RISK PERCEPTIONS OF CARDIOVASCULAR DISEASE AMONG
SAUDI ARABIAN WOMEN IN RELATION TO HOME COOKING
AND INTENTIONS TO COOK LOW FAT MEALS

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The purpose of this study was to investigate the risk perceptions and cooking behaviors of Saudi Arabian women in relation to cardiovascular disease (CVD) and intentions to cook low fat meals. Participants were Saudi Arabian women (ages 22-55). Data were collected through self-administered paper-pencil surveys in the summer of 2016. This study was conducted in a primary care clinic’s waiting room in a single hospital (King Khalid University Hospital) providing services to patients mainly from the Riyadh district of Saudi Arabia. The Home Cooking and Intentions to Cook Low Fat Meals Survey instrument was used in data collection. Both descriptive and inferential statistical data analyses were conducted using SPSS version 24.

The major findings of this study showed a moderate negative correlation between risk perception of CVD and fat-related cooking behavior. Significant positive correlation is seen between risk perception of CVD and intention to cook low fat meals. The participants demonstrated high fat cooking behavior. It is recommended to conduct further research to understand how perceptions are formed among Saudi Arabian women and why they do not practice healthy cooking behaviors to prevent CVD.
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CHAPTER I
INTRODUCTION

Cardiovascular disease (CVD) relates to diseases caused by disorders of the heart and blood vessels, and includes cerebrovascular disease, coronary heart disease, peripheral arterial disease, rheumatic heart disease, heart attack and stroke (World Health Organization [WHO], 2015). CVD accounts for more than 17.5 million deaths per year in the world, a number that is expected to grow to more than 23.6 million by 2030 (WHO, 2015). CVD is the number one cause of morbidity across the globe in the category of non-communicable diseases (NCDs; American Heart Association [AHA], 2015). Research studies around the world have revealed a substantial increase in cardiovascular disease by 41% between 1990-2013 (Institute for Health Metrics and Evaluation, 2015; Kelishadi & Poursafa, 2014). CVD is the leading cause of death not only for men but also for women worldwide (WHO, 2015). Globally, more than 8.6 million women die from CVD each year (Schenck-Gustafsson, 2009). Cardiovascular disease is a prominent cause of mortality among women throughout the world which has led the American Heart Association (AHA) to promote guidelines that specifically meet the needs of women (Berra, Fletcher, Hayman, & Miller, 2013). For the last two decades, the incidence of CVD among women has been increasing (Stranges & Guallar, 2012). Since 1984, more women than men have succumbed to CVD (Brown, 2015; Crocco, Pervez, & Katz, 2009).

Non-communicable diseases are estimated to account for 78% of total deaths in the Saudi Arabian population and CVD accounts for 46% of non-communicable disease
deaths (WHO, 2015). In 2012, the number of CVD deaths per 100,000 Saudis was 198.2 for women and 197.1 for men (WHO, 2015). CVD is considered a major health problem in Saudi Arabia and the country is facing an alarming increase in incidence and death rates due to CVD (Gaziano, Bitton, Anand, Abrahams-Gessel, & Murphy, 2010). For example, Brunner, Rees, Ward, Burke, and Thorogood (2007) found that CVD accounted for 26% of total deaths in Eastern Saudi Arabia.

CVD risk factors are any factors that stimulate the disease development or deteriorate the existing disease (Whitlock & Williams, 2003). The predominant risk factors for CVD are obesity, diabetes, smoking, hypertension, inadequate physical exercise, hypercholesterolemia, and intake of food above the recommended nutrient intake (Khatib, 2004). Risk factors for CVD in Saudi Arabia include hypercholesterolemia, smoking, obesity, lack of physical activity and excessive food intake (Kumosani, Alama, & Iyer, 2011). Research results have shown an increase in the incidence and prevalence of these factors in Saudi Arabia with a corresponding increase in risk for CVD (Aljefree & Ahmed, 2015). Many of these causes are prevalent among Saudi Arabian women. A study conducted by Midhet, Al Mohaimeed, and Sharaf, (2010) concluded that the high prevalence of CVD in Saudi Arabia is attributed to unhealthy eating practices and lack of physical activity. The prevalence of obesity and physical inactivity has increased in Saudi Arabian women (Majeed, 2015).

Saudi Arabia has experienced significant economic growth fueled by earnings from oil (Hawazen, Patsy, & Robyn, 2012). This economic growth has led to great changes in lifestyle, including physical activity and eating habits. Standards of living
have increased and ushered in a more sedentary lifestyle. Saudi Arabians consequently have adopted an energy-dense diet and sedentary lifestyle with a reduction in daily physical activity and energy expenditure relative to earlier times (Al-Hazzaa, 2004). The energy-dense foods contain a large amount of calories per serving, such as foods rich in fat (Escamilla et al., 2012). Physical inactivity patterns have been found to be significantly high among Saudi Arabians, especially in women (Al-Hazzaa, 2004). Al-Hazzaa demonstrated that strong associations do exist between the high prevalence of physical inactivity in the Saudi Arabians and the lifestyle-related diseases (i.e., obesity, diabetes, and CVD) in Saudi Arabia. This sedentary lifestyle has resulted in increased non-communicable disease transmission as well as increased morbidity and mortality caused by CVD.

