. In the present study, the most common complications were feet/leg problems (41.4%), followed by eye problems (34.3%) and nerve problems (21.4%), whereas close to one-third of the participants did not have any complications (32.9%). This percentage differed from the prevalence of diabetic complications in the U.S. diabetic population where 53.3% had limited mobility, which could be due to feet/leg problems, and 9.1% had eye problems (Centers for Disease Control and Prevention, 2014). In the present study, fewer participants had mobility problems but more participants had eye problems compared to the overall U.S. diabetic population. The present study showed that only 10.6% of participants reported that they had been hospitalized and 8.8% had been in the emergency room due to their diabetes in the last year. However, out of the U.S. general adult diabetic population, 2.9% had been hospitalized in 2010 with diabetes being the first listed diagnosis (Centers for Disease Control and Prevention, 2014), and 4.8% had visited the emergency room in 2009 with diabetes being the first listed diagnosis (Centers for Disease Control and Prevention, 2012). These results, when compared to the U.S. diabetic population seem to indicate that the study sample may have been more severe (i.e., more complications and higher emergency care and hospitalizations).

The final enabling variable in the present study was the number of low and high blood glucose level incidents during Ramadan. The present study showed that while more

than half of participants (58.8%) had no incidents of hypoglycemia or hyperglycemia, 41.4% did. More specifically, the following percentage had no incident of hypoglycemic (59.3%), severe hypoglycemic (86.9%), and severe hyperglycemic (65.5%). Hypoglycemic events were highly likely due to fasting and hyperglycemic events may have occurred after breaking the fast and eating sweet food (e.g., dates) during *Iftar* (i.e., the meal when breaking the fast) (Aadil et al., 2004; Aslam & Assad, 1986). Also, if participants were not taking their medication while fasting, this could lead to hyperglycemia when breaking the fast.

When compared to the general U.S. diabetic population, a higher proportion of study participants had type 1 diabetes and more diabetes-related complications and a higher proportion were hospitalized or visited the emergency room due to their diabetes. Also, a larger proportion had hypo- and hyperglycemic events during the last Ramadan. Therefore, the study population may have benefited from consulting with their health care providers regarding fasting from medication during Ramadan.

5.2.1.8 Satisfaction with care

Participants' satisfaction with care represented participants' satisfaction with pharmacists' services in general. On average, participants were satisfied with their pharmacists' services. Participants who were satisfied with their pharmacist's services may be more willing to accept a pharmacist's recommendations (Hammoud et al., 2005). Almost 70% of participants disagreed or were unsure that pharmacists were knowledgeable about Muslim culture and religion. This is an opportunity for pharmacists to learn about

Muslim culture and religion, which may help Muslims, who chose to fast during Ramadan, better manage their medications. Regarding communication skills, more than two-thirds of the participants agreed that pharmacists' had good communication skills. Another study showed that minority populations had a higher level of satisfaction with pharmacists who spoke their language (Kim-Romo et al., 2014), but even though the present study examined a minority population, the results showed that they were satisfied with pharmacists' communication skills. Regarding pharmacists' accessibility skills, participants either agreed or were unsure about being satisfied with pharmacists' accessibility skills. Having less time with a health care provider can lead to patients being less satisfied, but in the present study, well over half of the participants (58.9%) disagreed or strongly disagreed that they felt rushed when they spoke to pharmacists, whereas only 20.5% agreed or strongly agreed. In general, patients seemed to be satisfied with the time that pharmacists spend when providing services.

Language barriers can affect patients' satisfaction with health care providers' time spent. For example, Spanish-speaking Hispanic patients were less satisfied with the amount of time they spent with health care providers than were English-speaking Hispanics (Okoro, Odedina, Reams & Smith, 2012). In regards to pharmacists' comprehensiveness skills, 82.5% of participants in the present study agreed or strongly agreed that pharmacists' adequately answered their questions. In contrast, among a Spanish-speaking Hispanic population, less than half of survey participants (43.2%) indicated that their health care provider's responses were very good to excellent (Morales, Cunningham, Brown, Liu, & Hays, 1999). In summary, participants were satisfied with pharmacists' overall services,

especially their communication skills; however, they were unsure if pharmacists were knowledgeable about their culture and religion.

5.2.2 Description of participants' diabetes medication usage changes and diabetes management behaviors

Participants' medication usage changes during Ramadan included changing diabetes oral medications or insulin injections without a health care provider's approval. Knowing whether participants changed their medications without their health care provider's approval in order to fast was one goal of this study, so the responses of participants who did not fast were excluded. Participants who used an insulin pump were required to modify their insulin dose based on their blood glucose level, so their responses were not included either. Before discussing the results in regards to medication usage changes during Ramadan, a discussion of whether participants fasted or not during Ramadan will be explained first.

The average number of days participants fasted during Ramadan was 21.3 (± 12.0); 13 participants (18.3%) did not fast at all, and the remaining 58 participants (81.7%) fasted during some or the entire month of Ramadan. In comparison, a study across 13 Muslim countries found that 42.8% of type 1 diabetics ($n = 1,070$) and 78.7% of type 2 diabetics ($n = 11,173$) fasted at least 15 days during Ramadan (Salti et al., 2004). Participants in the present study seemed to fast for more days than those in the studies performed in Islamic countries, since 77.6% of participants, both type 1 and type 2 diabetics, fasted at least 11 days of Ramadan. In two countries, Denmark and France, where Muslims are a minority,

participants' rate of fasting was different. In France, 51% of the diabetic patients in a study ($N = 101$) fasted during Ramadan (B  n  dicte Gaborit et al., 2011), and in Denmark, all the diabetic patients in a small study ($N = 6$) fasted during Ramadan (Mygind et al., 2013). The present study included participants who had moderately high religiosity levels, which might explain their higher level of fasting compared to other studies in the literature.

Medication usage changes included seven categories: changing medication time, changing medication frequency, changing medication dosage form, increasing medication dose, decreasing medication dose, stopping a medication, and combining multiple doses. The present study found that among participants who used oral diabetes medication, the most common medication usage changes during Ramadan were changing medication time (65.2%), followed by changing medication frequency (39.1%). These types of changes, however, were not mentioned in similar studies. For example, Salti et al. (2004) found that, during Ramadan, among type 1 and type 2 Muslim diabetics, 14.9% and 18.8% decreased the dose, 5.3% and 4.4% increased the dose, and 1.1% and 2.1% stopped using a medication, respectively. Moreover, Pinelli and Jaber (2011) found that 15.4% of Muslim diabetics who were oral medication users decreased their medication dose during Ramadan. Compared to the previous types of changes, the present study showed that among oral diabetes medication users, 19.6% decreased their dose, 6.5% increased their dose, and 13.0% stopped using medications. Participants in the present study had percentages very similar to those in the previous study regarding increasing and decreasing the dose, but there was a higher percentage of those in the present study who stopped using their oral medications.

Regarding insulin changes, in the present study, some of the changes were less common while some were more common than what other studies found. In changing insulin frequency and decreasing the dose, the present study found that 18.2% of participants changed their insulin frequency and no one decreased their insulin dose. These two changes occurred less frequently when compared to a study by Mafauzy et al. (1990), which found that 32% of Muslim diabetics changed their insulin frequency during Ramadan, and Salti et al. (2004), which found that 24.0% of type 1 and 24.7% of type 2 Muslim diabetics decreased their insulin dose during Ramadan. In increasing and stopping insulin dose, the present study showed that 18.2% of participant increased their insulin dose and 9.1% stopped using their insulin, which was higher than other studies. In the Salti et al. (2004) study, researchers showed that 10.7% of type 1 and 8.2% of type 2 Muslim diabetics increased the insulin dose, and 8% of type 1 and 3% of type 2 stopped using insulin medications during Ramadan.

The findings of these three studies differed somewhat from the findings of the present study, and comparisons may not be appropriate for the following reasons: 1) the three studies did not mention whether these medications changes were done with or without health care providers' approval; 2) the first and second study might not be comparable to the present study, since participants were recruited and monitored by their physicians, and thus their physicians might have approved these medication changes (Mafauzy et al., 1990; Salti et al., 2004); and 3) two of these studies were conducted in countries where Muslims are a majority (Mafauzy et al., 1990; Salti et al., 2004) and the third was conducted in the city with the largest Arab population in the U.S. (Pinelli & Jaber, 2011). Therefore,

physicians in these areas would be more aware of fasting and may be more likely to modify patients' medication usage to enable them to fast during Ramadan.

5.2.2.1 Diabetes Management Behavior

Participants' diabetes management behavior was identified before and during Ramadan to understand how participants, whether they fasted or not, modified their diabetes management behavior. Before Ramadan, more than half of the participants (55.3%) followed a meal plan specifically for diabetics, while during Ramadan, half of participants did not change their diet, 30% decreased and 20% increased how often they followed a meal plan. Diet is very important among diabetic patients to maintain and control their blood glucose level. Some countries have traditional foods that are mainly carbohydrates and are customarily served during Ramadan (Akbani et al., 2005; Aadil et al., 2004). This type of change in diet might elevate blood glucose levels and lead to hyperglycemia. A study showed that 59.3% of diabetic patients followed a prescribed meal plan before Ramadan, and during Ramadan, 11% decreased following prescribed meal plans and the rest were unchanged (Pinelli & Jaber, 2011). This indicates that participants in the present study were less adherent to a healthy meal plan before and during Ramadan compared to those in the Pinelli and Jaber (2011) study.

Regarding exercising for at least 30 minutes 3 days of the week, 42.2% of participants in the present study exercised often or always at least 30 minutes; during Ramadan, 49.2% of the participants decreased their exercise, the exercise level of 38.5% of participants remained unchanged, and 12.3% increased how much they exercised. This

indicates that nearly half of the participants exercised before Ramadan, but during Ramadan, about half of those participants decreased how often they exercised. During fasting, Muslims abstain from both eating and drinking, so the participants would have low energy, and be less likely to exercise (Leiper, Pitsiladis, & Maughan, 2001). A study conducted in the U.S. showed that 55.6% of respondents mentioned that they were physically active before Ramadan; during Ramadan 73% performed less physical activity while the for 27% it remained the same (Pinelli & Jaber, 2011). Physical activity was measured as engaging in a physical activity for at least 15 minutes on a regular basis, whereas in the present study, physical activity was measured as performing exercise for at least 30 minutes. Therefore, compared to the previous study, the participants in the present study seem to have performed more physical activity before and during Ramadan.

Regarding diabetics' self-care, which included checking blood glucose levels and using oral medications and insulin as prescribed, the percentage of adherence in the present study was high. Before Ramadan, more than two-thirds of participants (67.1%) reported that they often or always self-checked their blood glucose levels, whereas during Ramadan, more than half of the participants' checking of glucose levels remained unchanged, while 20% decreased and 27.9% increased how often they self-checked their blood glucose level. Participants in the present study seem to have adhered to self-monitoring their blood glucose levels less often than other studies. In one study, the authors found that 92.6% of diabetic participants monitored their blood glucose levels outside of Ramadan, whereas during Ramadan this remained unchanged for 68%, 12% decreased, 12% increased, and 8% stopped self-checking their blood glucose levels (Pinelli & Jaber, 2011).

With regards to using oral medication as prescribed, before Ramadan, almost all participants in the present study who used oral diabetes medication (94.5%) always or often used their oral medication as prescribed, whereas during Ramadan, 57.4% of participants' oral medication use was unchanged, while 24.1% increased and 18.5% decreased how often they used oral medication as prescribed. This indicates that participants usually adhered to their oral diabetic medication use, but during Ramadan their oral medications adherence changed. Similarly, another study found that before Ramadan, 96.3% of those participants used their oral medication as prescribed, but during Ramadan, the medication use of 53.4% remained unchanged, while 26.9% changed the time of administration, 15.3% decreased the dose and 3.8% increased the dose ([Pinelli & Jaber, 2011](#)). In regards to using insulin as prescribed, before Ramadan, all participants in the present study who used insulin ($n = 15$) always or often used their insulin medications as prescribed, whereas during Ramadan, two-thirds of the participants ($n = 10$; 66.6%) did not change their insulin use, while four (26.7%) increased and one (6.7%) decreased how often they used insulin. Similarly, Pinelli and Jaber (2011) found that all of their participants ($n = 4$) used insulin as prescribed before Ramadan, but during Ramadan, only one participant (25%) increased his/her insulin dose.

5.2.3 Factors affecting participants' medication usage changes during Ramadan without a health care provider's approval

Identifying what factors affect whether participants change their medications without their health care provider's approval was the main objective of this study. A multivariate logistic regression model was used to identify the impact of relevant factors

(among 20 variables) on whether participants changed their medication usage during Ramadan without their health care provider's approval. Changing medication usage without a health care provider's approval was divided into two categories: one was not changing medication usage at all or only changing the medication time without a health care provider's approval, and the other category was changing some aspect other than the medication time without a health care provider's approval. Changing the time of taking a diabetes medication by a few hours, such as from 8 a.m. to 4 a.m., without a health care provider's approval was not considered a significant change that would lead to health complications during fasting. Therefore, this type of change was in the same category as not changing medication usage at all. In the general diabetic population, a patient who takes a diabetic medication every morning and evening might wake up in the morning before sunrise instead of at 8 a.m. In this case, the patient would eat his or her breakfast and take the morning dose, which would not be counted as violating the provider's directions for medication use.

After conducting all 20 bivariate analyses, only three factors were found to have a statistically significant relationship with medication usage changes during Ramadan without health care provider approval. These factors were health care barriers, diabetic complications, and satisfaction with care. Regarding the health care barriers factor, participants who did not change or changed only the time of their medication during Ramadan had fewer health care barriers (2.2 ± 0.4) than participants who changed aspects other than only the time of their medication (2.7 ± 0.5). It would make sense that participants who faced barriers preventing them from visiting their health care providers to

get approval for medication usage changes would be unable for some reason to use health care services and thus would make such changes by themselves. Health care barriers are common among immigrants, who comprised a large portion of the sample for the present study.

Regarding diabetic complications, participants who did not change their medication usage or who changed only the time of their medication during Ramadan had fewer diabetic complications (1.5 ± 0.7) than participants who changed aspects other than the time of their medications without a health care provider's approval (2.8 ± 2.2). This differed from what was found in the literature, which showed that patients with more diabetic complications tended to adhere to their health care utilization more than patients who had fewer complications. Studies have shown that patients with more severe diseases are associated with greater utilization of health care services and medication (Daumit et al., 2003; Lassila et al., 1996; Mutran & Ferraro, 1988). However, greater health care utilization does not necessarily mean greater adherence to medication usage. The severity of disease has been found to be associated with prescription medication complexity (Friedman, M., 1995), which in turn has been found to be negatively correlated with medication adherence (de Vries et al., 2014). Therefore, patients who had more severe diabetes would likely have more complex medication regimes, which could lead them to change their medication usage more than patients whose diabetes was less severe. Another reason could be that patients whose diabetes was severe but who decided to fast anyway would be less likely to consult their physicians, as they may perceive that their provider would not approve of

their fasting. This would lead such diabetics to change their medication usage without their physician's approval.

Regarding satisfaction with care, which was identified as participants' satisfaction with pharmacists' services, participants who did not change or changed only the time of their medication during Ramadan had higher levels of satisfaction with pharmacists' services (3.8 ± 0.6) than did participants who changed aspects of their medication usage other than the timing of medications without a health care provider's approval (3.3 ± 0.9). These results indicate that participants who were less satisfied with pharmacists' services would be more likely to change their medication usage during Ramadan without their health care provider's approval. Pharmacists are one type of health care provider that participants should consult with before modifying medication usage. For example, a pharmacist might recommend one of the long-acting diabetic medications, after getting approval from the patient's physician, which would allow a patient to fast with a lower risk of complications. Therefore, participants who were less satisfied with pharmacists may be more likely to modify their medication usage during Ramadan without their consulting pharmacist. In general, patients who use a single pharmacy tend to be more satisfied, and because they would have all their medication records at one pharmacy (Xu, 2002), this would increase a pharmacist's ability to help with medication modification during Ramadan.

All of the three preceding factors were included in a multivariate logistic regression model to determine which factors had an impact on medication usage changes during Ramadan. In the model, health care barriers was the only predictor of participants'

medication usage changes during Ramadan without a health care provider's approval. The model showed that as the score for health care barriers increased by one unit, the odds of changing medication usage without a health care provider's approval increased by 7.20 times.

Finding that health care barriers had a statistically significant relationship with medication usage changes, raised the question of which barriers (i.e., barriers related cost, language, trust, health care provider's characteristics, and discrimination) had a significant relationship with medication usage changes. Therefore, a post-hoc analysis of the relationships between each health care barrier and changes in medication usage during Ramadan was conducted. The significant health care barrier variables were then included in another multivariate logistic regression with the other two significant variables: diabetic complications scores and satisfaction with pharmacist' services.

Only health care barriers related to cost, health care providers' characteristics, and discrimination were found to have statistically significant bivariate relationships with medication usage changes during Ramadan without a health care providers' approval. Regarding health care barriers related to cost, participants who did not change or changed only the time of their medication during Ramadan had perceived the barriers related to cost to be lower (2.5 ± 1.0) than did participants who changed aspects of their medication usage other than the timing without a health care provider's approval (3.3 ± 0.9). Health care barriers related to cost measured barriers related to the cost of physician visits and medications. Therefore, participants who faced barriers related to the cost of visiting their physicians would be more likely to change their medication usage without visiting their

physicians to receive their approval. Similarly, participants who perceived barriers related to medication cost would be more likely to change their medication (e.g., not buying their medications during Ramadan) without their health care provider's approval. Regarding health care providers' characteristics, participants who did not change or changed only the time of their medication usage during Ramadan had a lower perception of barriers related to health care providers' characteristics (2.0 ± 0.8) than did participants who changed aspects of their medication usage other than the timing without a health care provider's approval (2.5 ± 1.0). Health care providers' characteristics included religion, ethnicity, gender, and language. Perceiving non-Muslim health care providers as a barrier would be more likely to lead participants to change their medication usage without their health care providers' approval. Fasting during Ramadan is believed by some diabetic patients to be a private matter that should not be discussed with non-Muslim health care providers (Mygind et al., 2013). A study showed that 20% of physicians believed that they were not prepared to provide health care services for patients whose religion affected their treatment (Weissman et al., 2005). Therefore, participants who perceived health care providers' religion as a barrier might be more likely to change their medication usage without their approval. Also, Muslim women's modesty leads them to seek treatments from female doctors (McKennis, 1999). Therefore, Muslim women who had to see a male health care provider to manage their medication usage during Ramadan might be more likely to change their medication usage without that male health care provider's approval. Participants who have limited English ability may be more likely to consider their health care providers' limited ability to speak their language as a barrier. In general patients who speak the same

language as their health care provider tend to utilize health care services more than patients who do not speak their health care provider's language (A. W. Chen et al., 2008). Moreover, health care providers' ability to speak patients' language was an important factor in improving patient satisfaction (Kim-Romo et al., 2014). The increase in patients' satisfaction, again, would increase the likelihood of patients' consulting their health care providers before changing their medication usage.