Socio-economic and environmental changes contribute to increased morbidity and mortality of cardiovascular disease. Recent studies indicate that the westernization of Saudi livelihood is the main cause of diet-related diseases (Majeed, 2015; Tomar, Al Ameer & Antony, 2015). Majeed (2015) asserts that the Saudi Arabian population selects a sedentary rather than an energetic lifestyle and prefers to eat pizza and burgers rather than fruits and vegetables. Tomar, Al Ameer, and Antony (2015) have linked unhealthy dietary changes with rapid socioeconomic growth. In Saudi Arabia, high percentages of women have sedentary lives with limited physical activity and unhealthy eating habits (Al-Haramlah, Al-Bakr, & Merza, 2015). A study conducted by Alhazza and Musaiger (2011) showed that 91.2% of Saudi Arabian women spent more than 2 hours daily on the computer or watching TV, which indicates that women are more
inactive than men. With the changing lifestyle, the prevalence of overweight and obesity levels has become high among males (23%) and females (30%) in Saudi Arabia (Albassam, Gawwad, Khanam, & Costarelli, 2008; Al Othaimeen, Al Nozha, & Osman, 2007). According to Albassam et al. (2008), Saudi Arabian women of childbearing age frequently become overweight and obese due to their diets and reduced physical activity. Alqout and Reynolds (2014) discussed how cultural restraints imposed on Saudi Arabia women could prohibit or limit physical activity. These women face many cultural challenges to practice sports activities. For example, the need to seek the permission from family members, dress codes, restrictions on going outdoors, and conservative norms all may restrict sports activity and physical activity overall (Alqout & Reynolds, 2014). Because of these cultural limitations, Saudi Arabian women have less opportunity to practice sports activities than males (El-Sobkey, 2014). The upsurge of cardiovascular disease is correlated with changes in lifestyle, consumption of unhealthy diets, minimal physical activity, and prevailing obesity (Al-Haramlah, Al-Bakr, & Merza, 2015). In order to reduce the morbidity resulting from CVD, it is prudent to educate people about the harm caused by lifestyle choices and dietary practices. Many chronic and acute diseases result from individual behavior (Mokdad, Marks, Stroup, & Gerberding, 2004). In particular, CVD can be attributed to unhealthy dietary and physical activity habits that can be prevented by healthy individual food choices and regular physical activity.

Dietary intake is comprised of different components that can increase or reduce the risk of cardiovascular disease. Most cardiovascular disease researchers in Saudi Arabia have focused on dietary and physical activity interventions. However, the
researchers have not explored behavioral change based on perception as an integral factor in influencing dietary habits. This study will present an in-depth understanding of perceptions of cardiovascular disease among Saudi Arabian women. These women play a critical role in the nutrition of Saudi families.

According to Al-Dkheel (2012), the type of diet, the cooking methods applied, and quantity of food can be used to determine whether individuals have adopted healthy eating lifestyles. Diet continues to be the cornerstone of prevention efforts of cardiovascular disease (Jakulj et al., 2007). Thus, perceptions of risk of cardiovascular disease and intentions to cook low fat diets are critical to primary prevention.

**Previous Work on CVD in Saudi Arabia**

Many studies conducted in Saudi Arabia on CVD risk factors have concentrated on the general population and prevalence of cardiovascular diseases. These studies have also sought out to establish the causes of CVD among Saudi Arabian women. A study conducted by Pharaon (2004) pointed out significant changes in eating behaviors of people of Saudi Arabia. The research established that many Saudi Arabians consume foods that have high sugar and fat content. In a case study to examine the perception of body weight and eating behaviors among Saudi Arabian women, Yahya, Muhammad, and Yossof (2012) found that there were misconceptions about eating habits. They also noted that high fat cooking methods led to major effects on the weight status of women.

In a similar study, Al-Alwan et al. (2013) examined the predisposing factors to CVD among Saudi Arabian women. The researchers found that Saudi Arabian women’s dietary and physical activity practices predisposed them to sedentary lifestyles and hence
they were likely to be overweight compared to average European women. The increased obesity was due to the adoption of unhealthy eating habits and the changes in socio-economic status, changes in traditional food cooking styles and a sedentary lifestyle. The study showed that Saudi Arabian women prepare food for their family and the common ingredients include fats, meat, sugar, and spices. The current food preparation practices are influenced by Western food culture that has eroded the healthy cooking practices experienced in traditional Saudi Arabian cooking methods and dietary practices. Studies conducted in Saudi Arabia by Al Nozha et al. (2005) indicated a high prevalence of cardiovascular disease among women. The findings attributed this prevalence to transition in nutrition marked by abandonment of traditional diets that were low in fat and high in fiber and the modern adoption of diets high in sugar, salt, and fat (Al Nozha et al., 2007). Pharaon (2004) noted that the new practices and ingredients are presumed to be proper. This presumption negatively influences the Saudi Arabian women from cooking traditional healthy foods. Kumosani, Alama, and Iyer (2011) indicated that nutritional problems in Saudi Arabia are attributed to a change in eating habits, illiteracy and ignorance, rather than a shortage of food supply or low income.

**Fat Intake and Cooking Behaviors**

There are many traditional cuisines in Saudi Arabia. These cuisines employ different types of cooking techniques and reflect the customs and traditional cooking methods depending on the geographical region in which an individual lives (Hawazen, Patsy, & Robyn, 2012). Research indicates that in Saudi Arabia, many women prefer preparing meat for their families (Rawas, Yates, Windsor, & Clark, 2012).
Approximately 40% of daily fat intake is consumed from meat and dairy products (Hansash et al., 2000). Several studies have shown an association of nutritional factors, especially saturated animal fat, with the increased incidence of cardiovascular disease (Jakulj et al., 2007). The modern diet of Saudi Arabians now emphasizes cooking tasty foods as opposed to ensuring that the fat levels in the food are minimized and hence increases the chances of CVD. According to Shara (2010), Saudi Arabians consume 143.3% of fat daily, which far exceeds the daily allowance, making them vulnerable to cardiovascular disease. A research study by Hanash et al. (2000) revealed that the fat intake of the Saudi Arabian population was more than 120 grams daily, of which about 50% was from saturated fat, which in turn has a negative impact on heart health. A high dietary fat intake has been identified as an independent risk factor for the development of CVD (Homko et al., 2008). It is essential to highlight the influence of dietary fat on the development and progression of cardiovascular disease. The consumption of a high-fat diet over a course of several weeks affects negatively cardiovascular function (Jakulj et al., 2007). The incidence of cardiovascular disease in Saudi Arabia has been reported to be high which requires health education professionals to investigate the relationship between the risk of CVD and the cooking behaviors of Saudi Arabian women. Obtaining information on cooking behaviors and risk perception of CVD among Saudi Arabian women is important for the development of effective health education programs to reduce the risks of CVD associated with high consumption of dietary fat.
Significance of the Study

The continuous rise in cardiovascular disease around the world necessitates health professionals to pay more attention to this lifestyle-related issue (Bovet & Paccaud, 2011). Health education professionals have the opportunity to be a great contributor in reducing cardiovascular disease rates by participating in research on this important issue and by providing effective preventive measures. CVD continues to be the leading cause of death in the world (Kelly, Narula, & Fuster, 2012; Rohleder, 2012). It has reached overwhelming proportions in many countries around the world, and Saudi Arabia is no exception. CVD has increased throughout the last decade in Saudi Arabia (Gaziano, Bitton, Anand, Abrahams-Gessel, & Murphy, 2010). Saudi Arabia has been identified as one place in the world where cardiovascular disease is at significantly high rates, especially those that result from high fat levels of foods (Ibrahim et al., 2014). CVD is a leading cause of death and morbidity in the Saudi Arabian population with a high prevalence rate among Saudi Arabian women (WHO, 2015).