Regarding perceived discrimination, participants who did not change or changed only the time of their medication during Ramadan had a lower perception of barriers related to discrimination (1.7 ± 0.8) than did participants who changed aspects other than the time of their medication without a health care provider's approval (2.6 ± 1.2). In general, participants who perceived that they had been discriminated against while receiving healthcare were more likely to be less satisfied with the health care services they received (Hausmann, Kressin, Hanusa, & Ibrahim, 2010), and thus would be less likely to adhere to the health care recommendations they received. For example, Latino immigrants showed lower health care utilization because they experienced discrimination (Graves et al., 2008; Nandi et al., 2008). Immigrants in general may face discrimination because of their race or because of being immigrants, but Muslim immigrants may also face discrimination for being Muslim, which could be a form of Islamophobia. Fear of being discriminated against might lead Muslims in the U.S. to hide their religion from their health care providers, to avoid getting suboptimal treatment. This could lead Muslim patients who have been discriminated against to hide their religion when receiving health care, which could also

lead them to change their medication usage during Ramadan without a health care provider's approval.

All the subcategories of health care barriers (i.e., barriers related to cost, to health care providers' characteristics, and to perceived discrimination) were added to the second multivariate logistic regression model with the diabetic complications and satisfaction variables. The results showed that only the health care cost barriers had a statistically significant relationship with medication usage changes during Ramadan without a health care provider's approval (Wald chi-square = 4.37, $p = 0.037$). As the health care cost increased by one unit, the odds of changing medication usage without a health care provider's approval increased 2.23 times. This result was surprising because participants' income did not have a statistically significant relationship with medication usage changes during Ramadan without a health care provider's approval. The study income variable was presented as dichotomous ($< \$30,000$ and $\geq \$30,000$) and this measurement level might affect how the variable related to the medication usage changes variable. Additionally, 11 participants did not report their income level, which might also affect the relationship with the medication usage changes variable.

In summary, participants' health care barriers, diabetic complications, and satisfaction with pharmacists' services had direct significant bivariate relationships with participants' medication usage changes during Ramadan without a health care provider's approval. However, when all these variables were incorporated into a model, only the health care barriers had a statistically significant impact on participants' medication usage changes during Ramadan without a health care provider's approval. The second model

specified participants' health care cost as the only statistically significant predictor of participants' medication usage changes during Ramadan without a health care provider's approval. Including more items to more accurately measure participants' health care cost barriers especially during Ramadan and participants' income level could lead to a better understanding of participants' changes in medication usage.

5.2.4 Participants' perceptions of pharmacists' proposed engagement services during Ramadan.

This objective was a secondary goal of the study. Pharmacists, like other health care providers, need to understand people's health needs and factors affecting their health. In Muslim populations, fasting during Ramadan may have an impact on Muslims' health care practices and their needs for specific health services. The present study measured participants' perspective on proposed services of pharmacists during Ramadan.

Overall, participants tended to agree that they would like a pharmacist to provide the proposed services during Ramadan. The first construct measured participants' view of having pharmacists encourage and support them in their fasting. Participants' average score was 3.8 (± 0.7), meaning they largely agreed. More than half of the participants agreed or strongly agreed (58.7%) that they would like pharmacists to support them in fasting before advising them not to fast. Fasting in Ramadan is the preference of Muslims with diabetes, so even though they are exempt, most diabetics still fast during Ramadan ([Salti et al., 2004](#)). Al-Arouj et al. (2010) classified diabetic patients' health risk from fasting into three categories: very high, high, moderate, and low. This classification would help health care

providers to identify diabetic patients' potential risks from fasting; therefore, providers can guide patients with appropriate advice. However, about three-quarters of the participants (72.0%) agreed or strongly agreed that they would like pharmacists to develop a specific plan with them to avoid any drug–drug interactions, and the overwhelming majority (92.0%) of participants would like pharmacists to provide them with information about what to do if they experienced any side effects from medications while fasting. These two proposed services were the most highly desired by participants and perhaps because they felt that these two proposed services were tied strongly to pharmacists' skills. In conclusion, participants would like pharmacists to encourage them to fast and to help them manage their health and medication usage while fasting.

Participants agreed (3.9 ± 0.8) that they wanted pharmacists to understand Islamic religious practices and culture. More than two-thirds of the participants (70.7%) wanted pharmacists to know about their culture. Knowing a patient's culture will help a health care provider better understand what factors related to the culture might affect their health. Knowing a patient's culture will also help a health care provider to build a relationship with the patient, which will positively affect the patient's health. A large majority of participants (84%) agreed or strongly agreed that they wanted their pharmacist to know about the importance of Ramadan and fasting. This result suggests that most Muslim diabetics want their pharmacists to know about their Islamic religious practices and culture, so that they will understand the importance of fasting and be able to provide more informed recommendations. In contrast, a qualitative study found that Muslim diabetics believed that fasting is private matter, and so their health care providers should not know about it

(Mygind et al., 2013). The views of the participants in the present study differed from those in that Danish study, as they would like pharmacists to know more about their religion practices.

Regarding creating a Muslim-friendly and welcoming environment in the pharmacy, participants were in less agreement on this construct compared to the other constructs. For example, less than half of the participants (41.7%) agreed or strongly agreed that they would like their pharmacist to greet them with “*As-salamu alaykum*,” whereas 90.6% agreed or strongly agreed that they would like their pharmacist to ask them if they had any concerns about using their medication. When answering the survey, participants might be focused only on how pharmacists could help them during Ramadan, and thus they may not have perceived value regarding the greeting they received when entering the pharmacy.

The last constructs measured the participants’ perspective on pharmacists’ services related to modifying their medications to facilitate fasting. On average, participants tended to agree that they would like pharmacists to modify their medication usage to facilitate their fasting. For all the construct items, more than half of the participants agreed or strongly agreed that they wanted pharmacists to provide this type of services. These results support the findings of another study, which showed 46% of diabetic patients who fasted during Ramadan received no education on medication usage during fasting (Pinelli & Jaber, 2011). The present results highlight the lack of these services and Muslim diabetics’ desire to receive them.

In conclusion, participants had a positive perception of the proposed services that pharmacists could offer them during Ramadan. They wanted pharmacists, who are culturally competent, to understand their religion and culture and provide them with support and medication management during Ramadan.

5.2.5 The Behavioral Model for Vulnerable Population Study Findings

The present study's target population, outcome variable, and variable relationships are similar to those that other studies have used. The present study focused on a Muslim population while other studies have focused on a homeless population (Currie, Patterson, Moniruzzaman, McCandless, & Somers, 2014; Doran et al., 2014; van den Berk-Clark & McGuire, 2014), patients with HIV (Boyd et al., 2015; Tsuyuki & Surratt, 2015), immigrants (Graves et al., 2008; Harcourt et al., 2014; Nandi et al., 2008), and minorities (H. M. Gonzalez et al., 2010; P. Gonzalez et al., 2012; Graves et al., 2008; Haynes-Maslow et al., 2014; London et al., 2015; Varga & Surratt, 2014; S. L. Williams, 2014). Our study population was similar to the other study populations in being minority, immigrants, and facing health care barriers limited their health care use. In addition, the study outcome variable (dependent variable) was changing medications usage during Ramadan without a health care provider's approval, while other studies focused on medication usage (H. M. Gonzalez et al., 2010), trust in health care providers (van den Berk-Clark & McGuire, 2014), access to regular care (Nandi et al., 2008), and use of mental health care services (S. L. Williams, 2014). The present study's dependent variable falls under the use of health care services, so it seems relatively similar to other studies' dependent variables. The present study's variable relationships were slightly similar to other studies' variable

relationship. The present study examined the impact of participants' predisposing, enabling, need, and satisfaction with care factors on their medication usage changes during Ramadan without a health care provider's approval, which falls under health behavior variables. In contrast, other studies examined the impact of only predisposing, enabling, and need factors on health behavior variables (Currie et al., 2014; Doran et al., 2014; Gelberg et al., 2000; (Currie et al., 2014; Doran et al., 2014; Gelberg et al., 2000; Weinreb et al., 2006; Varga & Surratt, 2014; P. Gonzalez et al., 2012). Thus, adding satisfaction with care, which falls under health care outcomes, as a predictor of health behavior is the only difference between the present study and other studies' variable relationships. The original model identified satisfaction with care as an outcome of health behavior and as a predictor of health behavior. Therefore, adding satisfaction with care as a predictor in the present study model was appropriate.

Health care barriers was the only predictor of medication usage changes during Ramadan without a health care provider's approval. The present study's health care barriers divided into barriers related to cost, language, trust, health care provider's characteristics, and discrimination. Health care barriers related to cost were found to be statistically predictive of participants' medication usage changes during Ramadan without a health care provider's approval. Similarly, the rate of antidepressant use among Asian immigrants was statistically significantly related to having financial distress, which is a type of health care barrier (H. M. Gonzalez et al., 2010). Among Latino immigrants, a study found that perceived discrimination significantly predicted patients' having regular access to health care providers (Nandi et al., 2008).

5.3 STUDY LIMITATION

The present study has several limitations related to the study design (self-reported survey), sample, instrument development primary dependent variable. These types of limitations are discussed in the following paragraphs.

Limitations related to the study's self-reported survey include questions that could be perceived by participants as sensitive, such as their income, their level of religiosity, and their adherence to medication. Therefore, participants might not answer such questions or might chose responses that are more socially desirable. When distributing the survey, the primary researcher informed participants who perceived this information as sensitive, that he would not be able to track their information and that they would be allowed to put the survey back in the envelope themselves. This type of limitation is common in self-reported surveys, so the researcher tried to minimize its impact on the validity of participants' responses. Also by doing so, a low rate of missing response on these questions was observed, which may indicate that participants gave valid responses. Another issue with self-reported surveys is recall bias. The study was conducted after Ramadan, so some people might not fully recall their general health practices and specifically their medication usage during Ramadan. However, this limitation could be minimal since Muslims tend to fast many days throughout the year (e.g., fasting every Monday and Thursday), so their Ramadan experience might not be so easily forgotten. In addition, Ramadan is a special month in Muslims' lives, which would make that time period especially memorable.

Limitations related to the study sample centered on the study's generalizability and sample size. The study sample comprised Sunni Muslims who lived in San Antonio, so the results might not be generalizable to other Sunni Muslims or to all Muslim populations in the U.S. The majority of participants were recruited from mosques; therefore, they might be more religious than Muslims who do not attend mosque regularly. Muslims who are more religious might insist on fasting during Ramadan more than less religious Muslims, and this may have influenced the study findings. In addition, participants received a \$25 gift card to participate in the study, so they might not represent patients who were not motivated to participate in the study by the financial incentive. Lack of generalizability is a very common limitation across research studies. Therefore, to overcome that, the present study results were compared to other studies such as Pew Research studies related Muslim in general, which has a good generalizability. Regarding sample size, the present study's power analysis required a minimum sample of 200 participants to be included in the study's multivariate logistic regression model. This sample size was estimated based on having all the study's 21 independent variables included in the model. In our study, only three independent variables were included in the first model and five in the second model. Therefore, based on the rule of thumb, a sample of 50 - 100 participants would meet the minimum required sample size. Since the study sample size was 76, we believe that the sample size in our study was sufficient.

Limitations regarding the study instrument relate to the study survey's reliability and validity. The study instrument's scales were adapted from different sources that were not designed to measure factors related to the medication usage of Muslims in the U.S. In

addition, the study survey was translated into Arabic to allow people who did not speak English to participate in the study. The study validity was checked by administering the survey to Muslim diabetics who were asked to evaluate how well the survey measured their underlying factors. Based on their recommendations, the scales were modified. Moreover, to maintain the validity of the study when it was translated into Arabic, the primary researcher translated the survey into Arabic and an official translation center in Saudi Arabia back-translated the survey into English. The two versions were then compared to validate the Arabic version of the survey. During the study analysis, all of the scales' reliability coefficients were examined, and items that were poorly correlated were removed. The study scales reliability estimates ranged from 0.67 and 0.91, which means that the scales had adequate reliability.

The last limitation was related to the primary dependent variable, which was changing medication use during Ramadan without a health care provider's approval. In the present study, participants who did not change or who only changed their diabetes medication time were scored as 0, while participants who changed aspects of medication other than their medication time were scored as 1. Therefore, only changing diabetes medications' time was assumed to be permitted, even without a health care provider's approval. This assumption was made based on the following factors. First, none of the previous literature that has investigated changing diabetes medications during Ramadan indicated that changing diabetes medications' time was prohibited. Second, based on the primary research and clinical experience and knowledge, none of the diabetes medications were indicated to be used at a specific hour of the day. For example, when health care

providers asked participants to use their diabetes medication in the morning, participants have the option of using their medications whenever they wake up, which could be at 5 a.m. or at 8 a.m. Participants who tend to wake up at 8 a.m. might wake up one day at 5 a.m. and take their diabetes medication. So long as it would not lead to a drug–drug interaction, changing the time of taking diabetes medications was assumed to be acceptable.

5.4 RECOMMENDATIONS

Muslims in the U.S. are considered to be a minority from a religious standpoint and they could also be part of minority groups if they are immigrants or non-Whites. Therefore, many factors related to religion and immigration could affect their health. During the month of Ramadan, Muslims tend to fast from the sunrise to sunset for the whole month. Although Muslims with medical issues are exempt from fasting, they tend to fast anyway. Therefore, Muslims with diabetes have additional factors that can affect whether they fast and how they manage their medications during Ramadan. Thus, it is important for health care providers to know how they manage Muslim patients' health during Ramadan.

Health care providers need to know that Muslims tend to fast throughout their entire lives and perceive their fasting as a sign of self-control and obedience to Allah's commands. In this situation, health care providers need to understand that although Allah commanded Muslims to fast during the month of Ramadan, he also commanded them to care for their health and those with illness are exempt from fasting. Therefore, in caring for diabetics' health, health care providers need to evaluate a patient's diabetes condition and

ability to fast during Ramadan. Health care providers need to inform patients with poorly controlled diabetes that they understand the importance of fasting, but based on their health condition they may or may not be able to fast. Health care providers may want to discuss with patients methods to enable fasting. For example, advising them to take a vacation from their work during Ramadan, so that they can avoid having low energy and maintain their fast throughout the entire day. Another option would be for health care providers to advise patients to avoid fasting in hot weather and make up their missed day of fasting in cold weather so that they can avoid dehydration. For patients with controlled diabetes or uncontrolled diabetes who still want to fast, health care providers need to modify their medication and diet, and then allow them to fast the first two or three days of Ramadan. After that, health care providers might need to evaluate patients' health and ability to continue fasting for the whole month.

Additionally, the present study found that patients with more health care barriers, especially barriers related to health care cost, were more likely to change their medication usage during Ramadan without a health care provider's approval. Patients who experience difficulties in paying for their physician visits or medications may choose to modify their medication usage without a health care provider's approval. One solution is for health care providers to discuss patients' fasting during their t diabetes visit before Ramadan, so patients need not pay for a separate visit to discuss their fasting ability. Another option is for providers to offer patients low-cost medication alternatives.

The study revealed that participants valued pharmacists' having a better understanding of Muslims and Islamic culture, and this may have implications for all types

of health care providers. Muslim patients want their providers, before advising them about whether or not to fast, to evaluate their diabetic condition and the possible risks of fasting and then to inform them about whether they should fast or not. In addition, they want their providers to manage their diabetes and provide them with information about what to do if they experienced any side effects during Ramadan. Understanding Muslim diabetic patients' fasting preferences and evaluating their fasting ability are major aspects of caring for Muslims during Ramadan.

5.5 FUTURE RESEARCH

The health of Muslims in the U.S. has not been well examined in the literature. The majority of Muslims in the U.S. are immigrants, so they might have health care practices that differ from those of other populations. The present study explored diabetic Muslims' health care practices before and after Ramadan and factors that could impact their medication usage during Ramadan. Future studies can explore health care practices among Muslims in the U.S. (not just those with diabetes) and what factors may affect their health care utilization. According to the U.S. Department of Homeland Security (2015), 70.3% of the refugees that arrived in the U.S. between 2013 and 2015 were from countries where Muslims are majority (i.e., Iraq, Somalia, Sudan, Syria, Iran, Burma, and Afghanistan) or are oppressed (e.g., Burma). Given this fact, researchers need to do more investigation into the impact of previous harsh experiences (e.g., war) on the health care utilization of patients, and specifically of refugees. In addition, Muslims can be of different races, so it would be useful to compare the health care utilization of Muslims of different races and of Muslims and non-Muslims of the same race and ethnicity. In the present study,

participants' medication usage changes during Ramadan without a health care provider's approval was the only aspect of health care utilization measured. Future studies may also want to go beyond medication use patterns and examine factors that impact physician visits, alternative medication usage, vaccinations, and preventive procedures (e.g., breast or prostate cancer screenings). Due to the culture of some Muslim countries, patients may view having annual preventive procedures (e.g., breast and prostate exams) as shameful procedures, which might limit their utilization of such checkups.

In addition, studies evaluating health care providers' knowledge of and ability to manage Muslims' health are needed. Similarly, studies evaluating the education of future health care providers (e.g., pharmacy students) about the health of Muslims in the U.S. are needed. Health care educators may need to develop a course that would teach future health care providers about Muslims' health care services utilization patterns, factors affecting their utilization, and ways to overcome barriers limiting their utilization. Researchers need to evaluate the effect of this type of course on students' ability to manage Muslim patients' health before and after completing the course. Educating current and future health care providers about minority populations' health may reduce barriers that could negatively impact the health of such populations. In general the research on the Muslim population in the U.S. is limited in many respects, and thus this could be a valuable area for scholars to explore. However, researchers need to find the best way to encourage Muslims in the U.S. to participate in such studies.

5.6 CONCLUSION

In conclusion, barriers related to health care, especially those related to cost, constituted the only predictor of participants' changing medication usage during Ramadan without a health care provider's approval. Health care providers should be aware of health care cost barriers and identify strategies that may help to mitigate them. Participants favored proposed activities that reflect pharmacists having a better understanding of their religion and culture so as to help them manage their medication while fasting during Ramadan. Pharmacists and other health care providers should recognize the importance of Ramadan so that they are able to advise Muslim patients with diabetes who choose to fast.

Appendices

APPENDIX A: ISLAMIC CENTER OF SAN ANTONIO (ICSA) CITE LETTER



المركز الإسلامي في سان أنطونيو

Islamic Center of San Antonio

March 20, 2015

James Wilson, Ph.D.

Chair, Institutional Review Board

P.O. Box 7426

Austin, TX 78713

irbchair@austin.utexas.edu

Dear Dr. Wilson:

The purpose of this letter is to grant Ahmed Alshehri, a graduate student at The University of Texas at Austin permission to conduct research at the mosque of the Islamic Center of San Antonio. The project, "Muslim Patients' Medication Use Behavior and Perceptions Regarding Collaboration with Pharmacists during Ramadan" involves approximately 10 male and 10 female Muslims who have chronic diseases whom will be asked questions about their medication usage and their engagement with health care providers during Ramadan. Those patients will be invited to join the focus group, which will be conducted in the mosque. The purpose of this focus group will help Ahmed develop a survey and administer it in the mosque during the last ten days of Ramadan, which starts on July 7, 2015. I will allow Ahmed Alshehri to distribute approximately 200 surveys to Muslim patients. I believe that Muslims' medical health care and religion practice especially during Ramadan may not be fully understood by health care professionals in the U.S., so this project may help improve Muslim health care. This mosque is the largest mosque in San Antonio, and most of them are from Middle East, which will provide diversity to his project findings. Therefore, I will help Ahmed to recruit Muslim patients in the mosque for both the focus group and the survey. I, Dr. Yousef Said do hereby grant permission for Ahmed Alshehri to conduct the study entitled, "Muslim Patients' Medication Use Behavior and Perceptions Regarding Collaboration with Pharmacists during Ramadan" at the Islamic Center of San Antonio.

Sincerely,

Yousef Said, Ph.D.

Imam and Director – Islamic Center of San Antonio

8638 Fairhaven St. • San Antonio, Texas 78229 • Tel. 210-614-0989 • Fax 210-614-2281
Email: admin@icsaonline.org • www.icsaonline.org • ICSA is an IRS-Approved 501 (c) (3) non-profit organization

APPENDIX B: MUSLIM CHILDREN'S EDUCATION AND CIVIC CENTER (MCECC) CITE LETTER



March 19, 2015

Dr. James Wilson, Ph.D.
Chair, Institutional Review Board
P.O. Box 7426
Austin, TX 78713
irbchair@austin.utexas.edu

Dear Dr. Wilson:

The purpose of this letter is to grant Ahmed Alshehri, a graduate student at The University of Texas at Austin permission to conduct research at the mosque of the Muslim Children Education and Civic Center. The project, "Muslim Patients' Medication Use Behavior and Perceptions Regarding Collaboration with Pharmacists during Ramadan" entails using the mosque and its members to conduct gender specific focus groups with Muslims who have chronic diseases. The topics to be discussed center around how they take their medications during Ramadan and their relationships with pharmacists and other health care providers. Twenty Muslims (i.e., 10 males and 10 females) will be invited to participate in the focus groups, which will be held in the mosque. After completing this focus group and after subsequent survey development, I will allow Ahmed to distributed and collect 200 surveys during Ramadan. I believe this research is important in helping pharmacists to understand Muslim patients' medications taking behaviors with the overall goal of helping them improve access to care and outcomes of care. I will support the project by helping Ahmed to recruit Muslims for both the focus groups and the surveys. The mosque of Muslim Children Education and Civic Center was selected because it is the second largest mosque in San Antonio comprised primarily of Muslims from the Pakistan and India. I, Dr. Said Atif, do hereby grant permission to Ahmed Alshehri to conduct the study entitled, "Muslim Patients' Medication Use Behavior and Perceptions Regarding Collaboration with Pharmacists during Ramadan" at Muslim Children Education and Civic Center.

Sincerely,

Said Atif (Imam of Muslim Children Education and Civic Center)

A handwritten signature in black ink, appearing to be "Said Atif", is written over a horizontal line. The signature is fluid and cursive, with a large loop at the end.

Muslim Children Education and Civic Center, 5281 Casabella, San Antonio, TX, 78249, USA
Phone: (210) 877-9738; Fax#210-877-9748 Email: contact@mcecc.com or Website: www.mcecc.com

APPENDIX C: SURVEY INSTRUMENT (ENGLISH VERSION)

Survey of Muslim Diabetes Patients' Medication Use Behavior and Perceptions Regarding Collaboration with Pharmacists during Ramadan

Health care providers have limited information about the US Muslims' health in general and more specifically during Ramadan. This survey will help inform them about how Muslims manage their health and how health care providers can best support them.

This survey is divided into three major parts. Part I focuses on health practices and how you manage your diabetes during Ramadan, while Part II includes sections related to your health in general. Part III asks about your perceptions of the US culture and your demographic information.

Please fill out the survey and return it back to the researcher to collect your **\$25 gift card**.

Thank you!

If you have any questions, please contact the primary researcher, Ahmed Alshehri at (512) 586-8765 or Ahmed_Alshehri@utexas.edu

PART I: HEALTH MANAGEMENT DURING RAMADAN

We would like to better understand how you manage your health during Ramadan and how health care providers can better support you during this time.

Section 1A: Diabetes and Ramadan

We would like to know how you feel about having diabetes and fasting or not during Ramadan. Please check the box that corresponds with your level of agreement with the statements below.

Items	Strongly Disagree	Disagree	Unsure	Agree	Strongly Agree
1. Diabetic patients are exempt from fasting.	☐	☐	☐	☐	☐
2. Diabetic patients should break their fast if they do not feel well.	☐	☐	☐	☐	☐
3. Diabetic patients should try to fast first before they consider themselves exempt from fasting.	☐	☐	☐	☐	☐
4. Fasting is safe for me even though I have diabetes.	☐	☐	☐	☐	☐
5. I always think about how fasting affects my diabetes.	☐	☐	☐	☐	☐
6. I believe Allah will help me manage my diabetes while fasting.	☐	☐	☐	☐	☐
7. Fasting for Allah helps me feel my power and ability to control diabetes.	☐	☐	☐	☐	☐
8. In order to fast, I have to believe that I have the power to fast.	☐	☐	☐	☐	☐
9. My faith strengthens me to complete my fasting even when I have problems with my diabetes.	☐	☐	☐	☐	☐
10. I need to fast to enjoy Ramadan.	☐	☐	☐	☐	☐
11. Fasting is a healthy practice for diabetic patients.	☐	☐	☐	☐	☐
12. I get used to fasting after the first week.	☐	☐	☐	☐	☐

Section 1B: Diabetes complications during Ramadan

We would like to know if you had any complications during this past Ramadan while fasting. Please check the box or fill in the blank.

During Ramadan, how many times did you have...	None	Number of times	Don't know
1. Low blood sugar with symptoms such as sweating, weakness, anxiety, trembling, hunger, or headache	☐	----- -	☐
2. Severe low blood sugar (glucose) reactions such as passing out or needing help to treat the reaction	☐	----- -	☐
3. High blood sugar (glucose) with symptoms such as thirst, dry mouth and skin, increased urination, loss of appetite, nausea, or fatigue	☐	----- -	☐

Section 1C: Diabetes management during Ramadan

During the month of Ramadan, did you increase, decrease, or not change your frequency with the activities below. Please check the box that corresponds with your response.

Please select **"Not applicable"** only if you **do not use medications** to treat your diabetes.

Activities	Increase	Decrease	No change	Not applicable
1. Follow a meal plan for my diabetes	☐	☐	☐	
2. Exercise for at least 30 minutes 3 days of the week	☐	☐	☐	
3. Check my blood glucose levels with a monitor	☐	☐	☐	
4. Take my diabetes oral medications as prescribed	☐	☐	☐	☐
5. Use my insulin as prescribed	☐	☐	☐	☐

Section 1D: Diabetes medication use during Ramadan

During the month of Ramadan, we would like to know if you changed how you took your medications without the approval from your health care provider(s). Please check the box that corresponds with your response.

If you **did not fast** during the past Ramadan, please **skip to section 2A**.

If you **do not use oral medications or insulin**, please choose **"Not applicable"** for the items below.

During Ramadan, did you change any of the following <u>WITHOUT</u> your health care provider's approval?	Oral Medications			Insulin		
	Yes	No	Not applicable	Yes	No	Not applicable
2. I changed the timing of my diabetes medication(s).	☐	☐	☐	☐	☐	☐
3. I changed the frequency of my diabetes medication(s).	☐	☐	☐	☐	☐	☐
4. I changed from oral diabetes medication(s) to non-oral diabetes medications.	☐	☐	☐	☐	☐	☐
5. I increased the dose of my diabetes medication(s).	☐	☐	☐	☐	☐	☐
6. I decreased the dose of my diabetes medication(s).	☐	☐	☐	☐	☐	☐
7. I stopped using my diabetes medication(s) while fasting.	☐	☐	☐	☐	☐	☐
8. I combined multiple doses of my diabetes medication(s) into a single dose.	☐	☐	☐	☐	☐	☐

Section 2A: Support from health care providers, family and friends

With the following questions, we would like to understand more about how health care providers, family and friends influence you regarding fasting during Ramadan. Please check the box that corresponds with your response.

1) During Ramadan, which of the following individuals' **opinions do you follow** to determine....

Please check **all that apply**.

a. Whether to fast ☐ Family ☐ Friends ☐ Imam ☐ Physicians ☐ Pharmacists ☐ Nurses

b. How to manage your medications ☐ Family ☐ Friends ☐ Imam ☐ Physicians ☐ Pharmacists ☐ Nurses

Section 2B: Perceptions of pharmacists' potential services and interaction

Below are examples of potential services and interactions that pharmacists could provide for Muslims. Please check the box that corresponds with your level of agreement with the statements below.

I would like for a pharmacist to...	Strongly Disagree	Disagree	Unsure	Agree	Strongly Agree
1. Support me to fast first before advising me not to fast.	☐	☐	☐	☐	☐
2. Develop a specific plan with me to avoid any drug-related problems.	☐	☐	☐	☐	☐
3. Refer me to other health care providers (e.g., physicians and dietitians) to enable me to fast and manage my medications.	☐	☐	☐	☐	☐
4. Provide me with information about what to do if I experience side effects from my medications if I decide to fast.	☐	☐	☐	☐	☐
5. Have an overall understanding of my culture.	☐	☐	☐	☐	☐
6. Respect my preference to not shake hands with the opposite gender.	☐	☐	☐	☐	☐
7. Provide me with consultation in a private area.	☐	☐	☐	☐	☐
8. Know about the importance of Ramadan and fasting.	☐	☐	☐	☐	☐
9. Have knowledge about Islam and Muslims practices.	☐	☐	☐	☐	☐
10. Greet me with " <i>As-salamu alaykum</i> ".	☐	☐	☐	☐	☐
11. Ask me if I have any concerns about using my medications.	☐	☐	☐	☐	☐
12. Place a sign in the pharmacy to encourage me to ask for help in managing my medications if I decide to fast.	☐	☐	☐	☐	☐
13. Provide suggestions about how to change (increase or decrease) my medication <i>dose</i> if I decide to fast.	☐	☐	☐	☐	☐
14. Provide suggestions about changing my medication <i>dosage form</i> (e.g, to sustained release) if I decide to fast..	☐	☐	☐	☐	☐
15. Provide suggestions about changing my medication <i>frequency</i> (e.g, from 2-3 times/day to 1 time/day) if I decide to fast.	☐	☐	☐	☐	☐
16. Provide suggestions about changing my medication <i>timing</i> (e.g, from morning or afternoon dose to before <i>Sohour</i> or after <i>Iftar</i>) if I decide to fast.	☐	☐	☐	☐	☐
17. Follow-up with me to ensure that I am managing my medications properly if I decide to fast.	☐	☐	☐	☐	☐

PART II: GENERAL HEALTH INFORMATION

We would like to understand more about your diabetes, how you treat it and how you manage your diabetes in general.

Section 1A: General Diabetes Health

Please check the box that corresponds with your response.

1) Would you say your **diabetes** is?

☐ Excellent ☐ Very good ☐ Good ☐ Fair ☐ Poor

2) How long have you had **diabetes**? _____ year(s)

3) What **type of diabetes** do you currently have? Please **check all that apply**.

☐ Type 1 ☐ Type 2 ☐ Other, Please specify: _____

4) During the past 3 months, in what ways have you **managed your diabetes**? Please **check all that apply**.

☐ Oral medications ☐ Exercise ☐ Other, Please specify: _____
☐ Insulin with injection(s) ☐ Diet ☐ None
☐ Insulin with pump ☐ Blood sugar (glucose) testing

5) Please tell us what **type of diabetes medications** you use and **how often** did you use them **before Ramadan**.

If you are using Insulin with pump, please skip to question 6.

Medication	Do not use	BEFORE Ramadan, how often did you use				
		Every morning	Every evening	Twice a day	Three times a day	Four or more times a day
Oral medication	☐	☐	☐	☐	☐	☐
Insulin with injection	☐	☐	☐	☐	☐	☐

6) Which of the following **complications** have you developed **because of your diabetes**? Please **check all that apply**.

☐ Nerve problems ☐ Kidney problems ☐ Feet or legs problems
☐ Eye problems ☐ No complications ☐ Other, Please specify: _____

7) In the ***past year***, how many times have you been hospitalized because of your **diabetes**? _____ time(s)

8) In the ***past year***, how many times have you been to the emergency room because of your **diabetes**? _____ time(s)

9) In the ***past 3 months***, how often did you do the following? Please check the box that corresponds with your level of frequency with the statements below.

In the <u>past 3 months</u> , How often did you...	Never	Rarely	Some-times	Often	Always	Not applicable
1. Follow a meal plan for my diabetes	☐	☐	☐	☐	☐	☐
2. Exercise for at least 30 minutes 3 days of the week	☐	☐	☐	☐	☐	☐
3. Check your blood glucose levels with a monitor	☐	☐	☐	☐	☐	☐
4. Take your diabetes oral medications as prescribed	☐	☐	☐	☐	☐	☐
5. Use your insulin as prescribed	☐	☐	☐	☐	☐	☐

Section 2A: General health and access to care

We would like to understand more about your general health, how you are able to get health services when you need them and any barriers you face to receiving care. Please check the box that corresponds with your response.

1) Which of the following disease do you have? Please **check all that apply**.

- ☐ Arthritis ☐ Chronic Pain ☐ Depression ☐ Diabetes
- ☐ Dyslipidemia ☐ Heart disease ☐ Hypertension ☐ Gastrointestinal disorder
- ☐ Obesity ☐ Thyroid disorder ☐ Other, Please specify _____

2) For all of your disease states, how many medications are you taking?

- ☐ 0 (no medications) ☐ 3 – 4 medications ☐ 7– 8 medications
- ☐ 1 – 2 medications ☐ 5 – 6 medications ☐ ≥ 9 medications

3) Do you smoke or use any of the tobacco products below?

- Cigarettes ☐ Yes ☐ In the past, but not currently ☐ No, I have never used.
- Hookah (shisha) ☐ Yes ☐ In the past, but not currently ☐ No, I have never used.
- Other, please specify _____ ☐ Yes ☐ In the past, but not currently ☐ No, I have never used.

4) Which category or categories below best describe how you usually pay for your medical care (in the past 12 months)? Please **check all that apply**.

- ☐ Medicaid ☐ Medicare ☐ No insurance
- ☐ Pay out of pocket ☐ Private insurance ☐ Other, Please specify _____

5) Where do you usually go to receive health care?

- ☐ A doctor's office ☐ Free or community clinic ☐ Emergency Room
- ☐ Hospital ☐ Other, Please specify _____

6) Do you have a primary care physician who you see regularly?

- ☐ Yes ☐ No

7) Do you have a specific pharmacist, who regularly answers your medication-related questions?

- ☐ Yes ☐ No

8) Do you have a pharmacy that you regularly get your medications?

- ☐ Yes ☐ No

Section 2B: Barriers

This section includes questions to identify barriers that may make it difficult for you to get health care services. Please check the box that corresponds with your level of agreement with the statements below.

Barriers	Strongly Disagree	Disagree	Unsure	Agree	Strongly Agree
1. It has been difficult for me to pay for <u>physician visits</u> .	☐	☐	☐	☐	☐
2. It has been difficult for me to pay for <u>prescription medications</u> .	☐	☐	☐	☐	☐
3. It has been difficult for me to pay for <u>over-the-counter medications</u> .	☐	☐	☐	☐	☐
4. I have difficulties understanding written medical information.	☐	☐	☐	☐	☐
5. I always have someone help me <u>read</u> medical forms.	☐	☐	☐	☐	☐
6. I always have someone help me <u>fill out</u> medical forms.	☐	☐	☐	☐	☐
7. My doctor considers my religious needs in my medical care.	☐	☐	☐	☐	☐
8. I trust my doctor's judgement about my medical care.	☐	☐	☐	☐	☐
9. I trust my pharmacist's judgement about my medical care.	☐	☐	☐	☐	☐
10. It is a problem for me when my health care providers <u>are not Muslim</u> .	☐	☐	☐	☐	☐
11. It is a problem for me when my health care providers <u>are not the same ethnicity</u> as I am.	☐	☐	☐	☐	☐
12. It is a problem for me when my health care providers <u>are not my same gender</u> .	☐	☐	☐	☐	☐
13. It is a problem for me when my health care providers <u>do not speak my language</u> .	☐	☐	☐	☐	☐
14. While getting medical care, I have often experienced discrimination because of being Muslim.	☐	☐	☐	☐	☐
15. I am very comfortable with <u>making an appointment</u> with a doctor or other health care provider	☐	☐	☐	☐	☐
16. I am very comfortable <u>going to the emergency room</u> when I am sick.	☐	☐	☐	☐	☐
17. I am very comfortable <u>asking pharmacists</u> about my medications.	☐	☐	☐	☐	☐
18. I know who to ask when I have questions about my health.	☐	☐	☐	☐	☐

Section 2C: Perceptions of pharmacists' services

This section includes questions about your perceptions of services that you have received from pharmacists in the US. Please check the box that corresponds with your level of agreement with the statements below.

Items	Strongly Disagree	Disagree	Unsure	Agree	Strongly Agree
1. I am very satisfied with the services I receive from pharmacists.	☐	☐	☐	☐	☐
2. I value the services that the pharmacists provide me.	☐	☐	☐	☐	☐
3. There are times when pharmacists seem insincere.	☐	☐	☐	☐	☐
4. Pharmacists are knowledgeable about my culture and religion.	☐	☐	☐	☐	☐
5. Pharmacists always treat me with respect.	☐	☐	☐	☐	☐
6. Pharmacists are trustworthy.	☐	☐	☐	☐	☐
7. Pharmacists explain things in a way that I am able to understand.	☐	☐	☐	☐	☐
8. Pharmacists are able to understand what I am trying to say.	☐	☐	☐	☐	☐
9. Pharmacists provide written information in a language that I can understand.	☐	☐	☐	☐	☐
10. I am comfortable calling the pharmacist if I have a medication question.	☐	☐	☐	☐	☐
11. I always feel rushed when I speak with the pharmacist.	☐	☐	☐	☐	☐
12. I can easily contact a pharmacist when I have questions or concerns.	☐	☐	☐	☐	☐
13. Pharmacists provide helpful information on my treatment goals.	☐	☐	☐	☐	☐
14. Pharmacists provide me with information about what to do if I experience side effects from my medications.	☐	☐	☐	☐	☐
15. Pharmacists adequately answer my questions.	☐	☐	☐	☐	☐

PART III: PERCEPTIONS OF US CULTURE AND DEMOGRAPHICS

Please tell us your perceptions, opinions and experiences regarding living in the US and then tell us about yourself.

Section 1A: Muslim Culture in the US

Please check the box that corresponds with how true each statement is for you. When making your choice, think of how true it is for you most of the time in most situations.