Women in the Middle East, specifically in Saudi Arabia, are the most affected (Ibrahim et al., 2014). Previous literature has indicated various reasons why women in Saudi Arabia and other parts of the world are increasingly contracting cardiovascular diseases related to unhealthy eating and activity behaviors (Shara, 2010). Due to the increased standards of living, lifestyle changes are evident in Saudi Arabia where many women have access to television, private drivers, and house maids (Rawas, Yates, Windsor, & Clark, 2012). This manner of living has increased sedentary behavior, causing many women to become obese, and as a result, has increased the rate of
cardiovascular disease in the country among women (Nanita, 2012). Furthermore, as a result of the global adoption of new technology and convenient eating habits, many women in Saudi Arabia now consume more fats, refined carbohydrates, and sugars than in the past (Al-Farwan, 2011; Ibrahim et al., 2014).

Even though cardiovascular disease morbidity and mortality rates are increasing among Saudi Arabian women, understanding and awareness of the disease are low (Shara, 2010). This lack of knowledge and awareness, combined with the lack of a proper exercise regimen not only puts the women of Saudi Arabia at risk, but also increases susceptibility to CVD among their families. These disturbing facts and statistics regarding the cardiovascular health of Saudi Arabian women justify the need for the implementation of effective initiatives to prevent CVD. Identifying and understanding the magnitude of risk factors contributing to cardiovascular disease, including high fat intake, are important aspects of creating targeted interventions for this particular population. The relationship between dietary fat and CVD has been well documented; however, the challenge of understanding the complex determinants of cooking behavior and consumption patterns needs more attention. The ability to attain and maintain dietary behavior change among Saudi Arabian women is essential to the long-term success of a cardiovascular disease prevention strategy.

Women are responsible for the well-being of the family in the traditional setting of Saudi Arabian society. In Saudi Arabia’s religious and traditional setting, it is the mandate of women to plan and cook meals. Many women are employed and their busy schedules make it difficult to meet the societal demands due to these changing
environments (Mobaraki & Soderfeldt, 2007). There have been remarkable and rapid economic, social, and cultural changes in Saudi Arabia in the past three decades. The rapid economic growth resulted in an increased purchasing power of many Saudi Arabian families, increased food supplies and varied meal patterns associated with a lifestyle of affluence. Al-Alwan, Badri, Al-Ghamdi, Aljarbou, and Tamin (2013) noted that the per capita intake of calories increased from 1,801 kcal in 1971 to a high of 3,015 kcal in 2004. Fat intake also increased from 34.0-76.1 grams a day. According to the Institute of Medicine (IOM), the recommended daily fat amounts for a 1,500 calorie diet is 33 grams (20%-25% of total daily calorie intake; Vannice & Rasmussen, 2014).

The role played by women in ensuring that they prepare and cook food for the family, their perception towards risk factors associated with CVD and their intentions to provide a lower fat diet could be a crucial turning point for the cardiovascular health of these women and their families. This study thus has great implications for the Department of Health Education and Promotion in Saudi Arabia by demonstrating the need to develop intervention programming that targets behavioral changes. The present study is significant for health care centers in Saudi Arabia since they serve the vital role to educate the target population to adopt preventive measures and reduce the burden of cardiovascular disease. This study may have an important impact on the focus of CVD research in Saudi Arabia. Specifically, this study would be beneficial to future researchers studying the cardiovascular health of Saudi Arabian women. The study is significant because it will indicate the importance of risk perception as a catalyst for improving cooking behaviors among Saudi Arabian women. A research study by
Beckham, Urrutia, Sahadeo, Corbie-Smith, and Nicholson (2015) showed that none of the participant women received information from providers about CVD prevention through diet. This research study could help to shift attention to dietary intervention in preventing cardiovascular disease. Emphasis should be given to implementing interventions aimed at increasing awareness of cardiovascular health in relation to cooking behaviors to encourage healthy eating habits among Saudi Arabian women, thereby reducing the risk of cardiovascular disease. In addition, this is the first study to utilize the Health Belief Model as a framework to investigate the psychological variables of perceived susceptibility and self-efficacy in relation to CVD, the cooking habits of Saudi Arabian women, and their intentions to cook low fat meals.