Items	Not at all true of me	Slightly true of me	Moderately true of me	Very true of me	Extremely true of me
1. The majority of my friends are Muslim.	☐	☐	☐	☐	☐
2. It is very important for me to maintain Islamic practices in my everyday life.	☐	☐	☐	☐	☐
3. I feel comfortable shaking hands with members of the opposite sex.	☐	☐	☐	☐	☐
4. I always celebrate American holidays such as Valentine's Day, Thanksgiving, 4th of July, and Halloween.	☐	☐	☐	☐	☐
5. It is very important for me to raise my children as Muslim.	☐	☐	☐	☐	☐
6. I feel it is important to participate in the American political system by voting in local and federal elections.	☐	☐	☐	☐	☐

Section 1B: Americans' Perceptions of Muslims

We would like to know your opinions about how you feel Americans perceive Muslims. Please check the box that corresponds with your level of agreement with the following statements.

Items	Strongly Disagree	Disagree	Unsure	Agree	Strongly Agree
1. Many Americans avoid Muslims.	☐	☐	☐	☐	☐
2. Americans are suspicious of Muslims.	☐	☐	☐	☐	☐
3. In general, Americans trust Muslims.	☐	☐	☐	☐	☐
4. Overall, only few Americans are afraid of Islam.	☐	☐	☐	☐	☐
5. Most Americans feel safe among Muslims.	☐	☐	☐	☐	☐
6. Many Americans get nervous in the presence of Muslims.	☐	☐	☐	☐	☐
7. American media always presents Muslims as dangerous people.	☐	☐	☐	☐	☐
8. Islam is always presented as a threat to American culture in media.	☐	☐	☐	☐	☐
9. American media spreads a lot of fear of Muslims and Islam.	☐	☐	☐	☐	☐

Section 2A: Muslim Religion

We would like to better understand your religious practices. Please check the box that corresponds with your response.

1) How would you describe your religion?

☐ Sunni ☐ Shia ☐ Other, Please specify _____

2) The following questions relate to the role of religion in your life. Please chose the option that applies to your current practices.

a) How often do you read or recite the Quran?

☐ Never ☐ Two or three times a year ☐ About once a month
☐ Once a week ☐ More than once a week ☐ Everyday

b) How many times do you pray salat (prescribed prayers) each day?

☐ 0 (I don't not pray every day) ☐ 1 times ☐ 2 times
☐ 3 times ☐ 4 times ☐ 5 times a day

c) How often do you go to the Mosque, Islamic Center, or attend Muslim gatherings?

☐ Never ☐ Once or twice a year ☐ More than a month
☐ About once a week ☐ More than once a week ☐ Everyday

d) How often do you fast?

☐ Never ☐ During Ramadan, but not the entire month ☐ Only during Ramadan, for the entire month
☐ Several times a year in addition to Ramadan ☐ About once a month in addition to Ramadan ☐ Almost every week in addition to Ramadan

e) Approximately, how many days did you fast during this past Ramadan?

☐ 0, I did not fast ☐ ____ number of days you fasted.

f) How often do you engage in free prayer (dua, other forms of prayer) outside of the prescribed five daily prayers?

☐ Never ☐ I do, but not frequently ☐ On about monthly basis
☐ At least once a week ☐ At least once a day ☐ More than once a day

Section 2B: Demographics

Please answer the following questions about yourself. Please check the box that corresponds with your response.

- 1) What year were you born? 19_____
- 2) What is your gender?
☐ Male ☐ Female
- 3) What is your race?
☐ White ☐ Black ☐ Asian ☐ Hispanic ☐ Other, Please specify_____
- 4) Where were you born?
☐ United States ☐ Other, Please specify _____
- 5) How long have you been in the U.S.? _____ Years
- 6) What is your marital status?
☐ Married ☐ Divorced ☐ Separated ☐ Widowed ☐ Never Married
- 7) What is your level of education?
☐ Less than middle school (intermediate school) ☐ High school graduate ☐ College graduate
☐ Middle school (intermediate school) graduate ☐ Some college ☐ Graduate degree (Master's or Ph.D.)
- 8) What is your total family income from all sources, before taxes?
☐ < \$20,000 ☐ \$20,000 – \$29,999 ☐ \$30,000 – \$49,999
☐ \$50,000 – \$74,999 ☐ \$75,000 – \$99,999 ☐ ≥ \$100,000
- 9) Are you currently working?
☐ Yes, Full time ☐ No, I do not want to work ☐ No, I am student
☐ Yes, Part time ☐ No, I am looking for work ☐ No, I am retired
- 10) Do you own your own business?
☐ Yes ☐ No
- 11) How many **adults, age 18 and older**, currently live in your household INCLUDING YOURSELF?

- 12) How many **children under the age of 18** live in your household? _____

Thank you for taking the time to participate in the survey. Please use the space below to provide us with your comments. **Please return your survey to the researcher to collect your \$25 gift card.**

APPENDIX D: SURVEY INSTRUMENT (ARABIC VERSION)

سلوك استخدام مرضى السكري المسلمون لأدويتهم خلال شهر رمضان المبارك ووجهة نظرهم فيما يتعلق بالتعاون مع الصيدلة خلال هذا الشهر

لدى مقدمي الرعاية الصحية بالولايات المتحدة الأمريكية معلومات محدودة جدا حول صحة المسلمين في الولايات المتحدة وخصوصا خلال شهر رمضان. لذلك ستقوم هذه الدراسة باطلاعهم حول كيفية تحكم المسلمين في حالاتهم الصحية وكيف يمكن لمقدمي الرعاية الصحية تقديم الدعم الأفضل للمرضى المسلمين خلال هذا الشهر الفضيل.

تنقسم هذه الدراسة إلى ثلاثة أجزاء رئيسية. الجزء الأول يركز على ممارسات المسلمين الصحية وكيف يتعاملون مع مرض السكري الذي يعانون منه خلال شهر رمضان المبارك، الجزء الثاني يتضمن أقسام متعلقة بصحتهم العامة. الجزء الثالث يتضمن بعض الاسئلة عن تصوراتهم المتعلقة بثقافة المجتمع في الولايات المتحدة وبعض الاسئلة الشخصية.

يرجى ملء الاستبيان وإعادته إلى الباحث لكي تحصل على بطاقة هدية بقيمة 25 دولار.

شكرا لتعاونكم.... مع تمنياتي لكم بالصحة دائماً،

للاستفسار الرجاء الاتصال على:

احمد الشهري

(512)-586-8765

Ahmed_Alshehri@utexas.edu

الجزء الأول: التحكم بالصحة خلال شهر رمضان المبارك
هنا نود ان نفهم كيف تتحكم بصحتك خلال شهر رمضان، وكيف يمكن لمقدمي الرعاية الصحية دعمكم خلال هذا الوقت.

القسم الاول/الفرع الاول: مرضى السكري في رمضان

هنا نود أن نتعرف على شعورك حيال مرضك السكري وصيامك او عدم صيامك خلال شهر رمضان. يرجى اختيار المربع المناسب بوضع علامة (√) لمعرفة مستوى موافقتك مع العبارات أدناه.

العناصر	لا أوافق وبشدة	لا أوافق	لا أوافق	أوافق	أوافق وبشدة
1. يعد مرضى السكري من الأشخاص المعفيين من الصيام.	☐	☐	☐	☐	☐
2. يجب على مريض السكري ان يفطر إذا شعر بتعب عند الصيام.	☐	☐	☐	☐	☐
3. يجب على مريض السكري أن يحاول الصيام أولاً قبل أن يعتبر نفسه معفي من الصيام.	☐	☐	☐	☐	☐
4. يعتبر الصوم غير ضار بالنسبة لي على الرغم من أنني مصاب بداء السكري.	☐	☐	☐	☐	☐
5. دائماً أفكر في تأثير الصيام على مرضي السكري.	☐	☐	☐	☐	☐
6. أو من بأن الله سيساعدني على التحكم في مرضي السكري عندما أصوم.	☐	☐	☐	☐	☐
7. الصوم من أجل الله يساعدني على الشعور بقوة وقدرتي على التحكم في مرضي السكري.	☐	☐	☐	☐	☐
8. لكي أستطيع الصيام، يجب على الايمان بأن لدي القدرة على الصيام.	☐	☐	☐	☐	☐
9. إيماني بالله يعينني على إكمال الصيام حتى عندما يكون لدي مشاكل متعلقة بمرضي السكري.	☐	☐	☐	☐	☐
10. لكي استمتع بـرمضان يجب على أن اصوم.	☐	☐	☐	☐	☐
11. يعتبر الصوم ممارسه صحية لمريض السكري.	☐	☐	☐	☐	☐
12. اعتاداً على الصيام بعد الأسبوع الأول من رمضان.	☐	☐	☐	☐	☐

القسم الاول/الفرع الثاني: مضاعفات مرضك السكري خلال شهر رمضان المبارك

هل حدثت لديك أي من المضاعفات التالية أثناء صيامك شهر رمضان الماضي. يرجى اختيار المربع الذي يمثل اجابتك بوضع علامة (√) أو ملء الفراغ.

لا يوجد	عدد مرات	لا أعرف	خلال شهر رمضان المبارك، كم مرة حدث لديك...
☐	-----	☐	1. انخفاض السكر في الدم مع وجود أعراض مثل التعرق، الضعف، القلق، الرجفة، الجوع، أو الصداع
☐	-----	☐	2. انخفاض شديد في نسبة السكر في الدم مع فقدان الوعي او الحاجة الماسة للمساعدة.
☐	-----	☐	3. ارتفاع في نسبة السكر في الدم مع وجود أعراض مثل العطش، جفاف الفم والجلد، زيادة التبول، فقدان الشهية، الغثيان أو التعب

القسم الاول/الفرع الثالث: طريقة تحكمك في مرضك السكري خلال شهر رمضان المبارك
 خلال شهر رمضان المبارك، هل قمت بزيادة، أو تقليل، أو لم تغير في عدد مرات ممارسة الأنشطة التالية.
 يرجى اختيار المربع المناسب بوضع علامة (√) لمعرفة مستوى موافقتك مع العبارات أدناه.
 إذا كنت لا تستخدم ادوية الخاصة بمرض السكري، يرجى اختيار "لا ينطبق على ذلك".

الأنشطة	زيادة	انخفاض	لا يوجد تغيير	لا ينطبق على ذلك
1. اتباع الوجبات الغذائية الخاصة بمرضى السكري	☐	☐	☐	☐
2. ممارسة الرياضة لمدة 30 دقيقة ثلاث مرات في الأسبوع على الأقل	☐	☐	☐	☐
3. التحقق من مستوى السكر في الدم باستخدام جهاز قياس السكر	☐	☐	☐	☐
4. تناول ادوية مرض السكري الفموية (عن طريق الفم) حسب تعليمات الطبيب أو الصيدلي	☐	☐	☐	☐
5. استخدام دواء الأنسولين حسب تعليمات الطبيب أو الصيدلي	☐	☐	☐	☐

القسم الاول/الفرع الرابع: استخدام ادوية السكري خلال شهر رمضان المبارك
 خلال شهر رمضان المبارك، نود أن نعرف إذا قمت بتغيير في كيفية تناولك للادوية بدون موافقة مقدم الرعاية الصحية الخاص بك (مثلا الطبيب أو الصيدلي). يرجى وضع علامة (√) في المربع الذي يمثل اختيارك.
 إذا لم تتمكن من الصوم خلال شهر رمضان الماضي، الرجاء تجاوز هذا القسم الى القسم الثاني/الفرع الأول.
 إذا كنت لا تأخذ الادوية أو لا تستخدم الأنسولين لعلاج داء السكري الخاص بك، الرجاء اختيار "لا ينطبق" للعبارات التالية.

خلال شهر رمضان، هل قمت بتغيير أي مما يلي بدون موافقة مقدم الرعاية الصحية الخاص بك (مثلا: الطبيب)؟						الادوية عن طريق الفم	الانسولين
نعم	لا	لا ينطبق	نعم	لا	لا ينطبق	نعم	لا
☐	☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐	☐

القسم الثاني/الفرع الاول: دعم مقدمي الرعاية الصحية، الأسرة أو الأصدقاء لك خلال شهر رمضان:
 نود أن نعرف تأثير مقدمي الرعاية الصحية، أو العائلة أو الأصدقاء عليك فيما يتعلق بالصيام أو تناول ادويتك خلال شهر رمضان. يرجى اختيار جميع ما ينطبق عليك وذلك بوضع علامة (√) في المربع المناسب.
 (1) "خلال شهر رمضان"، هل اتبعت نصيحة أي من الأشخاص التالية أسماؤهم لتحديد...

1. ما إذا كان بإمكانك الصيام

☐ الأسرة	☐ أصدقاء	☐ المسجد	☐ إمام	☐ الأطباء	☐ الصيادلة	☐ الممرضات
---------------------------------	---------------------------------	---------------------------------	-------------------------------	----------------------------------	-----------------------------------	-----------------------------------
2. كيف يمكنك تناول الأدوية الخاصة بك

☐ الأسرة	☐ أصدقاء	☐ المسجد	☐ إمام	☐ الأطباء	☐ الصيادلة	☐ الممرضات
---------------------------------	---------------------------------	---------------------------------	-------------------------------	----------------------------------	-----------------------------------	-----------------------------------

القسم الثاني/الفرع الثاني: تصورك لخدمات الصيدلة الممكن تقديمها ومدى تجاوبهم معك خلال شهر رمضان المبارك

هنا بعض الأمثلة للخدمات التي يمكن للصيدلة تقديمها وكيف يمكن لهم التجاوب معك خلال شهر رمضان. يرجى اختيار المربع المناسب بوضع علامة (√) لمعرفة مستوى موافقتك مع العبارات أدناه

أود من الصيدلي أن...	لا أوافق بشدة	لا أوافق	غير متأكد	أوافق	أوافق بشدة
1. يدعمني لكي اصوم أولا قبل توجيهي بعدم الصيام.	☐	☐	☐	☐	☐
2. يعد خطة خاصة بي تمكنني من تفادي المشاكل المرتبطة بأدويتي.	☐	☐	☐	☐	☐
3. يوجهني إلى طلب المساعدة من مقدمي الرعاية الصحية الآخرين (مثل الأطباء أو أخصائيين التغذية) لكي أتمكن من الصيام والتحكم في أدويتي.	☐	☐	☐	☐	☐
4. يزودني بما يجب على القيام به في حال حدوث آثار جانبية للأدوية إذا قررت ان اصوم.	☐	☐	☐	☐	☐
5. يفهم عادات وتقاليد مجتمعي بشكل عام.	☐	☐	☐	☐	☐
6. يحترم رغبتني بعدم مصافحة يد الجنس الآخر.	☐	☐	☐	☐	☐
7. يقدم لي المشورة الصحية في مكان خاص بعيد عن المراجعين.	☐	☐	☐	☐	☐
8. يتفهم أهمية شهر رمضان والصيام فيه.	☐	☐	☐	☐	☐
9. يملك معلومات عن تعاليم الإسلام وعن ممارسات المسلمين.	☐	☐	☐	☐	☐
10. يحييني ب "السلام عليكم" عند مقابلتي.	☐	☐	☐	☐	☐
11. يسألني إذا كان لدى سؤال بشأن استخدامي للأدوية.	☐	☐	☐	☐	☐
12. يضع اعلان في الصيدلية يشجعني علي طلب المساعدة في التحكم في أدويتي إذا قررت ان اصوم.	☐	☐	☐	☐	☐
13. يقدم لي اقتراحات حول كيفية تغيير <u>جرعة</u> الدواء (زيادة أو نقصان) إذا قررت ان اصوم.	☐	☐	☐	☐	☐
14. يقدم لي اقتراحات حول تغيير شكل <u>جرعة</u> الدواء (على سبيل المثال، من دواء فعال لمدة قصيره جدا إلى دواء فعال لمدة طويلة) إذا قررت ان اصوم.	☐	☐	☐	☐	☐
15. يقدم لي اقتراحات حول تغيير عدد مرات استخدام الدواء (على سبيل المثال، من مرتين او ثلاث مرات إلى مرة واحدة في اليوم) إذا قررت ان اصوم.	☐	☐	☐	☐	☐
16. يقدم لي اقتراحات حول تغيير <u>توقيت</u> استخدام الدواء (على سبيل المثال، تغيير استخدام الجرعة الصباحية أو جرعة بعد الظهر إلى قبل السحور أو بعد الافطار) إذا قررت ان اصوم.	☐	☐	☐	☐	☐
17. يتابعني لكي يتأكد من تناولتي للأدوية بشكل الصحيح إذا قررت ان اصوم.	☐	☐	☐	☐	☐

الجزء الثاني: معلومات متعلقة بصحتك

نود أن نعرف المزيد عن مرضك السكري، كيف تعالجه وكيف تتحكم به بشكل عام.

القسم الاول/الفرع الاول: الصحة العامة

الرجاء وضع علامة (√) في المربع الذي يمثل اختيارك

(1) يمكنني القول ان صحتي مع اصابتي بمرض السكري؟

☐ ممتازة ☐ جيد جداً ☐ جيدة ☐ مقبولة ☐ سيئة

(2) منذ متى وانت مصاب بمرض السكري؟ سنة ____ سنة (سنوات)

(3) ما هو نوع مرض السكري المصاب به حالياً؟ يرجى اختيار جميع ما ينطبق عليك

☐ النوع الاول ☐ النوع الثاني ☐ أخرى، الرجاء تحديد: _____

(4) كيف تحكمت في مرضك السكري خلال الأشهر الثلاثة الماضية؟ يرجى اختيار جميع ما ينطبق عليك

☐ الأدوية عن طريق الفم ☐ ممارسة الرياضة ☐ أخرى، الرجاء تحديد: _____

☐ ابر الأنسولين ☐ نظام غذائي خاص ☐ بدون أي شيء

☐ مضخة الأنسولين ☐ قياس السكر في الدم

(5) ما هي أنواع أدوية مرض السكري التي تستخدمها قبل رمضان، وكم مره ايضاً كنت تستخدمها

إذا كنت تستخدم مضخة انسولين، الرجاء تجاوز هذا السؤال الى سؤال رقم 6.

قبل شهر رمضان، كم مره كنت تستخدم					لا تستخدمه	الدواء
كل صباح	كل مساء	مرتين في اليوم	ثلاث مرات في اليوم	أربع مرات أو أكثر في اليوم		
☐	☐	☐	☐	☐	☐	الأدوية عن طريق الفم
☐	☐	☐	☐	☐	☐	حقن الأنسولين

(6) أي من المضاعفات التالية حدثت لك بسبب مرضك السكري؟ يرجى اختيار جميع ما ينطبق عليك:

☐ مشاكل في الاعصاب ☐ مشاكل في الكلي ☐ مشاكل في القدمين أو الساقين

☐ مشاكل في العين ☐ لا توجد مضاعفات او مشاكل ☐ أخرى، الرجاء تحديد: _____

(7) خلال العام الماضي، كم عدد المرات التي تم تنويمك في المستشفى بسبب مرضك السكري؟ _____ مرة (مرات)

(8) خلال العام الماضي، كم عدد المرات التي ذهبت فيها الى غرفة الطوارئ بسبب مرضك السكري؟ _____ مرة (مرات)

(9) خلال الثلاثة أشهر السابقة لشهر رمضان، كم عدد المرات فعلت ما يلي؟ يرجى اختيار المربع الذي يمثل عدد المرات

التي قمت بما يلي أدناه.