Rationale

The purpose of the present study was to examine the risk perceptions of cardiovascular disease among Saudi Arabian women. Perception of a given phenomena is usually hinged on the knowledge acquired and the expected outcome (Brunner et al., 2007). The implication of perception is that it acts as the determinant of the level of exposure towards a given phenomena (Vanhecke, Miller, Franklin, Weber, & McCullough, 2006). Women’s lack of risk perception of CVD may result in poor motivation for adopting healthy behavior (Brown, 2015). According to Vanhecke, Miller, Franklin, Weber, and McCullough (2006), CVD is preventable by adoption of a healthy diet and increased physical activity. A balanced diet is necessary for a healthy circulatory system. Perception of risk factors and intention to adopt good dietary habits and cooking practices are important to a healthy lifestyle and reduced incidence of CVD.
The awareness of risk factors for cardiovascular disease is a crucial step in the implementation of preventive care programs (Khatib, 2004). There are no current data available on the prevalence of cardiovascular diseases in Saudi Arabia itself. However, smaller studies and data from health facilities point to a trend of increased CVD in urbanized towns. The trend of increased CVD has been made worse by the new roles of women in employment and socio-economic factors that have resulted to sedentary lifestyle and high carbohydrate diets (Bener et al., 2004). Research on the perception of risk factors of cardiovascular disease will enrich the existing research on cardiovascular diseases in Saudi Arabia. The findings of the research will be crucial in developing interventions to educate Saudi Arabian women on prevention measures that relate to food preparation. Despite the fact that research showed that women could reduce their risk of CVD, the risk perception of the disease and awareness of preventive strategies were poor (Brown, 2015). Health educators in Saudi Arabia could potentially provide a tremendous impact on Saudi Arabian women by promoting the benefits of following recommended dietary allowances in the Dietary Guidelines for Saudi Arabians. The present study will play an important role in providing a research-based framework for lowering risks for CVD based on the identified perceptions. Furthermore, the results of this study will support greater awareness and prevention of cardiovascular disease, and create targeted areas for future health promotion and education efforts. Findings of the study will be helpful to use risk perception of CVD in the prediction of Saudi Arabian women’s cooking behavior in relation to cooking low fat meals.
Improved nutritional knowledge and perceptions of Saudi Arabian women tasked with taking care of their own nutrition, and that of their families, has implications for the reduction of CVD. According to a current study by Majeed (2015), 81% of Saudi college students prefer a home cooked meal. This helps to underscore the importance of home cooking as a potential area to promote healthy eating among families. It is important to research the cooking behavior of Saudi Arabian women to identify strategies that would encourage and enable them to cook healthy food at home. According to Vanhecke et al. (2006), lack of risk perception prevents people from adopting healthy lifestyles, and is the genesis of an uncaring attitude towards what people consume. A better understanding of what Saudi Arabian women perceive as their risk of CVD in relation to their cooking behavior is essential to establish effective health promotion interventions. The established risk perception will significantly inform the type of nutrition interventions, of preventive measures and behavior change campaigns that target dietary changes and cooking practices. Brown (2015) indicated that risk perception of CVD among women does not reflect the fact that the disease is the leading cause of death among them. Due to an increase in cardiovascular disease and poor risk perception, health educators are challenged with the task of increasing awareness regarding CVD perceived risk among Saudi Arabian women.

It is imperative to highlight the issues of cardiovascular health of Saudi Arabian women in relation to their cooking habits and behaviors as Saudi Arabia is one of the leading nations in cardiovascular disease and there has thus far been limited attention devoted to the cardiovascular health of Saudi Arabian women (Ibrahim et al., 2014).
Stranges and Guallar (2012) reported that the principal emphasis in cardiovascular research has been placed on men. Considering that women in Saudi Arabia usually are in charge of their family’s diet, it is best to study the cooking habits of these women and other risks associated with these habits and behaviors. The increased cardiovascular disease in the region clearly indicates that the foods people are eating have high levels of fat and there is a need to reduce these levels. It is the goal of this study to investigate the risk perceptions of CVD and cooking habits and make recommendations for educational programs to increase the knowledge of cardiovascular health risks in relation to cooking habits so as to decrease the incidence of cardiovascular disease among the target population.

**Purpose of the Study**

The purpose of this study was to investigate the risk perceptions and cooking habits of Saudi Arabian women in relation to cardiovascular disease and intentions to cook low fat meals. According to Schwarzer (2011), risk perception represents the most obvious motivation for overcoming a risk behavior. Investigating the risk perceptions of CVD is a key predictor of Saudi Arabian women’s likelihood of adopting low fat food choices when cooking in order to prevent cardiovascular disease. Cardiovascular disease risk factor awareness and risk perception are considered to be prerequisites for adopting healthy eating behaviors.

Previous studies on CVD have investigated the prevalence and the risk factors of the disease. There are not adequate studies that have been done with respect to perception and intentions of the Saudi Arabian women to adopt low fat diets. This has
left a significant research gap that requires further study. This study aims at enriching the literature with information regarding cooking habits of Saudi Arabian women and their intentions to follow low fat diets to protect heart health. This research focuses on risk perceptions of cardiovascular diseases among Saudi Arabian women in relation to home cooking and intentions to cook low fat meals. It is expected to create an awareness of women’s cardiovascular health in relation to their dietary behaviors. The research study will not only recognize the cooking behaviors of Saudi Arabian women in relation to cardiovascular health but also may have the implications for effective interventions for CVD prevention.

**Study Methodology**

This quantitative-based survey research study addressed Saudi Arabian women living in the city of Riyadh. The women were recruited in the primary care clinic’s waiting room of King Khalid University Hospital. This hospital serves mostly patients from the capital city of Riyadh. Survey research was used to obtain the required data from the participating women. The survey was anonymous to protect the confidentiality of the participants. The women completed the survey in the waiting room and then returned it to the researcher. The goal of using quantitative survey research methodology for this study was to determine the potential predictive power of the psychological variable, risk perception in cooking low fat meals. The data were collected using structured self-administered surveys.
Theoretical Framework

The study employed two theoretical models, the Health Belief Model (HBM) and the Precaution Adoption Process Model (PAPM) to investigate risk perceptions of CVD among Saudi Arabian women in relation to home cooking and intentions to cook low fat meals. The two constructs of the HBM, perceived susceptibility and perceived self-efficacy, were used to identify the participants’ risk perceptions of CVD and participants’ perception of their ability to cook low fat meals. The HBM is one relevant theory that claims to predict healthy behavior (Glanz, Rimer, & Viswanath, 2008). The Precaution Adoption Process Model is a stage theory including seven discrete stages along the path from ignorance to completed preventive action. The stages are “unaware of the issue,” “aware of the issue but not personally engaged,” “engaged and deciding what to do,” “having decided not to act,” “planning to act but not yet having acted,” “acting,” and “maintenance.” PAPM is the tool to find the target population’s stage and effective intervention strategies for the given stage. It seeks to explain how a person comes to decisions to take action and how he or she moves that decision into action (Weinstein, Sandman, & Blalock, 2008). PAPM was used to classify the participants in stages in relation to their intention to follow the target behavior and was applied in the present study to examine the readiness of these participants to cook low fat meals.

Health Belief Model

Personal risk of cardiovascular disease or susceptibility can be an important predictor in making low fat food choices when cooking; the greater the perceived risk,
the greater the likelihood of making low fat food choices when cooking to decrease the risk of acquiring CVD. See Figure 1 for a visual of the Health Belief Model.

Self-efficacy can be an important predictor in cooking low fat meals; high self-efficacy for a cooking low fat meals will likely increase opportunities to execute the behavior to decrease the risk of acquiring CVD.

Figure 1. Conceptual Model of Risk Perceptions and Behavioral Intention

The Seven Stages of PAPM in the Application of Cardiovascular Risks of Cooking High Fat Foods

In Stage 1, the individuals are unaware of cooking high fat food-related cardiovascular risk. In Stage 2, the individuals are aware of the health risk, but
unengaged and they believe that the risk may be applicable to others but not to themselves. In Stage 3, individuals who reach the decision-making stage are engaged with the issue and are considering their response to make low fat food choices when cooking. In Stage 4, they decide not to act or make low fat food choices when cooking. In Stage 5, they choose to take action and make low fat food choices when cooking. In Stage 6, they initiate the behavior and start making low fat food choices when cooking. In Stage 7, they maintain the behavior and keep making low fat food choices when cooking for more than six months (see Figure 2).

Figure 2. The seven stages of PAPM in the application of cardiovascular risks of cooking high fat foods

Research Questions

1. What will be the risk perceptions of CVD among Saudi Arabian women?
2. What are Saudi Arabian women’s fat-related cooking behaviors?
3. What will be the intentions of Saudi Arabian women to cook low fat meals?
4. Is there a significant relationship between risk perceptions of CVD and fat-related cooking behaviors?

5. Are Saudi Arabian women’s risk perceptions of CVD a significant predictor of their intentions to cook low fat meals?

**Research Hypotheses**

1. Saudi Arabian women will indicate low risk perceptions of CVD.
2. Saudi Arabian women will indicate high fat cooking behaviors.
3. Saudi Arabian women will indicate low intentions to cook low fat meals.
4. \( H_0 \): There is no statistically significant relationship between risk perceptions of CVD and fat-related cooking behaviors
   \( H_1 \): There is a statistically significant relationship between risk perceptions of CVD and fat-related cooking behaviors.
5. \( H_0 \): Risk perceptions of CVD will not be a significant predictor of Saudi Arabian women’s intentions to cook low fat meals.
   \( H_1 \): Risk perceptions of CVD will be a significant predictor of Saudi Arabian women’s intentions to cook low fat meals.

**Limitations of the Study**

1. The participants were asked to recall what they have cooked during the last three months. Thus, participants would not be able to precisely remember what they have cooked over that period of time. In addition, it is possible that the participants’ food choices will change when they know their intake will be measured.
2. The variables of interest were measured by self-report, and therefore, subject to bias, underreporting and over reporting.

**Operational Definition of Terms**

*Behavioral intention:* a person’s intention to perform a behavior (Hernandez, 2011).

*Cardiovascular disease:* a broad term for diseases caused by disorders of the heart and blood vessels, and includes cerebrovascular disease, coronary heart disease, peripheral arterial disease, rheumatic heart disease, heart attack and stroke (WHO, 2015).

*Energy dense foods:* the number of calories per unit measure (Farley, Baker, Futrell, & Rice, 2010). The measure is a bite, an ounce or a gram. According to Farley et al. (2010), foods described as energy dense have a very high concentration of fat per unit measure.

*Health Belief Model (HBM):* is one of the most widely used theoretical models in health education and promotion. It is applied in health research to predict the likelihood of individuals following recommended preventive health actions (Glanz, Rimer, & Viswanath, 2008).

*Precaution Adoption Process Model (PAPM):* is a model used to predict the process of health behavior change. It describes the various stages that lead to behavioral change and provides tailored messages for the stages (Weinstein & Sandman, 2002).

*Risk perceptions of CVD in relation to low fat cooking:* an individual’s ability to perceive the level of susceptibility of CVD or risk for the disease in relation to low fat cooking behavior (Slovic & Peters, 2006).
Self-Efficacy in cooking low fat meals: is the confidence the participants have in their ability to successfully cook low fat meals.

Traditional cooking in Saudi Arabia: the foods and cooking methods that formed the daily diet of Saudi Arabians before the discovery of oil and the economic boom during the 1970s and 1980s.

Summary

Cardiovascular diseases pose a significant health challenge in Saudi Arabia just as in other developed countries in the western world. In Saudi Arabia, researchers have identified a trend of higher mortality and morbidity from CVD among women as compared to men. The differences of risks in relation to sex are influenced by cultural differences; therefore, the differences in perception of risk factors have implications for primary prevention. Understanding the perception and behaviors that influence eating habits and activity patterns of Saudi Arabian women can be critical in guiding intervention strategies to ensure energy balance and reduce the mortality and morbidity caused by CVD.

Saudi Arabian women are increasingly demonstrating a high prevalence of overweightness compared to women in other developed countries. Currently, research on perception and nutritional practices of women in Saudi Arabia have been rather limited. Therefore, the present study aims at investigating the risk perceptions of cardiovascular disease among Saudi Arabian women in relation to home cooking and intentions to cook low fat meals.
Chapter 2 of the research reviews the literature on cardiovascular disease and risk factors of Saudi Arabian women. The review covers the recommended dietary allowances in Saudi Arabia and the Dietary Guidelines for Saudi Arabians symbolically dubbed: “Healthy Food Palm.” Further, the chapter explores the history of dietary changes in Saudi Arabia. Literature on the Precaution Adoption Process Model (PAPM) and Health Belief Model (HBM) are reviewed and synthesized.

Chapter 3 includes the study methodology to be employed in the research. It also includes a discussion of the quantitative research design, the participants, procedures in sampling, data collection and analysis, as well as the ways in which the variables were measured.
CHAPTER II

LITERATURE REVIEW

The purpose of this study was to examine the risk perceptions and cooking behaviors of Saudi Arabian women in relation to cardiovascular disease and intentions to cook low fat meals. The review of the literature is focused on Saudi Arabian women, cardiovascular disease, risk factors for cardiovascular disease, women and cooking responsibilities, dietary patterns in Saudi Arabia, and the importance of nutrition in cardiovascular disease prevention. A review of the theories used in the study (Health Belief Model and Precaution Adoption Process Model) is also included.