لا ينطبق	دائماً	غالباً	احياناً	نادراً	أبداً لا	خلال الثلاثة أشهر السابقة لشهر رمضان، كم عدد المرات التي فعلت ما يلي:
☐	☐	☐	☐	☐	☐	1. اتبعت برنامج غذائي خاص بمرضك السكري
☐	☐	☐	☐	☐	☐	2. مارست رياضة على الأقل لمدة ثلاثين دقيقة ثلاث مرات في الأسبوع
☐	☐	☐	☐	☐	☐	3. تحققت من مستوي السكر في الدم باستخدام جهاز قياس السكر
☐	☐	☐	☐	☐	☐	4. تناولت عن طريق الفم أدوية مرض السكري كما وصفت لك من الطبيب
☐	☐	☐	☐	☐	☐	5. استخدمت ابر الأنسولين كما وصفت لك من الطبيب

القسم الثاني / الفرع الاول: صحتك العامة وطريقة حصولك على الرعاية:

هنا نود فهم المزيد حول صحتك بوجه عام، وعن كيفية حصولك على الخدمات الصحية عند حاجتك لها وماهي العقبات التي تواجهها عند تلقي تلك الخدمات. يرجى اختيار المربع المناسب الذي يمثل اجابتك بوضع علامة (√).

- (1) أي من الأمراض التالية؟ يرجى اختيار **جميع ما ينطبق** عليك
- ☐ التهاب المفاصل ☐ الأم مزمنة ☐ اكتئاب ☐ مرض السكري
- ☐ ارتفاع نسبة الدهون في الدم ☐ أمراض القلب ☐ ارتفاع ضغط الدم ☐ اضطراب في الجهاز الهضمي
- ☐ السمعة ☐ اضطراب الغدة الدرقية ☐ أخرى، الرجاء تحديد: _____
- (2) كم عدد الادوية التي تتناولها لعلاج جميع الامراض التي لديك؟
- ☐ لا اتناول ادوية ☐ 3 - 4 ادوية ☐ 7 - 8 ادوية
- ☐ 1 - 2 ادوية ☐ 5 - 6 ادوية ☐ اكثر من 9 ادوية
- (3) هل تدخن أو تستخدم أي من منتجات التبغ أدناه؟
- السجائر ☐ نعم ☐ في الماضي، ولكن ليس حالياً ☐ لا، أنا لم استخدمها مطلقاً
- النرجيلة (الشيشة) ☐ نعم ☐ في الماضي، ولكن ليس حالياً ☐ لا، أنا لم استخدمها مطلقاً
- أخرى، يرجى تحديد: _____ ☐ نعم ☐ في الماضي، ولكن ليس حالياً ☐ لا، أنا لم استخدمها مطلقاً
- (4) خلال الاثني عشر شهراً الماضية، كيف كنت تدفع تكاليف الرعاية الطبية التي حصلت عليها؟ الرجاء اختيار **جميع ما ينطبق** أدناه التي تصف كيفية سدادك للرعاية الصحية
- ☐ التأمين الطبي (مديكيد) ☐ التأمين الطبي (مديكير) ☐ لا يوجد تأمين
- ☐ (Medicaid) ☐ (Medicare) ☐ أخرى، الرجاء التحديد: _____
- ☐ تدفع من جيبك الخاص ☐ تأمين خاص
- (5) اين تذهب عادة لتلقي الرعاية الصحية؟
- ☐ عيادة الطبيب ☐ عيادة المجتمع او مجانية ☐ غرفة الطوارئ
- ☐ المستشفى ☐ أخرى، يرجى التحديد: _____
- (6) هل لديك طبيب خاص تذهب لزيارته بانتظام؟
- ☐ نعم ☐ لا
- (7) هل لديك صيدلي محدد، تذهب لسؤاله عن ادويةك بانتظام؟
- ☐ نعم ☐ لا
- (8) هل لديك صيدلية تذهب اليها لتحصل على أدويةك بشكل منتظم؟
- ☐ نعم ☐ لا

القسم الثاني / الفرع الثاني: العقبات

يتضمن هذا القسم أسئلة لتحديد العقبات التي قد تجعل من الصعب عليك الحصول على الخدمات الصحية. يرجى اختيار المربع المناسب بوضع علامة (√) لمعرفة مستوى موافقتك مع العبارات أدناه.

العقبات	لا أوافق وبشدة	لا أوافق	أوافق	أوافق وبشدة
1. من الصعب بالنسبة لي دفع ثمن زيارات الطبيب.	☐	☐	☐	☐
2. من الصعب بالنسبة لي دفع ثمن الأدوية الوصفية.	☐	☐	☐	☐
3. من الصعب بالنسبة لي دفع ثمن الأدوية الغير وصفية.	☐	☐	☐	☐
4. لدي صعوبة في فهم المعلومات الطبية المكتوبة.	☐	☐	☐	☐
5. دائما يساعدني شخص لقراءة النماذج الطبية.	☐	☐	☐	☐
6. دائما يساعدني شخص لتعبئة النماذج الطبية.	☐	☐	☐	☐
7. طبيبي يأخذ في الاعتبار احتياجاتي الدينية عند تقديمه الرعاية الطبية.	☐	☐	☐	☐
8. اثق بقرار طبيبي عند تقديمه الرعاية الطبية لي.	☐	☐	☐	☐
9. اثق بقرار الصيدلي عند تقديم الرعاية الطبية لي.	☐	☐	☐	☐
10. تعتبر مشكلة بالنسبة لي عندما يكون من يقدم لي الرعاية الصحية غير مسلم.	☐	☐	☐	☐
11. تعتبر مشكلة بالنسبة لي عندما يكون عرق من يقدم لي الرعاية الصحية غير مماثل لعريقي.	☐	☐	☐	☐
12. تعتبر مشكلة بالنسبة لي عندما يكون جنس من يقدم لي الرعاية الصحية غير مماثل لجنسي.	☐	☐	☐	☐
13. تعتبر مشكلة بالنسبة لي عندما يكون لغة من يقدم لي الرعاية الصحية غير مماثلة للغة.	☐	☐	☐	☐
14. غالبا اعاني من العنصرية أثناء حصولي على الرعاية الطبية بسبب انني مسلم.	☐	☐	☐	☐
15. لا يوجد لدي مشكلة في حجز موعد مع الطبيب أو مقدمي الرعاية الصحية الآخرين.	☐	☐	☐	☐
16. لا يوجد لدي مشكلة في الذهاب إلى غرفة الطوارئ عندما أكون مريض.	☐	☐	☐	☐
17. لا يوجد لدي مشكلة في سؤال الصيدلي حول أدويتي.	☐	☐	☐	☐
18. اعرف من أسأل عندما يكون لدى أسئلة حول صحتي.	☐	☐	☐	☐

القسم الثاني / الفرع الثالث: تصوراتك تجاه خدمات الصيدلة

يتضمن هذا الجزء أسئلة حول تصوراتك للخدمات التي سبق وان تلقيتها من الصيدلة في الولايات المتحدة. يرجى اختيار المربع المناسب بوضع علامة (√) لمعرفة مستوى موافقتك مع العبارات أدناه.

العناصر	لا أوافق وبشدة	لا أوافق	أوافق	أوافق وبشدة
1. أنا راض جداً عن الخدمات التي يقدمها لي الصيدلة.	☐	☐	☐	☐
2. أقدر الخدمات المقدمة لي من الصيدلة.	☐	☐	☐	☐
3. هناك أوقات يبدو فيها الصيدلة غير مخلصون.	☐	☐	☐	☐
4. الصيدلة على علم بثقافة مجتمعي وكذلك ديني.	☐	☐	☐	☐
5. دائماً يعاملني الصيدلة باحترام.	☐	☐	☐	☐
6. الصيدلة جديرون بالثقة.	☐	☐	☐	☐
7. يشرح الصيدلة الأمور لي بطريقة تساعدني على الفهم.	☐	☐	☐	☐
8. الصيدلة قادرون على فهم ما أحاول أن أقول.	☐	☐	☐	☐
9. يقدم الصيدلة لي معلومات مكتوبة بلغة أستطيع فهمها.	☐	☐	☐	☐
10. أشعر بالارتياح عند الاتصال بالصيدلي إذا كان لدى سؤال عن الادوية.	☐	☐	☐	☐
11. دائماً أشعر ان على الاستعجال عندما أتكلم مع الصيدلي.	☐	☐	☐	☐
12. يمكنني وبسهولة الاتصال بصيدلي عندما يكون لدى أسئلة.	☐	☐	☐	☐
13. يقدم لي الصيدلة معلومات مفيدة في أهداف العلاج.	☐	☐	☐	☐
14. يقدم الصيدلة لي معلومات حول ما يجب القيام به إذا واجهتني اعراض جانبية للأدوية.	☐	☐	☐	☐
15. يقدم الصيدلة اجابات كافيه على أسئلتي.	☐	☐	☐	☐

الجزء الثالث: مفاهيم الثقافة الأمريكية والتركيبة السكانية

هنا نريد معرفة تصوراتك الخاصة وجهة نظرك وكذلك خبرتك حول العيش في الولايات المتحدة الأمريكية وبعد ذلك نود منك ان تخبرنا عن نفسك.

القسم الاول/الفرع الاول: ثقافة المسلمين في الولايات المتحدة الأمريكية

يرجى اختيار المربع الذي يمثل مدى صحة كل فقرة بالنسبة لك. عند اختيارك، عليك الاعتقاد أن هذا الاختيار هو الاختيار الصحيح في معظم الاوقات والحالات

الفقرات	ليس صحيح على الاطلاق بالنسبة لي	صحيح قليلاً بالنسبة لي	معتدل الصحة بالنسبة لي	صحيح جداً بالنسبة لي	صحيح للاغاية بالنسبة لي
1. معظم أصدقائي مسلمون.	☐	☐	☐	☐	☐
2. مهم جداً بالنسبة لي الحفاظ على ممارسة التعاليم الإسلامية في حياتي اليومية.	☐	☐	☐	☐	☐
3. لا اشعر بالتضايق عند مصافحة اشخاص من الجنس الآخر.	☐	☐	☐	☐	☐
4. احتفل دائماً بالعطلات الأمريكية مثل عيد الحب، عيد الشكر، عيد الرابع من يوليو، وعيد الهالوين.	☐	☐	☐	☐	☐
5. مهم جداً بالنسبة لي تربية اولادي وبناتي تربية اسلامية.	☐	☐	☐	☐	☐
6. اشعر أنه من المهم المشاركة في النظام السياسي الأمريكي بالتصويت في الانتخابات المحلية والاتحادية.	☐	☐	☐	☐	☐

القسم الاول/الفرع الثاني: تصورات الأمريكيين عن المسلمين

نود معرفة آرائكم حول كيف يشعر الأميركيون حيال المسلمين. يرجى اختيار المربع المناسب بوضع علامة (√) لمعرفة مستوى موافقتك مع العبارات أدناه.

العناصر	لا أوافق ويشدة	لا أوافق	أوافق	أوافق ويشدة
1. العديد من الأمريكيين يتجنبون المسلمين.	☐	☐	☐	☐
2. يرتاب الأميركيون من المسلمين.	☐	☐	☐	☐
3. بشكل عام، يثق الأميركيون بالمسلمين.	☐	☐	☐	☐
4. بشكل عام، يخشى الإسلام عدد قليل فقط من الأمريكيين.	☐	☐	☐	☐
5. يشعر غالبية الأميركيون بالأمان بين المسلمين.	☐	☐	☐	☐
6. العديد من الأمريكيين يصاب بالعصبية عند حضور المسلمين.	☐	☐	☐	☐
7. تعرض وسائل الإعلام الأميركية دائماً المسلمين كشعب خطير.	☐	☐	☐	☐
8. تعرض وسائل الإعلام دائماً الإسلام كتهديد للثقافة الأميركية.	☐	☐	☐	☐
9. تنشر وسائل الإعلام الأميركية الخوف الهائل من الإسلام والمسلمين.	☐	☐	☐	☐

القسم الثاني / الفرع الاول: الدين الإسلامي

نود ان نعلم بشكل أعمق عن ممارساتك الدينية، لذلك يرجى منك اختيار المربع الذي يتوافق مع استجابتك.

1) كيف يمكن أن تصف مذهبك؟

☐ سني ☐ شيعي ☐ أخرى، الرجاء التحديد: _____

2) الأسئلة التالية تتعلق بدور الدين في حياتك. الرجاء اختيار المربع الذي ينطبق على ممارساتك الحالية.

أ) كم مره تقرا أو تتلو القرآن؟

☐ ولا مره ☐ مرتين أو ثلاث مرات في السنة ☐ تقريبا مرة واحدة في الشهر
☐ مرة واحدة في الأسبوع ☐ أكثر من مرة واحدة في الأسبوع ☐ كل يوم

ب) كم مره تصلي الصلوات اليومية المفروضة؟

☐ أنا لا أصلي كل يوم ☐ مره واحده في اليوم ☐ مرتين في اليوم
☐ ثلاث مرات في اليوم ☐ اربع مرات في اليوم ☐ خمس مرات في اليوم

ت) كم عدد المرات التي تذهب فيها إلى المسجد أو المركز الإسلامي، أو تحضر تجمعات المسلمين؟

☐ ولا مره ☐ مرة واحدة أو مرتين في السنة ☐ أكثر من مره في شهر
☐ مرة واحدة في الأسبوع ☐ أكثر من مرة واحدة في الأسبوع ☐ كل يوم

ث) كم مره تصوم؟

☐ أبداً لا أصوم ☐ أصوم بعض ايام شهر رمضان ☐ أصوم شهر رمضان كاملا فقط.
☐ أصوم شهر رمضان كاملا بالإضافة ☐ أصوم شهر رمضان كاملا بالإضافة ☐ إلى عدة مرات في السنة. ☐ إلى مرة واحدة كل شهر. ☐ بالإضافة إلى كل أسبوع.

ج) كم عدد الأيام التي استطعت صيامها تقريبا في شهر رمضان الماضي؟

☐ ولا يوم، لم استطع الصيام اطلاقا ☐ استطعت صيام ----- يوم (أيام)

ح) كم عدد المرات التي تمارس فيها العبادات الغير واجبة (مثل: الدعاء، أو اي انواع الصلاة الأخرى الغير مفروضة مثل قيام الليل)؟

☐ لا أمارس ابداً ☐ أمارس، ولكن ليس كثيرا ☐ أمارس بصفة شهرية
☐ أمارس على الأقل مرة واحدة في الأسبوع ☐ أمارس على الأقل مرة واحدة في اليوم ☐ أمارس أكثر من مرة واحدة في اليوم

القسم الثاني / الفرع الثاني: المعلومات الشخصية

الرجاء الإجابة على الأسئلة التالية حول نفسك. يرجى اختيار المربع الذي يتوافق مع استجابتك.

(1) في أي سنة ولدت؟ 19__

(2) ما هو جنسك؟

☐ ذكر

☐ أنثى

(3) ما هو عرقك؟

☐ أبيض ☐ أسود ☐ آسيوي ☐ من أصل إسباني ☐ أخرى، الرجاء التحديد: _____

(4) أين ولدت؟

☐ الولايات المتحدة ☐ أخرى، الرجاء التحديد: _____

(5) منذ متى وانت في الولايات المتحدة الأمريكية؟ _____ سنة

(6) ما هي حالتك الاجتماعية؟

☐ متزوج ☐ مطلق ☐ منفصل ☐ أرمل ☐ لم تتزوج

(7) ما هو مستوى تعليمك؟

☐ أقل من المتوسطة ☐ خريج الثانوية ☐ كلية الدراسات العليا ☐ خريج المتوسطة ☐ بعض الكليات ☐ التخرج شهادة عليا (الماجستير أو الدكتوراه)

(8) ما هو مجموع دخل أسرتك من جميع المصادر، قبل الضرائب؟

☐ 0 – 20,000 دولار ☐ 20,000 – 29,999 دولار ☐ 30,000 – 49,999 دولار ☐ 50,000 – 74,999 دولار ☐ 75,000 – 99,999 دولار ☐ $\geq 100,000$ دولار

(9) هل تعمل حالياً؟

☐ نعم، اعمل دوام كامل ☐ لا اعمل ، ولا أريد أن أعمل ☐ لا، أنا طالب ☐ نعم، اعمل جزء من الوقت ☐ لا اعمل ، لكن ابحث عن عمل الان ☐ لا، أنا متقاعد

(10) هل تملك أعمال تجارية خاصة بك؟

☐ لا

☐ نعم

(11) كم عدد الاشخاص البالغين، 18 سنة فأكثر، يعيشون حالياً في منزلك "بما في ذلك نفسك"؟ _____

(12) كم عدد الأطفال تحت سن 18 سنة يعيشون في منزلك؟ _____

شكراً للمشاركة في الدراسة. يرجى استخدام المساحة أدناه لتزويدنا بتعليقاتكم. يرجى إعادة الاستبيان الى الباحث للحصول على بطاقة هدية بقيمة 25 دولار

References

- Aadil, N., Fassi-Fihri, A., Houti, I., Benaji, B., Ouhakki, M., Kotbi, S., . . . Hakkou, F. (2000). Influence of Ramadan on the pharmacokinetics of a single oral dose of valproic acid administered at two different times. *Methods Find Exp Clin Pharmacol*, 22(2), 109-114.
- Aadil, N., Houti, I., & Moussamih, S. (2004). Drug intake during Ramadan. *BMJ: British Medical Journal*, 329(7469), 778.
- Abdul-Rahman, M. S. (2007). *Islam: Questions and Answers-Jurisprudence and Islamic Rulings*: MSA Publication Limited.
- Abdulrahim, S., & Baker, W. (2009). Differences in self-rated health by immigrant status and language preference among Arab Americans in the Detroit Metropolitan Area. *Soc Sci Med*, 68(12), 2097-2103. doi:10.1016/j.socscimed.2009.04.017
- Aboul-Enein, B. H., & Aboul-Enein, F. H. (2010). The cultural gap delivering health care services to Arab American populations in the United States. *J Cult Divers*, 17(1), 20-23.
- Aday, L. A. (2002). *At risk in America: The health and health care needs of vulnerable populations in the United States* (Vol. 13): John Wiley & Sons.
- Aday, L. A., & Andersen, R. (1974). A Framework for the Study of Access to Medical Care. *Health Services Research*, 9(3), 208-220.
- Aday, L. A., Andersen, R., & Fleming, G. V. (1980). *Health care in the U.S: equitable for whom?*: Sage Publications.
- Aday, L. A., Andersen, R. M., Loevy, S. S., & Kremer, B. (1985). *Hospital-physician sponsored primary Care: Marketing and Impact*: Health Administration Press.
- Afilalo, J., Marinovich, A., Afilalo, M., Colacone, A., Leger, R., Unger, B., & Giguere, C. (2004). Nonurgent emergency department patient characteristics and barriers to primary care. *Academic Emergency Medicine*, 11(12), 1302-1310.
- Aharony, L., & Strasser, S. (1993). Patient satisfaction: what we know about and what we still need to explore. *Med Care Rev*, 50(1), 49-79.
- Akanji, A., Mojiminiyi, O., & Abdella, N. (2000). Beneficial changes in serum apo A-1 and its ratio to apo B and HDL in stable hyperlipidaemic subjects after Ramadan fasting in Kuwait. *European journal of clinical nutrition*, 54(6), 508-513.
- Akbani, M., Saleem, M., Gadit, W., Ahmed, M., Basit, A., & Malik, R. (2005). Fasting and feasting safely during Ramadan in the patient with diabetes. *Practical Diabetes International*, 22(3), 100-104.
- Al-Arouj, M., Assaad-Khalil, S., Buse, J., Fahdil, I., Fahmy, M., Hafez, S., ... Thomas, A. (2010). Recommendations for Management of Diabetes During Ramadan: Update 2010. *Diabetes Care*, 33(8), 1895-1902. <http://doi.org/10.2337/dc10-0896>
- Al-Hourani, H., & Atoum, M. (2007). Body composition, nutrient intake and physical activity patterns in young women during Ramadan. *Singapore medical journal*, 48(10), 906.
- Ali, W., Clifton, E., Duss, M., Fang, L., Keyes, S., & Shakir, F. (2011). Fear, Inc The Roots of the Islamophobia Network in America. Retrieved from <https://cdn.americanprogress.org/wp-content/uploads/issues/2011/08/pdf/islamophobia.pdf>
- Alqurashi, K. A., Aljabri, K. S., & Bokhari, S. A. (2011). Prevalence of diabetes mellitus in a Saudi community. *Annals of Saudi medicine*, 31(1), 19.

- Alshehri, A. M., Barner, J. C., Brown, C. M., & Rush, S. K. (2015). Medication and health problems and recommendations from MTM services provided by third-year pharmacy students in community pharmacies. *Currents in Pharmacy Teaching and Learning*, 7(1), 70-77.
- Andersen, R. (1968). A behavioral model of families' use of health services. *Research Ser.*(25).
- Andersen, R. (1995). Revisiting the behavioral model and access to medical care: does it matter? *Journal of health and social behavior*, 36(1), 1-10.
- Andersen, R., Davidson, P. L., & Ganz, P. A. (1994). Symbiotic relationships of quality of life, health services research and other health research. *Qual Life Res*, 3(5), 365-371.
- Andersen, R., & Kravits, J. (1976). EQUITY IN HEALTH SERVICES; Empirical Analysis in Social Policy. *AJN The American Journal of Nursing*, 76(8), 1339.
- Andersen, R., Marcus, M., & Mahshigan, M. (1995). A comparative systems perspective on oral health promotion and disease prevention. *Oral Health Promotion: socio-dental sciences in action. Munksgaard International Publishers, Copenhagen*, 307-340.
- Andersen, R., & Newman, J. F. (1973). Societal and individual determinants of medical care utilization in the United States. *Milbank Mem Fund Q Health Soc*, 51(1), 95-124.
- Andersen, R., & Newman, J. F. (2005). Societal and individual determinants of medical care utilization in the United States. *Milbank Quarterly*, 83(4), Online-only-Online-only.
- Andersen, R., Smedby, B. r., & Andersen, O. (1970). *Medical care use in Sweden and the United States; a comparative analysis of systems and behavior* (Vol. 27): Center for Health Administration Studies.
- Andersen, R. M., Yu, H., Wyn, R., Davidson, P. L., Brown, E. R., & Teleki, S. (2002). Access to medical care for low-income persons: how do communities make a difference? *Medical care research and review*, 59(4), 384-411.
- Anderson, L. A., & Dedrick, R. F. (1990). Development of the trust in physician scale: A measure to assess interpersonal trust inpatient-physician relationships. *Psychological reports*, 67(3f), 1091-1100.
- Ani, C., Bazargan, M., Bazargan-Hejazi, S., Andersen, R. M., Hindman, D. W., & Baker, R. S. (2008). Correlates of self-diagnosis of chronic medical and mental health conditions in under-served African American and Latino populations. *Ethn Dis*, 18(2 Suppl 2), S2-105.
- Asfar, T., Ahmad, B., Rastam, S., Mulloli, T., Ward, K., & Maziak, W. (2007). Self-rated health and its determinants among adults in Syria: a model from the Middle East. *BMC Public Health*, 7(1), 177.
- Aslam, M., & Assad, A. (1986). Drug regimens and fasting during Ramadan: A survey in Kuwait. *Public health*, 100(1), 49-53.
- Aslam, M., & Healy, M. (1986). Compliance and drug therapy in fasting Moslem patients. *Journal of Clinical Pharmacy and Therapeutics*, 11(5), 321-325.
- Athar, S. (2005). Ramadan fasting and Muslim patients: Retrieved December.
- Azizi, F. (2010). Islamic fasting and health. *Annals of Nutrition and Metabolism*, 56(4), 273-282.
- Azizi, F., & Rasouli, H. A. (1987). Serum glucose, bilirubin, calcium, phosphorus, protein and albumin concentrations during Ramadan. *Medical Journal of The Islamic Republic of Iran (MJIRI)*, 1(1), 38-41.
- Bagasra, A. B. (2011). *Acculturation, religious commitment, and conceptualization of mental illness in the Muslim American community*. SAYBROOK UNIVERSITY.

- BaHammam, A. S., Almushailhi, K., Pandi-Perumal, S. R., & Sharif, M. M. (2014). Intermittent fasting during Ramadan: does it affect sleep? *Journal of sleep research*, 23(1), 35-43.
- Bakhotmah, B. A. (2011). The puzzle of self-reported weight gain in a month of fasting (Ramadan) among a cohort of Saudi families in Jeddah, Western Saudi Arabia. *Nutr J*, 10, 84.
- Barnard, R. J., Jung, T., & Inkeles, S. B. (1994). Diet and exercise in the treatment of NIDDM. The need for early emphasis. *Diabetes Care*, 17(12), 1469-1472.
- Barry, D. T. (2005). Measuring acculturation among male Arab immigrants in the United States: an exploratory study. *J Immigr Health*, 7(3), 179-184. doi:10.1007/s10903-005-3674-9
- Bashoff, E. C., & Beaser, R. S. (1995). Insulin therapy and the reluctant patient. Overcoming obstacles to success. *Postgrad Med*, 97(2), 86-90, 93-86.
- Belkhadir, J., El Ghomari, H., Klöcker, N., Mikou, A., Nasciri, M., & Sabri, M. (1993). Muslims with non-insulin dependent diabetes fasting during Ramadan: treatment with glibenclamide. *BMJ: British Medical Journal*, 307(6899), 292.
- Berkman, L. F., Glass, T., Brissette, I., & Seeman, T. E. (2000). From social integration to health: Durkheim in the new millennium. *Soc Sci Med*, 51(6), 843-857.
- Bernieh, B., Al Hakim, M., & Boobes, Y. (2010). Fasting Ramadan in chronic kidney disease patients: clinical and biochemical effects. *Saudi Journal of Kidney Diseases and Transplantation*, 21(5), 898.
- Blackwell, A. H. (2009). *Ramadan*: Infobase Publishing.
- Blackwell, D. L., Martinez, M. E., Gentleman, J. F., Sanmartin, C., & Berthelot, J. M. (2009). Socioeconomic status and utilization of health care services in Canada and the United States: findings from a binational health survey. *Med Care*, 47(11), 1136-1146. doi:10.1097/MLR.0b013e3181adcbe9
- Bounthavong, M., Christopher, M. L., Mendes, M. A., Foster, E. B., Johns, S. T., Lim, L., . . . Stewart, A. G. (2010). Measuring patient satisfaction in the pharmacy specialty immunization clinic: a pharmacist-run Immunization Clinic at the Veterans Affairs San Diego Healthcare System. *Int J Pharm Pract*, 18(2), 100-107.
- Boyd, A. T., Song, D. L., Meyer, J. P., & Altice, F. L. (2015). Emergency department use among HIV-infected released jail detainees. *J Urban Health*, 92(1), 108-135. doi:10.1007/s11524-014-9905-4
- Brandon, L. J., & Proctor, L. (2010). Comparison of health perceptions and health status in African Americans and Caucasians. *J Natl Med Assoc*, 102(7), 590-597.
- Brenner, S.-O., & Levi, L. (1987). Long-term unemployment among women in Sweden. *Social science & medicine*, 25(2), 153-161.
- Briesacher, B., & Corey, R. (1997). Patient satisfaction with pharmaceutical services at independent and chain pharmacies. *Am J Health Syst Pharm*, 54(5), 531-536.
- Brown, A. (1947). Fluid intakes in the desert. *Physiology of Man in the Desert*. New York, NY: Intersciences.
- Broyles, R. W., McAuley, W. J., & Baird-Holmes, D. (1999). The medically vulnerable: their health risks, health status, and use of physician care. *Journal of health care for the poor and underserved*, 10(2), 186-200.
- Centers for Disease Control Prevention. (2012). Crude and Age-Adjusted Percentage of Adults Aged 18 Years or Older with Diagnosed Diabetes Reporting Visual Impairment, United

- States, 1997–2011. Retrieved from
<https://www.cdc.gov/diabetes/statistics/visual/fig2.htm>
- Centers for Disease Control Prevention. (2012). Distribution of First-Listed Diagnoses Among Emergency Department Visits with Diabetes as Any-Listed Diagnosis, Adults, United States, 2009. Retrieved from
<https://www.cdc.gov/diabetes/statistics/emergency/fig3.htm>
- Centers for Disease Control Prevention. (2013). CDC health disparities and inequalities report—United States, 2013. *Morbidity and Mortality Weekly Report*, 62, 1-186.
- Centers for Disease Control Prevention. (2014). Mean and Median Distribution of Diabetes Duration Among Adults Aged 18–79 Years, United States, 1997–2011. Retrieved from
<https://www.cdc.gov/diabetes/statistics/duration/fig2.htm>
- Centers for Disease Control Prevention. (2014). Distribution of First-Listed Diagnoses Among Hospital Discharges with Diabetes as Any-Listed Diagnosis, Adults Aged 18 Years and Older, United States, 2010. Retrieved from
<https://www.cdc.gov/diabetes/statistics/hosp/adulttable1.htm>
- Chamsi-Pasha, H., & Ahmed, W. H. (2004). The effect of fasting in Ramadan on patients with heart disease. *Saudi medical journal*, 25(1), 47-51.
- Chen, A. W., Kazanjian, A., & Wong, H. (2008). Determinants of mental health consultations among recent Chinese immigrants in British Columbia, Canada: Implications for mental health risk and access to services. *Journal of immigrant and minority health*, 10(6), 529-540.
- Chen, S. L., Tsai, J. C., & Chou, K. R. (2011). Illness perceptions and adherence to therapeutic regimens among patients with hypertension: a structural modeling approach. *Int J Nurs Stud*, 48(2), 235-245. doi:10.1016/j.ijnurstu.2010.07.005
- Chen, S. L., Tsai, J. C., & Lee, W. L. (2009). The impact of illness perception on adherence to therapeutic regimens of patients with hypertension in Taiwan. *J Clin Nurs*, 18(15), 2234-2244. doi:10.1111/j.1365-2702.2008.02706.x
- Chilcot, J., Wellsted, D., & Farrington, K. (2011). Illness perceptions predict survival in haemodialysis patients. *Am J Nephrol*, 33(4), 358-363. doi:10.1159/000326752
- Cipolle, R. J., Strand, L. M., & Morley, P. C. (1998). *Pharmaceutical care practice*: McGraw-Hill.
- Clarke, M. (2013). *Islam and new kinship: Reproductive technology and the shariah in Lebanon* (Vol. 16): Berghahn Books.
- Control, C. f. D., & Prevention. (2014). National diabetes statistics report: estimates of diabetes and its burden in the United States, 2014. *Atlanta, GA: US Department of Health and Human Services, 2014*.
- Cross, J. H., Eminson, J., & Wharton, B. A. (1990). Ramadan and birth weight at full term in Asian Moslem pregnant women in Birmingham. *Archives of disease in childhood*, 65(10 Spec No), 1053-1056.
- Currie, L. B., Patterson, M. L., Moniruzzaman, A., McCandless, L. C., & Somers, J. M. (2014). Examining the relationship between health-related need and the receipt of care by participants experiencing homelessness and mental illness. *BMC Health Serv Res*, 14, 404. doi:10.1186/1472-6963-14-404
- Daumit, G. L., Crum, R. M., Guallar, E., Powe, N. R., Primm, A. B., Steinwachs, D. M., & Ford, D. E. (2003). Outpatient prescriptions for atypical antipsychotics for African Americans,

- Hispanics, and whites in the United States. *Archives of General Psychiatry*, 60(2), 121-128.
- Davis, M., Poisal, J., Chulis, G., Zarabozo, C., & Cooper, B. (1999). Prescription drug coverage, utilization, and spending among Medicare beneficiaries. *Health Affairs*, 18(1), 231-243.
- Davis, T. C., Long, S. W., Jackson, R. H., Mayeaux, E., George, R. B., Murphy, P. W., & Crouch, M. A. (1993). Rapid estimate of adult literacy in medicine: a shortened screening instrument. *Family medicine*, 25(6), 391-395.
- de Boer, A. G., Wijker, W., & de Haes, H. C. (1997). Predictors of health care utilization in the chronically ill: a review of the literature. *Health Policy*, 42(2), 101-115.
- de Vries, Sieta T., et al. "Medication beliefs, treatment complexity, and non-adherence to different drug classes in patients with type 2 diabetes." *Journal of psychosomatic research* 76.2 (2014): 134-138.
- Dhingra, S., Zack, M., Strine, T., Pearson, W., & Balluz, L. (2010). Determining prevalence and correlates of psychiatric treatment with Andersen's behavioral model of health services use. *Psychiatric Services*, 61(5), 524-528.
- Dickens, C., McGowan, L., Percival, C., Tomenson, B., Cotter, L., Heagerty, A., & Creed, F. (2008). Negative illness perceptions are associated with new-onset depression following myocardial infarction. *Gen Hosp Psychiatry*, 30(5), 414-420. doi:10.1016/j.genhosppsy.2008.04.003
- Dietrich, U. C. (1996). Factors influencing the attitudes held by women with type II diabetes: a qualitative study. *Patient Educ Couns*, 29(1), 13-23.
- Doran, K. M., Shumway, M., Hoff, R. A., Blackstock, O. J., Dilworth, S. E., & Riley, E. D. (2014). Correlates of hospital use in homeless and unstably housed women: the role of physical health and pain. *Womens Health Issues*, 24(5), 535-541. doi:10.1016/j.whi.2014.06.003
- Einbinder, L. C., & Schulman, K. A. (2000). The effect of race on the referral process for invasive cardiac procedures. *Medical care research and review*, 57(4 suppl), 162-180.
- el-Islam, M. F., Malasi, T. H., & Abu-Dagga, S. I. (1988). Oral contraceptives, sociocultural beliefs and psychiatric symptoms. *Soc Sci Med*, 27(9), 941-945.
- El Ati, J., Beji, C., & Danguir, J. (1995). Increased fat oxidation during Ramadan fasting in healthy women: an adaptative mechanism for body-weight maintenance. *The American journal of clinical nutrition*, 62(2), 302-307.
- Erkeköl, F. Ö., Çelik, G. E., Keskin, Ö., Güllü, E., Mungan, D., & Mısırlıgil, Z. (2006). Fasting: an important issue in asthma management compliance. *Annals of Allergy, Asthma & Immunology*, 97(3), 370-374.
- Etemadyfar, M. (2001). Effect of Ramadan on Frequency of Seizures. Abstract Book, Congress of Health and Ramadan. *Iranian journal of endocrinology and metabolism*, 32.
- Fagard, R. H. (2001). Exercise characteristics and the blood pressure response to dynamic physical training. *Med Sci Sports Exerc*, 33(6 Suppl), S484-492; discussion S493-484.
- Farooq, S., Nazar, Z., Akhtar, J., Irfan, M., Subhan, F., Ahmed, Z., . . . Naeem, F. (2010). Effect of fasting during Ramadan on serum lithium level and mental state in bipolar affective disorder. *Int Clin Psychopharmacol*, 25(6), 323-327. doi:10.1097/YIC.0b013e32833d18b2
- Fitzgerald, J. T., Davis, W. K., Connell, C. M., Hess, G. E., Funnell, M. M., & Hiss, R. G. (1996). Development and validation of the Diabetes Care Profile. *Evaluation & the Health Professions*, 19(2), 208-230.

- Fitzgerald, J. T., Funnell, M. M., Hess, G. E., Barr, P. A., Anderson, R. M., Hiss, R. G., & Davis, W. K. (1998). The reliability and validity of a brief diabetes knowledge test. *Diabetes Care*, 21(5), 706-710.
- Ford, R. C., Bach, S. A., & Fottler, M. D. (1997). Methods of measuring patient satisfaction in health care organizations. *Health Care Manage Rev*, 22(2), 74-89.
- Friedman, M. (1995). Changing practices in COPD: a new pharmacologic treatment algorithm. *CHEST Journal*, 107(5_Supplement), 194S-197S.
- Frost, G., & Pirani, S. (1987). Meal frequency and nutritional intake during Ramadan: a pilot study. *Human nutrition. Applied nutrition*, 41(1), 47-50.
- Gaborit, B., Dutour, O., Ronsin, O., Atlan, C., Darmon, P., Gharsalli, R., . . . Dutour, A. (2011). Ramadan fasting with diabetes: an interview study of inpatients' and general practitioners' attitudes in the South of France. *Diabetes and Metabolism*, 37(5), 395-402. doi:10.1016/j.diabet.2010.12.010
- Gaborit, B., Dutour, O., Ronsin, O., Atlan, C., Darmon, P., Gharsalli, R., . . . Dutour, A. (2011). Ramadan fasting with diabetes: an interview study of inpatients' and general practitioners' attitudes in the South of France. *Diabetes & metabolism*, 37(5), 395-402. doi:10.1016/j.diabet.2010.12.010
- Garay-Sevilla, M. E., Malacara, H. J., Gonzalez-Parada, F., & Jordan-Gines, L. (1998). The belief in conventional medicine and adherence to treatment in non-insulin-dependent diabetes mellitus patients. *J Diabetes Complications*, 12(5), 239-245.
- Gatrad, A. R., & Sheikh, A. (2001). Medical ethics and Islam: principles and practice. *Arch Dis Child*, 84(1), 72-75.
- Gelberg, L., Andersen, R. M., & Leake, B. D. (2000). The Behavioral Model for Vulnerable Populations: application to medical care use and outcomes for homeless people. *Health Services Research*, 34(6), 1273.
- Ghalib, M., Qureshi, J., Tamim, H., Ghamdi, G., Flaiw, A., Hejaili, F., . . . Al-Khader, A. A. (2008). Does repeated Ramadan fasting adversely affect kidney function in renal transplant patients? *Transplantation*, 85(1), 141-144.
- Gianfrancesco, F. D., Baines, A. P., & Richards, D. (1993). Utilization effects of prescription drug benefits in an aging population. *Health Care Financing Review*, 15(3), 113-113.
- Goel, M. S., Wee, C. C., McCarthy, E. P., Davis, R. B., Ngo-Metzger, Q., & Phillips, R. S. (2003). Racial and ethnic disparities in cancer screening. *Journal of general internal medicine*, 18(12), 1028-1035.
- Goldman, D. P., Joyce, G. F., Escarce, J. J., Pace, J. E., Solomon, M. D., Laouri, M., . . . Teutsch, S. M. (2004). Pharmacy benefits and the use of drugs by the chronically ill. *Jama*, 291(19), 2344-2350.
- Gonzalez, H. M., Tarraf, W., West, B. T., Chan, D., Miranda, P. Y., & Leong, F. T. (2010). Antidepressant use among Asians in the United States. *Depression and anxiety*, 27(1), 46-55.
- Gonzalez, P., Castaneda, S. F., Mills, P. J., Talavera, G. A., Elder, J. P., & Gallo, L. C. (2012). Determinants of Breast, Cervical and Colorectal Cancer Screening Adherence in Mexican-American Women. *Journal of community health*, 37(2), 421-433.
- Gottschalk, P., & Greenberg, G. (2008). *Islamophobia: making Muslims the enemy*: Rowman & Littlefield.