The sources for this literature review are derived from the online databases: ProQuest, CINAHL, Academic Search Complete, Food Science Source, SPORT Discus, PsycINFO, PubMed, and EBSCOHOST data. Search terms utilized included Saudi Arabian women, cardiovascular disease, risk factors for cardiovascular disease, dietary habits, low-fat diet, Health Belief Model, and Precaution Adoption Process Model.

The review was completed in order to identify research gaps in relation to cardiovascular risk perceptions among Saudi Arabian women and their fat-related cooking behaviors. The review indicated the need for continued research to investigate their risk perceptions of the disease and fat-related cooking behaviors. To date, no researchers have examined the risk perceptions of cardiovascular disease among Saudi Arabian women in relation to their fat-related cooking habits. However, researchers have examined Saudi Arabian women in terms of risk factors for cardiovascular disease (obesity, unhealthy eating practices, and lack of physical activity; Al-Alwan, Badri,
Al-Ghamdi, Aljarbou, & Tamim, 2013; Al-Farwan, 2011; AlQuaiz et al., 2015; AlQuaiz et al., 2014; Ibrahim et al., 2014; Khalaf, Westergren, Berggren, Ekblom, & Al-Hazzaa, 2015; Khattab, Abolfotouh, Alakija, Al Humaidi, & Al Wahat, 1999; Kumasani, Alama, & Iyer, 2011; Musaiger, 2002; Shara, 2010). These researchers have suggested that Saudi Arabian women are at greater risk for cardiovascular disease due to a high prevalence of many modifiable risk factors (Al-Alwan et al., 2013; AlQuaiz et al., 2015; Ibrahim et al., 2014; Shara, 2010). These women have higher rates of obesity, physical inactivity, and excessive intake of fats. The researchers asserted that the more risk factors that Saudi Arabian women have, the greater the likelihood that they will develop cardiovascular disease (Al-Alwan et al., 2013 & AlQuaiz et al., 2015). The authors also indicated that a lack of knowledge and awareness may contribute to the advances in prevalence of cardiovascular disease in the Saudi Arabian female population (Al-Alwan et al., 2013; Shara, 2010).

Saudi Arabian women who live in Riyadh (the Central region) have the greatest prevalence of obesity when compared to those in other regions (Al Hazzaa, 2004). Many research studies referred to the sedentary lifestyle among Saudi Arabian women in urban cities such as Riyadh (Al-Eisa & Al-Sobayel, 2012; Al-Haramlah, Al-Bakr, & Merza, 2015; Al-Nozha et al., 2007; Al Othaimeen, Al Nozha, & Osman, 2007; DeNicola, Aburizaiza, Siddique, Khwaja, & Carpenter, 2015; Majeed, 2015). The researchers attributed the high level of physical inactivity to many cultural factors such as restrictions to exercise outdoors and the need of male approval to join sports clubs (Al-Eisa & Al-Sobayel, 2012; Al-Farwan, 2011; Al-Haramlah, Al-Bakr & Merza, 2015; DeNicola,
Aburizaiza, Siddique, Khwaja, & Carpenter, 2015; Rawas, Yates, Windsor, & Clark, 2012). Findings of many studies concluded that Saudi Arabian women living in Riyadh consume a diet high in fat (Al Othaimeen, Ezzat, Mohamed, Muammar, & Al Madouj, 2004; Tomar, Al Ameer, & Antony, 2015). The researchers reported that higher consumption of fat-rich foods, meats, and other animal products rich in saturated fats has been related to a high incidence of diet-related chronic diseases including cardiovascular disease among this particular population (Al-Haramlah, Al-Bakr, & Merza, 2015; Bakhotmah, 2012; DeNicola, Aburizaiza, Siddique, Khwaja, & Carpenter, 2015; Ibrahim et al., 2014; Khalaf, Westergren, Berggren, Ekblom, & Al-Hazzaa, 2015; Midhet, Al Mohaimeed, & Sharaf, 2010; Mohiedein, Alzohairy, & Hasan, 2011; Shara, 2010). Despite concerns about changing dietary habits and the incidence of cardiovascular disease in Saudi Arabia, no study has investigated the relationship between the risk perceptions of the disease and fat-related cooking habits among Saudi Arabian women. Therefore, this cross-sectional study at King Khalid University Hospital in Riyadh was conducted to examine the risk perceptions of cardiovascular disease in terms of cooking behaviors and intentions to cook low fat meals among Saudi Arabian women.

**Cardiovascular Disease in Women**

Cardiovascular disease is defined as the disease of the heart and blood vessels (WHO, 2015). Diseases that affect the cardiovascular system include coronary artery disease, myocardial infarction, cerebrovascular disease, heart attack, and stroke (Berrih-Aknin et al., 2009). In developed countries, cardiovascular disease continues to
be the main cause of mortality and morbidity (Hammond, Salamonson, Davidson, Everett, & Andrew, 2007). More than 600,000 Americans die yearly of cardiovascular disease (Centers for Disease Control and Prevention [CDC], 2015). Healthy People 2020 has reported that about 81 million Americans have some type of cardiovascular disease (The U.S Department of Health and Human Services [USDHHS], 2015). Cardiovascular disease is among the most costly health issues facing the United States, accounting for more than $500 billion in health care expenditures and related expenses (USDHHS, 2015). Approximately 44 million American women have cardiovascular disease, accounting for one third of deaths among women each year (AHA, 2015). CVD is the dominant cause of death for women in the United States (Folta et al., 2015). In reviewing the consequences CVD has on the population, the mortality rates are much higher for women than men (Brown, 2015; Davidson et al., 2012). The Women’s Ischemia Syndrome Evaluation (WISE) study by the National Institutes of Health (NIH) found significant gender differences in the prevention and treatment of CVD (Finks, 2010). More women than men succumb to CVD every year (Brown, 2015; Hammond et al., 2004). In the United States, 42% of women who have heart attacks die within the first year, compared with 24% of men (Hammond et al., 2004). Each year, 66,000 more women than men die after myocardial infarction and cardiovascular interventions (Finks, 2010). The U.S. has a well-documented history of CVD among women and continues to invest in research and prevention, yet the women of Saudi Arabia have been overlooked and there is a need for recognition of the serious consequences to stop the widespread acceptance of CVD.
CVD has been historically considered a man’s disease with breast cancer perceived as the greater issue for women (Oliver-McNeil & Artinian, 2002). In a 2015 survey to examine the perceptions and awareness of CVD among Saudi Arabian teachers, the majority of university teachers demonstrated poor perceptions of CVD (Tomar, Al Ameer, & Antony, 2015). The researchers found that the university teachers were unable to perceive the risk of CVD despite the fact that they were at high risk of the disease. Only half of the university teachers had discussed CVD prevention with their health care provider. In another study among Ghaza (Palestine) university students, only 8% perceived themselves as more exposed to CVD risk than their peers (Dabbak & Arafa, 2014). Most of the participants (84%) did not perceive CVD as a public health issue.