- Graves, K. D., Huerta, E., Cullen, J., Kaufman, E., Sheppard, V., Luta, G., . . . Mandelblatt, J. (2008). Perceived risk of breast cancer among Latinas attending community clinics: risk comprehension and relationship with mammography adherence. *Cancer Causes & Control*, 19(10), 1373-1382.
- Grim, B. J., & Karim, M. S. (2011). The Future of the Global Muslim Population: Projections for 2010-2030. *Washington DC: Pew Research Center*.
- Grant, R. W., Devita, N. G., Singer, D. E., & Meigs, J. B. (2003). Polypharmacy and medication adherence in patients with type 2 diabetes. *Diabetes care*, 26(5), 1408-1412.
- Gu, N. Y., Gai, Y., & Hay, J. W. (2008). The effect of patient satisfaction with pharmacist consultation on medication adherence: an instrumental variable approach. *Pharm Pract (Granada)*, 6(4), 201-210.
- Habbal, R., Azzouzi, L., Adnan, K., Tahiri, A., & Chraibi, N. (1998). Variations of blood pressure during the month of Ramadan]. *Archives des Maladies du Coeur et des Vaisseaux*, 91(8), 995.
- Hadi, K. H., Bener, A., Osman, M., Al-marri, A., & Al Suwaidi, J. (2012). The impact of diurnal fasting during Ramadan on the lipid profile, hs-CRP, and serum leptin in stable cardiac patients. *Vascular health and risk management*, 8, 7-14.
- Hajek, P., Myers, K., Dhanji, A.-R., West, O., & McRobbie, H. (2012). Weight change during and after Ramadan fasting. *J Public Health (Oxf)*, 34(3), 377-381. doi:10.1093/pubmed/fdr087
- Hallak, M. H., & Nomani, M. Z. (1988). Body weight loss and changes in blood lipid levels in normal men on hypocaloric diets during Ramadan fasting. *Am J Clin Nutr*, 48(5), 1197-1210.
- Halm, E. A., Mora, P., & Leventhal, H. (2006). No symptoms, no asthma: the acute episodic disease belief is associated with poor self-management among inner-city adults with persistent asthma. *Chest*, 129(3), 573-580. doi:10.1378/chest.129.3.573
- Hammad, A., Kysia, R., Rabah, R., Hassoun, R., & Connelly, M. (1999). Guide to Arab culture: Health care delivery to the Arab American community. Retrieved October, 15, 2010.
- Hammond, W. P., Matthews, D., & Corbie-Smith, G. (2010). Psychosocial factors associated with routine health examination scheduling and receipt among African American men. *J Natl Med Assoc*, 102(4), 276-289.
- Hammoud, M. M., White, C. B., & Fetters, M. D. (2005). Opening cultural doors: Providing culturally sensitive healthcare to Arab American and American Muslim patients. *American journal of obstetrics and gynecology*, 193(4), 1307-1311.
- Harcourt, N., Ghebre, R. G., Whembolua, G.-L., Zhang, Y., Osman, S. W., & Okuyemi, K. S. (2014). Factors associated with breast and cervical cancer screening behavior among African immigrant women in Minnesota. *Journal of immigrant and minority health*, 16(3), 450-456.
- Hausmann, L. R., Kressin, N. R., Hanusa, B. H., & Ibrahim, S. A. (2010). Perceived racial discrimination in health care and its association with patients' healthcare experiences: does the measure matter? *Ethn Dis*, 20(1), 40-47.
- Haynes-Maslow, L., Godley, P., Dimartino, L., White, B., Odom, J., Richmond, A., & Carpenter, W. (2014). African American women's perceptions of cancer clinical trials. *Cancer Med*, 3(5), 1430-1439. doi:10.1002/cam4.284

- Heisler, M., Piette, J. D., Spencer, M., Kieffer, E., & Vijan, S. (2005). The relationship between knowledge of recent HbA1c values and diabetes care understanding and self-management. *Diabetes Care*, 28(4), 816-822.
- Herold, J., & Waldron, I. (1985). Part-time employment and women's health. *Journal of Occupational and Environmental Medicine*, 27(6), 405-412.
- Hill, P. C., & Hood, R. W. (1999). *Measures of religiosity*: Religious Education Press.
- Hodge, D. R. (2005). Social work and the house of Islam: Orienting practitioners to the beliefs and values of Muslims in the United States. *Social Work*, 50(2), 162-173.
- Horne, R., & Weinman, J. (2002). Self-regulation and self-management in asthma: exploring the role of illness perceptions and treatment beliefs in explaining non-adherence to preventer medication. *Psychology and Health*, 17(1), 17-32.
- Howell, S., & Shryock, A. (2003). Cracking Down on Diaspora: Arab Detroit and America's "War on Terror". *Anthropological Quarterly*, 76(3), 443-462.
- Hunt, L. M., Pugh, J., & Valenzuela, M. (1998). How patients adapt diabetes self-care recommendations in everyday life. *J Fam Pract*, 46(3), 207-215.
- Hurley, R. E., Gage, B. J., & Freund, D. A. (1991). Rollover effects in gatekeeper programs: cushioning the impact of restricted choice. *Inquiry*, 28(4), 375-384.
- Hussain, M. (2012). *The Five Pillars of Islam : Laying the Foundations of Divine Love and Service to Humanity*: Kube Publishing Ltd.
- Huttin, C. (1994). The use of prescription charges. *Health Policy*, 27(1), 53-73.
- Ilkilic, I. (2002). Bioethical conflicts between Muslim patients and German physicians and the principles of biomedical ethics. *Med Law*, 21(2), 243-256.
- Inhorn, M. C. (2003). *Local babies, global science: Gender, religion, and in vitro fertilization in Egypt*: Psychology Press.
- Inhorn, M. C. (2012). *The new Arab man: emergent masculinities, technologies, and Islam in the Middle East*: Princeton University Press.
- Inhorn, M. C., & Fakih, M. H. (2006). Arab Americans, African Americans, and infertility: barriers to reproduction and medical care. *Fertility and Sterility*, 85(4), 844-852.
- Inhorn, M. C., & Serour, G. I. (2011). Islam, medicine, and Arab-Muslim refugee health in America after 9/11. *The Lancet*, 378(9794), 935-943.
- Insaf, T. Z., Jurkowski, J. M., & Alomar, L. (2010). Sociocultural factors influencing delay in seeking routine health care among Latinas: a community-based participatory research study. *Ethn Dis*, 20(2), 148-154.
- An Islamic View of Certain Contemporary Medical Issues*. (1997). Paper presented at the The 9th Fiqh-Medical Seminar, Casablanca, Morocco.
- Jaber, L. A., Brown, M. B., Hammad, A., Zhu, Q., & Herman, W. H. (2003). Lack of acculturation is a risk factor for diabetes in Arab immigrants in the US. *Diabetes Care*, 26(7), 2010-2014.
- Jamal, A. A., & Naber, N. C. (2008). *Race and Arab Americans before and after 9/11: From invisible citizens to visible subjects*: Syracuse University Press.
- Jean-Pierre, P., Fiscella, K., Griggs, J., Joseph, J. V., Morrow, G., Carroll, J., . . . Kirshner, J. J. (2010). Race/ethnicity-based concerns over understanding cancer diagnosis and treatment plan. *J Natl Med Assoc*, 102(3), 184-189.

- Jennings, S., Mazaik, C., & McKinlay, S. (1984). Women and work: An investigation of the association between health and employment status in middle-aged women. *Social science & medicine*, 19(4), 423-431.
- Jessop, D. C., & Rutter, D. R. (2003). Adherence to asthma medication: The role of illness representations. *Psychology and Health*, 18(5), 595-612.
- Jorm, A., Parslow, R., Christensen, H., & Jacomb, P. (2002). Factors associated with young adults' obtaining general practitioner services. *Australian Health Review*, 25(6), 109.
- Kadiri, A., Al-Nakhi, A., El-Ghazali, S., Jabbar, A., Al Arouj, M., Akram, J., . . . Ristic, S. (2001). Treatment of type 1 diabetes with insulin lispro during Ramadan. *Diabetes & metabolism*, 27(4), 482-486.
- Kaiser Family Foundation analysis of the Center for Disease Control and Prevention (CDC)'s Behavioral Risk Factor Surveillance System (BRFSS) 2013-2015 Survey Results access at <http://kff.org/disparities-policy/state-indicator/no-personal-doctor/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D>
- Kaufman, D. W., Kelly, J. P., Rosenberg, L., Anderson, T. E., & Mitchell, A. A. (2002). Recent patterns of medication use in the ambulatory adult population of the United States: the Slone survey. *Jama*, 287(3), 337-344.
- Kessler, R. C., House, J. S., & Turner, J. B. (1987). Unemployment and health in a community sample. *Journal of health and social behavior*, 51-59.
- Kim-Romo, D. N., Barner, J. C., Brown, C. M., Rivera, J. O., Garza, A. A., Klein-Bradham, K., . . . Brown, B. (2014). Spanish-speaking patients' satisfaction with clinical pharmacists' communication skills and demonstration of cultural sensitivity. *Journal of the American Pharmacists Association*, 54(2), 121-129.
- Kim, S., Martin, M. T., Pierce, A. L., & Zueger, P. (2014). Satisfaction With Medication Therapy Management Services at a University Ambulatory Care Clinic. *J Pharm Pract*. doi:10.1177/0897190014550718
- King, H., Aubert, R. E., & Herman, W. H. (1998). Global burden of diabetes, 1995-2025: prevalence, numerical estimates, and projections. *Diabetes Care*, 21(9), 1414-1431.
- Kinney, A. Y., Gammon, A., Coxworth, J., Simonsen, S. E., & Arce-Laretta, M. (2010). Exploring attitudes, beliefs, and communication preferences of Latino community members regarding BRCA1/2 mutation testing and preventive strategies. *Genetics in Medicine*, 12(2), 105-115.
- Knutson, K. L., Ryden, A. M., Mander, B. A., & Van Cauter, E. (2006). Role of sleep duration and quality in the risk and severity of type 2 diabetes mellitus. *Arch Intern Med*, 166(16), 1768-1774.
- Knutson, K. L., & Van Cauter, E. (2008). Associations between sleep loss and increased risk of obesity and diabetes. *Annals of the New York Academy of Sciences*, 1129(1), 287-304.
- Krieger, N., Smith, K., Naishadham, D., Hartman, C., & Barbeau, E. M. (2005). Experiences of discrimination: validity and reliability of a self-report measure for population health research on racism and health. *Social science & medicine*, 61(7), 1576-1596.
- Ku, L., & Matani, S. (2001). Left out: immigrants' access to health care and insurance. *Health Affairs*, 20(1), 247-256.

- Kulwicki, A. D., Miller, J., & Schim, S. M. (2000). Collaborative partnership for culture care: enhancing health services for the Arab community. *J Transcult Nurs*, 11(1), 31-39.
- Kunst, J. R., Sam, D. L., & Ulleberg, P. (2013). Perceived islamophobia: Scale development and validation. *International Journal of Intercultural Relations*, 37(2), 225-237.
- Laajam, M. (1990). Ramadan fasting and non-insulin-dependent diabetes: effect on metabolic control. *East African medical journal*, 67(10), 732-736.
- Laird, L. D., Amer, M. M., Barnett, E. D., & Barnes, L. L. (2007). Muslim patients and health disparities in the UK and the US. *Archives of disease in childhood*, 92(10), 922-926.
- Lange, L. J., & Piette, J. D. (2005). Perceived health status and perceived diabetes control: psychological indicators and accuracy. *Journal of psychosomatic research*, 58(2), 129-137.
- Lassila, H. C., Stoehr, G. P., Ganguli, M., Seaberg, E. C., Gilby, J. E., Belle, S. H., & Echement, D. A. (1996). Use of prescription medications in an elderly rural population: the MoVIES Project. *The Annals of Pharmacotherapy*, 30(6), 589-595.
- LaVeist, T. A., & Nuru-Jeter, A. (2002). Is doctor-patient race concordance associated with greater satisfaction with care? *Journal of health and social behavior*, 296-306.
- Leibowitz, A., Manning, W. G., & Newhouse, J. P. (1985). The demand for prescription drugs as a function of cost-sharing. *Soc Sci Med*, 21(10), 1063-1069.
- Leiper, J. B., Pitsiladis, Y., & Maughan, R. J. (2001). Comparison of water turnover rates in men undertaking prolonged cycling exercise and sedentary men. *Int J Sports Med*, 22(3), 181-185. doi:10.1055/s-2001-15912
- Leventhal, H., Leventhal, E. A., & Contrada, R. J. (1998). Self-regulation, health, and behavior: A perceptual-cognitive approach. *Psychology and Health*, 13(4), 717-733.
- Lewis, K. M. (2014). Living with a husband's chronic illness has a bad effect on his wife's health. *The Washington Post*. Retrieved from http://www.washingtonpost.com/?nid=top_pb_wplogo
- Linn, M. W., Sandifer, R., & Stein, S. (1985). Effects of unemployment on mental and physical health. *American Journal of Public Health*, 75(5), 502-506.
- Lip, G. Y., Khan, H., Bhatnagar, A., Brahmabhatt, N., Crook, P., & Davies, M. K. (2004). Ethnic differences in patient perceptions of heart failure and treatment: the West Birmingham heart failure project. *Heart*, 90(9), 1016-1019. doi:10.1136/hrt.2003.025742
- Locker, D., & Dunt, D. (1978). Theoretical and methodological issues in sociological studies of consumer satisfaction with medical care. *Soc Sci Med*, 12(4A), 283-292.
- Loke, S. C., Rahim, K., Kanesvaran, R., & Wong, T. (2010). A prospective cohort study on the effect of various risk factors on hypoglycaemia in diabetics who fast during Ramadan. *The Medical journal of Malaysia*, 65(1), 3-6.
- London, L., Hurtado-de-Mendoza, A., Song, M., Nagirimadugu, A., Luta, G., & Sheppard, V. B. (2015). Motivators and barriers to Latinas' participation in clinical trials: the role of contextual factors. *Contemp Clin Trials*, 40, 74-80. doi:10.1016/j.cct.2014.11.013
- Lorenzoni, L., Belloni, A., & Sassi, F. (2014). Health-care expenditure and health policy in the USA versus other high-spending OECD countries. *The Lancet*, 384(9937), 83-92.
- Lorig, K. R., Sobel, D. S., Ritter, P. L., Laurent, D., & Hobbs, M. (2001). Effect of a self-management program on patients with chronic disease. *Eff Clin Pract*, 4(6), 256-262.

- Lorig, K. R., Sobel, D. S., Stewart, A. L., Brown, B. W., Jr., Bandura, A., Ritter, P., . . . Holman, H. R. (1999). Evidence suggesting that a chronic disease self-management program can improve health status while reducing hospitalization: a randomized trial. *Med Care*, 37(1), 5-14.
- Lyons, A. S., Petrucelli, R. J., Bosch, J., & Barnert, A. H. (1978). *Medicine: an illustrated history*: HN Abrams.
- Mafauzy, M., Mohammed, W., Anum, M., Zulkifli, A., & Ruhani, A. (1990). A study of the fasting diabetic patients during the month of Ramadan. *Med J Malaysia*, 45(1), 14-17.
- Mahmoud, V. (1996). African American Muslim families. *Ethnicity and family therapy*, 2, 122-128.
- Malhotra, A., Scott, P., Scott, J., Gee, H., & Wharton, B. (1989). Metabolic changes in Asian Muslim pregnant mothers observing the Ramadan fast in Britain. *British Journal of Nutrition*, 61(03), 663-672.
- McFarland, B. H., Freeborn, D. K., Mullooly, J. P., & Pope, C. R. (1985). Utilization patterns among long-term enrollees in a prepaid group practice health maintenance organization. *Med Care*, 23(11), 1221-1233.
- McInturff, B., Harrington, E., Greenberg, A., & Walker, D. (2007). Perceived Health Challenges in the United States. *National Survey Results. Survey conducted for the Robert Wood Johnson Foundation's Commission to Build a Healthier America by Public Opinion Strategies and Greenberg Quinlan Rosner*.
- McKennis, A. T. (1999). Caring for the Islamic patient. *AORN journal*, 69(6), 1185-1196.
- McKercher, P. L., Taylor, S. D., Lee, J. A., Chao, J., & Kumar, R. N. (2002). Prescription drug use among elderly and nonelderly families. *Journal of managed care pharmacy: JMCP*, 9(1), 19-28.
- Meleis, A. I. (1981). The Arab American in the health care system. *AJN The American Journal of Nursing*, 81(06), 1180.
- Melton, J. G., & Baumann, M. (2010). *Religions of the world: a comprehensive encyclopedia of beliefs and practices*: ABC-CLIO.
- Moczygemba, L. R., Barner, J. C., Brown, C. M., Lawson, K. A., Gabrillo, E. R., Godley, P., & Johnsrud, M. (2010). Patient satisfaction with a pharmacist-provided telephone medication therapy management program. *Research in Social and Administrative Pharmacy*, 6(2), 143-154.
- Molloy, G. J., Gao, C., Johnston, D. W., Johnston, M., Witham, M. D., Struthers, A. D., & McMurdo, M. E. (2009). Adherence to angiotensin-converting-enzyme inhibitors and illness beliefs in older heart failure patients. *European journal of heart failure*, 11(7), 715-720.
- Morales, L. S., Cunningham, W. E., Brown, J. A., Liu, H., & Hays, R. D. (1999). Are Latinos less satisfied with communication by health care providers?. *Journal of general internal medicine*, 14(7), 409-417.
- Muazzam, M. G., & Khaleque, K. A. (1959). Effects of fasting in ramadhan. *J Trop Med Hyg*, 62, 292-294.
- Mueller, C., Schur, C., & O'Connell, J. (1997). Prescription drug spending: the impact of age and chronic disease status. *American Journal of Public Health*, 87(10), 1626-1629.

- Muslim Americans: No Signs of Growth in Alienation or Support for Extremism. (2011). *United States Politics and Policy*. Retrieved from <http://www.people-press.org/2011/08/30/muslim-americans-no-signs-of-growth-in-alienation-or-support-for-extremism/>
- Mustafa, K., Mahmoud, N., Gumaa, K., & Gader, A. (1978). The effects of fasting in Ramadan. *Br. J. Nutr*, 40, 583.
- Mutran, E., & Ferraro, K. F. (1988). Medical need and use of services among older men and women. *Journal of Gerontology*, 43(5), S162-S171.
- Mygind, A., Kristiansen, M., Wittrup, I., & Nørgaard, L. S. (2013). Patient perspectives on type 2 diabetes and medicine use during Ramadan among Pakistanis in Denmark. *International journal of clinical pharmacy*, 1-8.
- Naik-Panvelkar, P., Saini, B., & Armour, C. (2009). Measurement of patient satisfaction with community pharmacy services: a review. *Pharm World Sci*, 31(5), 525-537. doi:10.1007/s11096-009-9311-2
- Nandi, A., Galea, S., Lopez, G., Nandi, V., Strongarone, S., & Ompad, D. C. (2008). Access to and use of health services among undocumented Mexican immigrants in a US urban area. *American Journal of Public Health*, 98(11), 2011.
- National Minority Health Month/April 2015. (2015). Retrieved from <http://www.minorityhealth.hhs.gov/nmhm/>
- Newschaffer, C. J., Zhang, D., Hauck, W. W., Fanning, T., & Turner, B. J. (1999). Effect of enhanced prenatal and HIV-focused services for pregnant women who are infected by human immunodeficiency virus on emergency department use. *Med Care*, 37(12), 1308-1319.
- Nichol, M., Margolies, J., & Gill, M. (1997). Factors associated with antihypertensive prescribing. *The Annals of Pharmacotherapy*, 31(2), 154-159.
- O'Brien, B. (1989). The effect of patient charges on the utilisation of prescription medicines. *J Health Econ*, 8(1), 109-132.
- Okoro, O. N., Odedina, F. T., Reams, R. R., & Smith, W. T. (2012). Clinical cultural competency and knowledge of health disparities among pharmacy students. *American journal of pharmaceutical education*, 76(3), 40.
- Oxford Dictionaries. Oxford University Press. n.d. Web. Retrieved from http://www.oxforddictionaries.com/us/definition/american_english/acculturate
- Pascoe, G. C. (1983). Patient satisfaction in primary health care: a literature review and analysis. *Eval Program Plann*, 6(3-4), 185-210.
- Penn, D. J., & Smith, K. R. (2007). Differential fitness costs of reproduction between the sexes. *Proceedings of the National Academy of Sciences*, 104(2), 553-558.
- Perk, G., Ghanem, J., Aamar, S., Ben-Ishay, D., & Bursztyn, M. (2001a). The effect of the fast of Ramadan on ambulatory blood pressure in treated hypertensives. *Journal of human hypertension*, 15(10), 723-725.
- Perk, G., Ghanem, J., Aamar, S., Ben-Ishay, D., & Bursztyn, M. (2001b). The effect of the fast of Ramadan on ambulatory blood pressure in treated hypertensives. *Journal of Human Hypertension*, 15(10).

- Peterson, S., Nayda, R. J., & Hill, P. (2012). Muslim person's experiences of diabetes during Ramadan: information for health professionals. *Contemp Nurse*, 41(1), 41-47. doi:10.5172/conu.2012.41.1.41
- Phumipamorn, S., Pongwecharak, J., Soorapan, S., & Pattharachayakul, S. (2008). Effects of the pharmacist's input on glycaemic control and cardiovascular risks in Muslim diabetes. *Primary care diabetes*, 2(1), 31-37.
- Pinelli, N. R., & Jaber, L. A. (2011). Practices of Arab American patients with type 2 diabetes mellitus during Ramadan. *Journal of Pharmacy Practice*, 24(2), 211-215.
- Poisal, J. A., & Chulis, G. S. (2000). Medicare beneficiaries and drug coverage. *Health Affairs*, 19(2), 248-256.
- Poisal, J. A., Murray, L. A., Chulis, G. S., & Cooper, B. S. (1999). Prescription drug coverage and spending for Medicare beneficiaries. *Health Care Financing Review*, 20(3), 15.
- Polit, D. F., & Beck, C. T. (2008). *Nursing research: Generating and assessing evidence for nursing practice*: Lippincott Williams & Wilkins.
- Prentice, A. M., Prentice, A., Lamb, W. H., Lunn, P. G., & Austin, S. (1983). Metabolic consequences of fasting during Ramadan in pregnant and lactating women. *Human nutrition. Clinical nutrition*, 37(4), 283-294.
- Qaisi, V. G. (2000). Increasing awareness of health care concerns during Ramadan. *Journal of the American Pharmaceutical Association (Washington, DC: 1996)*, 41(4), 511-511.
- Reece, D. (1996). Covering and communication: The symbolism of dress among Muslim women. *Howard Journal of Communications*, 7(1), 35-52.
- Rees, G., Leong, O., Crowston, J. G., & Lamoureux, E. L. (2010). Intentional and unintentional nonadherence to ocular hypotensive treatment in patients with glaucoma. *Ophthalmology*, 117(5), 903-908. doi:10.1016/j.ophtha.2009.10.038
- Reitmanova, S., & Gustafson, D. L. (2008). "They can't understand it": maternity health and care needs of immigrant Muslim women in St. John's, Newfoundland. *Matern Child Health J*, 12(1), 101-111. doi:10.1007/s10995-007-0213-4
- Richards, E. G. (1999). *Mapping Time : The Calendar and Its History*. New York: Oxford University Press.
- Ross, C. E., & Bird, C. E. (1994). Sex stratification and health lifestyle: consequences for men's and women's perceived health. *Journal of health and social behavior*, 161-178.
- Ross, S., Walker, A., & MacLeod, M. (2004). Patient compliance in hypertension: role of illness perceptions and treatment beliefs. *Journal of human hypertension*, 18(9), 607-613.
- Sacks, F. M., Svetkey, L. P., Vollmer, W. M., Appel, L. J., Bray, G. A., Harsha, D., . . . Lin, P. H. (2001). Effects on blood pressure of reduced dietary sodium and the Dietary Approaches to Stop Hypertension (DASH) diet. DASH-Sodium Collaborative Research Group. *N Engl J Med*, 344(1), 3-10. doi:10.1056/nejm200101043440101
- Sakr, A. H. (1975). Fasting in Islam. *J Am Diet Assoc*, 67(1), 17-21.
- Salimbene, S. (2005). *What language does your patient hurt in?: a practical guide to culturally competent patient care* (2nd ed.): Emc Pub.
- Salti, I., Bénard, E., Detournay, B., Bianchi-Biscay, M., Le Brigand, C., Voinet, C., & Jabbar, A. (2004). A Population-Based Study of Diabetes and Its Characteristics During the Fasting Month of Ramadan in 13 Countries Results of the Epidemiology of Diabetes and Ramadan 1422/2001 (EPIDIAR) study. *Diabetes Care*, 27(10), 2306-2311.

- Saour, J., Sick, J., Khan, M., & Mamo, I. (1989). Dose Ramadan Fasting Complicate Anticoagulant therapy? *Ann Saudi Med*, 9, 538-540.
- Schneider, D. (1976). [Stress and sleep]. *Schweizer Archiv fur Neurologie, Neurochirurgie und Psychiatrie= Archives suisses de neurologie, neurochirurgie et de psychiatrie*, 121(1), 47-54.
- Schommer, J. C., & Kucukarslan, S. N. (1997). Measuring patient satisfaction with pharmaceutical services. *Am J Health Syst Pharm*, 54(23), 2721-2732; quiz 2741-2723.
- Scott, D. M., Dewey, M. W., Johnson, T. A., Kessler, M. L., & Friesner, D. L. (2010). Preliminary evaluation of medication therapy management services in assisted living facilities in rural Minnesota. *Consult Pharm*, 25(5), 305-319. doi:10.4140/TCP.n.2010.305
- Shah, S. M., Ayash, C., Pharaon, N. A., & Gany, F. M. (2008). Arab American immigrants in New York: health care and cancer knowledge, attitudes, and beliefs. *Journal of immigrant and minority health*, 10(5), 429-436.
- Shephard, R. (2013). Ramadan and sport: minimizing effects upon the observant athlete. *Sports Med*, 43(12), 1217-1241. doi:10.1007/s40279-013-0080-7
- Shi, L. (2000). Vulnerable populations and health insurance. *Medical care research and review*, 57(1), 110-134.
- Simonson, D. C. (1988). Etiology and prevalence of hypertension in diabetic patients. *Diabetes care*, 11(10), 821-827.
- Simpson, J. L., & Carter, K. (2008). Muslim women's experiences with health care providers in a rural area of the United States. *Journal of transcultural nursing*, 19(1), 16-23.
- Smith, J. I. (1999). *Islam in America*: Columbia University Press.
- Spector, R. E., & Spector, R. E. (2004). *Cultural diversity in health and illness*: Pearson Prentice Hall Upper Saddle River, NJ.
- Stannard, S. R. (2011). Ramadan and Its Effect on Fuel Selection during Exercise and Following Exercise Training. *Asian J Sports Med*, 2(3), 127-133.
- Steinberg, E. P., Gutierrez, B., Momani, A., Boscarino, J. A., Neuman, P., & Deverka, P. (2000). Beyond survey data: a claims-based analysis of drug use and spending by the elderly. *Health Affairs*, 19(2), 198-211.
- Stergachis, A., Maine, L. L., & Brown, L. (2002). The 2001 national pharmacy consumer survey. *Journal of the American Pharmacists Association*, 42(4), 568-576.
- Stevens, J. P. (2012). *Applied multivariate statistics for the social sciences*: Routledge.
- Stockdale, S. E., Tang, L., Zhang, L., Belin, T. R., & Wells, K. B. (2007). The effects of health sector market factors and vulnerable group membership on access to alcohol, drug, and mental health care. *Health Services Research*, 42(3p1), 1020-1041.
- Stuart, B., & Coulson, N. E. (1993). Dynamic aspects of prescription drug use in an elderly population. *Health Services Research*, 28(2), 237.
- Stuart, B., & Grana, J. (1998). Ability to pay and the decision to medicate. *Med Care*, 36(2), 202-211.
- Sulimani, R. A., Laajam, M., Al-Attas, O., Famuyiwa, F. O., Bashi, S., Mekki, M. O., & Al-Nuaim, A. A. (1991). The effect of Ramadan fasting on diabetes control in type II diabetic patients. *Nutrition Research*, 11(2), 261-264.

- Surood, S., & Lai, D. W. (2010). Impact of culture on use of western health services by older South Asian Canadians. *Canadian Journal of Public Health/Revue Canadienne de Sante'e Publique*, 176-180.
- Swan, J., Breen, N., Coates, R. J., Rimer, B. K., & Lee, N. C. (2003). Progress in cancer screening practices in the United States: results from the 2000 National Health Interview Survey. *Cancer*, 97(6), 1528-1540. doi:10.1002/cncr.11208
- Syed, I. B. (2002). Islamic Medicine: 1000 years ahead of its times. *JISHIM*, 2, 2-9.
- Tehrani, J. (2007). Selective racialization: Middle-Eastern American identity and the Faustian pact with whiteness. *Conn. L. Rev.*, 40, 1201.
- Taskinen, M. R. (2002). Diabetic dyslipidemia. *Atherosclerosis Supplements*, 3(1), 47-51.
- Thode, N., Bergmann, E., Kamtsiuris, P., & Kurth, B. M. (2005). [Predictors for ambulatory medical care utilization in Germany]. *Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz*, 48(3), 296-306. doi:10.1007/s00103-004-1004-3
- Tiliouine, H., & Belgoumid, A. (2009). An exploratory study of religiosity, meaning in life and subjective wellbeing in Muslim students from Algeria. *Applied Research in Quality of Life*, 4(1), 109-127.
- Tsuyuki, K., & Surratt, H. L. (2015). Antiretroviral drug diversion links social vulnerability to poor medication adherence in substance abusing populations. *AIDS Behav*, 19(5), 869-881. doi:10.1007/s10461-014-0969-7
- Ural, E., Kozdag, G., Kilic, T., Ural, D., Sahin, T., Celebi, O., & Komsuoglu, B. (2008). The effect of Ramadan fasting on ambulatory blood pressure in hypertensive patients using combination drug therapy. *Journal of human hypertension*, 22(3), 208-210.
- U.S. Census Bureau. (2016). Average Number Of People Per Family Household, By Race And Hispanic Origin, Marital Status, Age, And Education Of Householder: 2016 access at <https://www.census.gov/data/tables/2016/demo/families/cps-2016.html>
- U.S. Department of Health Human Services. (2011). Disparities in healthcare quality among racial and ethnic minority groups [Fact sheet].
- U.S. Department of Homeland Security. (2015). **2015 Yearbook of Immigration Statistics**. Retrieved from <https://www.dhs.gov/immigration-statistics/yearbook/2015/table14>
- Uysal, A., Erdoğan, M., Sahin, G., Kamel, N., & Erdoğan, G. (1998). Clinical and metabolic effects of fasting in 41 type 2 diabetic patients during Ramadan. *Diabetes Care*, 21(11), 2033-2034.
- van den Berk-Clark, C., & McGuire, J. (2014). Trust in health care providers: factors predicting trust among homeless veterans over time. *J Health Care Poor Underserved*, 25(3), 1278-1290. doi:10.1353/hpu.2014.0115
- Varga, L. M., & Surratt, H. L. (2014). Predicting Health Care Utilization in Marginalized Populations: Black, Female, Street-Based Sex Workers. *Women's Health Issues*, 24(3), e335-e343.
- Viswanathan, M., Kahwati, L. C., Golin, C. E., Blalock, S. J., Coker-Schwimmer, E., Posey, R., & Lohr, K. N. (2015). Medication therapy management interventions in outpatient settings: a systematic review and meta-analysis. *JAMA internal medicine*, 175(1), 76-87.
- Weinman, J., Petrie, K. J., Sharpe, N., & Walker, S. (2000). Causal attributions in patients and spouses following first-time myocardial infarction and subsequent lifestyle changes. *British Journal of Health Psychology*, 5(3), 263-274.

- Weinreb, L., Perloff, J., Goldberg, R., Lessard, D., & Hosmer, D. W. (2006). Factors associated with health service utilization patterns in low-income women. *J Health Care Poor Underserved, 17*(1), 180-199. doi:10.1353/hpu.2006.0036
- Weiss, L. J., & Blustein, J. (1996). Faithful patients: the effect of long-term physician-patient relationships on the costs and use of health care by older Americans. *Am J Public Health, 86*(12), 1742-1747.
- Weissman, J. S., Betancourt, J., Campbell, E. G., Park, E. R., Kim, M., Clarridge, B., . . . Maina, A. W. (2005). Resident physicians' preparedness to provide cross-cultural care. *Jama, 294*(9), 1058-1067. doi:10.1001/jama.294.9.1058
- Weissman, J. S., Stern, R., Fielding, S. L., & Epstein, A. M. (1991). Delayed access to health care: risk factors, reasons, and consequences. *Ann Intern Med, 114*(4), 325-331.
- Weissman, J. S., Witzburg, R., Linov, P., & Campbell, E. G. (1999). Termination from Medicaid: how does it affect access, continuity of care, and willingness to purchase insurance? *Journal of health care for the poor and underserved, 10*(1), 122-137.
- Wheatly, R., & Shelly, M. (1993). Drug treatment during Ramadan. Stopping bronchodilator treatment is dangerous. *BMJ: British Medical Journal, 307*(6907), 801.
- Whiting, D. R., Guariguata, L., Weil, C., & Shaw, J. (2011). IDF diabetes atlas: global estimates of the prevalence of diabetes for 2011 and 2030. *Diabetes research and clinical practice, 94*(3), 311-321.
- Wild, S., Roglic, G., Green, A., Sicree, R., & King, H. (2004). Global prevalence of diabetes estimates for the year 2000 and projections for 2030. *Diabetes Care, 27*(5), 1047-1053.
- Williams, P. T., & Franklin, B. (2007). Vigorous exercise and diabetic, hypertensive, and hypercholesterolemia medication use. *Med Sci Sports Exerc, 39*(11), 1933-1941. doi:10.1249/mss.0b013e318145b337
- Williams, S. L. (2014). Mental health service use among African-American emerging adults, by provider type and recency of use. *Psychiatr Serv, 65*(10), 1249-1255. doi:10.1176/appi.ps.201300329
- Wolinsky, F. D., Stump, T. E., & Johnson, R. J. (1995). Hospital utilization profiles among older adults over time: consistency and volume among survivors and decedents. *J Gerontol B Psychol Sci Soc Sci, 50*(2), S88-100.
- World Health Organization. (1946). Preamble to the Constitution, adopted by the International Health Conference held in New York 19 June to 22 July 1946. *The First Ten Years of the World Health Organization*.
- Worley, M., & Schommer, J. (1999). Pharmacist-patient relationships: factors influencing quality and commitment. *Journal of Social and Administrative Pharmacy, 16*(3/4), 157-173.
- Xu, K. T. (2002). Choice of and overall satisfaction with pharmacies among a community-dwelling elderly population. *Med Care, 40*(12), 1283-1293. doi:10.1097/01.mlr.0000036411.91560.30
- Yosef, A. R. O. (2008). Health Beliefs, Practice, and Priorities for Health Care of Arab Muslims in the United States Implications for Nursing Care. *Journal of transcultural nursing, 19*(3), 284-291.
- Zaidi, F. (2003). Fasting in Islam--implications for midwifery practice. *British Journal of Midwifery, 11*(5), 289-292.

Ziaee, V., Razaei, M., Ahmadinejad, Z., Shaikh, H., Yousefi, R., Yarmohammadi, L., . . . Behjati, M. (2006). The changes of metabolic profile and weight during Ramadan fasting. *Singapore medical journal*(47), 409-414.

Vita

Ahmed Mohammed Alshehri was born in Riyadh, Saudi Arabia, in 1984, to Mohammed and Zeina Alshehri. In January 2008, he earned his Bachelor's degree in pharmaceutical science from King Saud University College of Pharmacy in Riyadh, Saudi Arabia. After graduation, Ahmed worked as an inpatient pharmacist at King Abdulazizi Medical City National Guard Hospital for almost two years. In December 2008, in addition to working as a pharmacist, he also worked as a teaching assistant in King Saud University College of Pharmacy, Alkarje, Saudi Arabia. In August 2009, he resigned from his position as a pharmacist in King Abdulaziz Medical City and came to the U.S. to pursue his Master's and PhD degrees. After studying intensive English at The University of Texas at Austin for one year, he began his Master's degree in August 2010 in the College of Pharmacy, Health Outcomes and Pharmacy Practice division, at The University of Texas at Austin. Ahmed received his Master of Pharmaceutical Science from The University of Texas at Austin in December 2012. In 2013, among more than 60,000 Saudi students in the U.S., Ahmed was selected by the Saudi government as an outstanding student in the United States for obtaining a master's degree at one of the top ten Colleges of Pharmacy in the U.S. with an excellent GPA. While pursuing his Ph.D., Ahmed worked as a graduate research assistant in the College of Pharmacy in The University of Texas at Austin. He also is a member of the Pharmacy Honor Society, Rho Chi.

Permanent email: Ahmed_Alshehri@utexas.edu

This dissertation was typed by Ahmed Mohammed Alshehri.