According to Vanhecke, Miller, Franklin, Weber, & McCullough (2006), only 14% of study participants recognized CVD as the main cause of death for women in the United States. In the “Help Your Heart Stay Young” study in the U.S., the researchers concluded that women’s knowledge of CVD risk factors and lifestyles changes were lower than men’s (Oliver-McNeil & Artinian, 2002). Despite the fact that CVD is the leading cause of death and disability among Australian women, most of these women were unaware that CVD is considered to be a primary women’s health issue and fail to identify their lifestyle risk factors (Davidson et al., 2012; Guillemin, 2004).

Unfortunately, cardiovascular disease has been the main cause of death among women, taking more lives than all forms of cancer combined globally (AHA, 2015; WHO, 2015). CVD accounts for one-third of deaths among women in the world (WHO, 2015). Even though the life span of women has increased, the incidence of CVD has
grown. According to the WHO (2015), women live an average of four years longer than men. Furthermore, women have a higher lifetime risk of CVD than men (AHA, 2015). Causes of CVD include obesity, hypertension, atherosclerosis, and diabetes (CDC, 2015). Main risk factors include physical inactivity, unhealthy diet, high body weight, high blood pressure, high serum cholesterol, and smoking (Khatib, 2004). According to the AHA (2015), 90% of women have one or more risk factors for CVD. Oliver-McNeil and Artinian (2002) conducted a descriptive study to examine perceptions of cardiovascular risk factors and risk-reducing behaviors among American women with newly diagnosed coronary heart disease in a large Midwestern suburban hospital. The study revealed that 93% of surveyed participants, even though having risk factors for CVD, were not aware of their individual risk and what they could do to lower their risk of the disease.

The trend of the rising CVD mortality rate is currently present in countries with emerging economies. An increased rate of CVD has been found in Africa and the Middle East, including Saudi Arabia (Alquaiz et al., 2015). An epidemiological study done by Al-Daghri and colleagues (2011) highlighted the worsening prevalence of cardiovascular disease in the capital Riyadh as compared to the previous decade. Saudi Arabia is one of the countries that has experienced a dramatic increase in CVD among women (Al-Hazzaa, 2004). The high risk of CVD among women remains a challenge. Projections for CVD mortality in developing countries suggest that mortality will increase by 120% for women during the next two decades (Shara, 2010). A study conducted by Midhet, Al Mohaimeed, and Sharaf (2010) examined the common diseases and their relationship with the level of physical activity among 980 Saudi Arabian
women in the Al-Qassim region of Saudi Arabia. The study found that CVD incidence has increased to become the greatest health threat for women in Saudi Arabia. The economic impact and the toll of CVD among women in Saudi Arabia are very high. Culturally, women are mandated with food preparation responsibilities for the family. Furthermore, many Saudi women are currently engaged in active employment; hence, morbidity and mortality among the women has a negative implication on the social and the economic sectors (Mobarak & Soderfeldt, 2007). Changes in dietary patterns, cooking styles, and reduced physical exercise are the main risk factors for CVD among Saudi Arabian women (Al-Hazzaa et al., 2010).

**CVD Risk Factors for Saudi Arabian Women**

Cardiovascular disease presents a significant health challenge in Saudi Arabia. According to WHO (2004), the risk factors for cardiovascular diseases in Saudi Arabia are similar to those in developed countries. Hypertension, atherosclerosis, obesity, diabetes and ischemic heart diseases are common in Saudi Arabia (Al-Alwan et al., 2013; Khan, 1997). The etiology presents a trend in which women show high prevalence compared to their male counterparts. Extensive study conducted by Yahya, Muhammad, & Yussof (2012) identified the risk factors and pointed to possible primary prevention care programs based on the peoples’ attitudes and perceptions. Despite the fact that CVD among Saudi Arabian women is preventable, their changing lifestyle and dietary patterns have been a significant impediment leading to high morbidity and mortality.

A study conducted by Kumosani, Alama, and Iyer (2011) categorized cardiovascular risk factors into modifiable and non-modifiable risk factors. According to
Kumasani et al. (2011), the modifiable risk factors are comprised of the changeable risk factors. Examples of modifiable risk factors include unhealthy diet, use of tobacco, inadequate physical exercise, being overweight, and hypercholesterolemia (Khatib, 2004). The non-modifiable risk factors include gender, the history of the family, socio-economic status, and the social history of an individual. In Saudi Arabia, both the modifiable and non-modifiable risk factors have been a leading cause of CVD among women. However, Kumosani et al. (2011) indicated that the modifiable factors are the major risk factors accounting for over 80% of CVD among women. Epidemiological data have reported that women with few CVD risk factors are less likely to suffer a cardiac event (Davidson et al., 2012). Moreover, reducing CVD risk factors decreases the chances of developing CVD (AHA, 2015). Worrall-Carter, Ski, Scruth, Campbell, and Page (2011) noted that the highest risk factors associated with CVD in women are diabetes mellitus, smoking, and hypertriglyceridemia. The authors asserted that these risk factors are all modifiable or preventable, which in turn could lower the risk of CVD. However, Mosca et al. (2009) revealed that there was a lack of screening for women with potential of developing CVD by healthcare providers, therefore, these women were not treated effectively to prevent further progression of CVD. Khatib (2004) indicated that lifestyle education, change in perception, and monitoring the risk factors contribute significantly to prevention of CVD. Increasing public awareness of the disease could raise knowledge of risk factors and prompt primary care providers to determine a woman’s potential for risk factors. In addition, promoting healthy cooking behavior
through a sense of health consciousness and risk perception could help in preventing CVD potential risks.

The changes in lifestyle have significantly influenced females more than males. Akram, Yacoub, Saedi and Raheem (2011) noted that many women find it more modern to engage in sedentary lifestyles. For instance, teenage females find consuming junk foods and smoking hookah as a more prestigious activity than adapting to a healthy diet and exercise regimen. In a study conducted by Al Qauhiz (2010) to determine the college female lifestyle, it was found that the lifestyle behaviors teenage girls engage in during this period of life typically translate to the dietary practices they will adopt in early adulthood. In relation to the lifestyle, women in Saudi Arabia have the primary responsibility to prepare foods for their family. Thus, they will adopt cooking styles and food choices that relate to what they perceive as popular and most appealing to their families. This ultimately transfers the risk factors of CVD to their entire family. These practices coupled with female specific predisposing factors such as reduced exercise during pregnancy and subsequent weight gain contributes to the increased prevalence of CVD among Saudi Arabian women (Al-Alwan et al., 2013). Alquaiz et al. (2015) indicated that high percentages of Saudi Arabian women have sedentary lives with limited physical activity and high consumption of unhealthy foods. Previous studies conducted on Saudi Arabian college students have revealed a high prevalence of physical inactivity, ranging from 25% to as high as 94% (Al Hazzaa, 2004; Al-Hazzaa et al., 2010; Al-Nozha et al. 2007). These studies have also demonstrated a higher incidence of physical inactivity for females as compared to males (Al-Hazzaa, 2007; Al Hazzaa, 2004;
A study conducted by Al-Dahi et al. (2013) found high prevalence of physical inactivity associated with high cardiovascular risk scores among militaries in Saudi Arabia. Another recent study by Alquaiz et al. (2015) calculated the CVD risk scores of Saudi Arabian women and reported that 8.2% (\(N = 24\)) of women are in the high/intermediate CVD risk group. The researchers found that only 22.9% of study participants were physically active and the majority (52.6%) were insufficiently active. Also, the study by Alquaiz et al. (2015) showed that daily moderate level household activities were significantly negatively associated with CVD risk in women in Saudi Arabia.

Sedentary lifestyles in Saudi Arabia coupled with high obesity rates and high prevalence of diabetes mellitus puts this population at greater risk of premature CVD (European Society of Cardiology, 2013). The Saudi Project for Assessment of Acute Coronary Syndrome concluded that the high diabetes prevalence in their study reflects the high prevalence in the general population, and underscores the importance of cardiovascular disease prevention (European Society of Cardiology, 2013). Professor Hani Najm, Vice President of the Saudi Heart Association, stated:

The prevalence of risk factors is so high in our young society that they will get cardiovascular disease early, in their 40s and 50s. We’re facing a tsunami of cardiovascular disease in the Gulf region in the coming 10-15 years. People drink soft drinks instead of water, eat unhealthy food and don’t exercise, and obesity is starting at a younger and younger age. (European Society of Cardiology, 2013, para. 4)
Therefore, preventing and controlling risk factors of cardiovascular disease, such as unhealthy eating habits, among the Saudi Arabian population can help to control the widespread prevalence of CVD. Specifically, lifestyle changes like adopting healthy cooking habits among Saudi Arabian women who are responsible for preparing food for themselves and their families can reduce the incidence of CVD.

A cross-sectional study carried out by Mahmood, Jahan, and Habibullar (2004) in the Saudi Arabian city of Jeddah examined the prevalence of smoking among college females and determined that the students were aware of the dangers of smoking and its connection to CVD. Despite these findings, the smoking prevalence was 11%. A similar study by Osman and Al-Nozha (2000) in Eastern Saudi Arabia was conducted to determine the dietary practices and cooking choices among women, which also reported a similar trend. The women were aware of the risk factors of high-fat diets. However, a majority of the women still prepared foods that were energy dense, low fiber, and consisted of a high fat content. Benner et al. (2004) attributed the findings to lifestyle changes. Pharaon (2004) noted that despite the Islamic teaching of a healthy diet and advocacy of physical exercise, the socio-economic changes and the food influences from outside cultures were responsible for adoption of the high fat foods presumed to be healthy. A study conducted by Pharaon pointed out that there were significant changes in eating behaviors of people in Saudi Arabia. The study indicated that many people engage in consumption of foods that have high sugar and fats. In addition, a case study to examine the perception of body weight and eating behaviors among Saudi Arabian women, found that there were misconceptions about eating habits and cooking methods
that led to major effects on the weight status of women (Yahya, Muhammad, & Yossof, 2012).

Al-Alwan et al. (2013) investigated the risk factors associated with CVD among Saudi Arabian women. The study established that Saudi Arabian women were more obese than average European women. The increased obesity was due to adoption of new eating habits and the changes in socio-economic status, changes in traditional food styles and the sedentary lifestyle. The study showed that Saudi Arabian women have the responsibility to prepare food for their family. The preparation includes different types of food that are rich in fat, meat, sugar, and spices. The food preparation practices were influenced by Western food culture that eroded the healthy cooking practiced in traditional Arabian cuisine. Vanhecke, Miller, Franklin, Weber, and McCullough (2006) noted that such practices that have been regarded as the right way bar Saudi Arabian women from the intentions to cook healthy foods because they have to ensure food is agreeable to the whole family. Although providing the family a satisfying meal is a priority to Saudi Arabian women, they still need to be aware of the risks high fat foods have not only on themselves, but the rest of their family members.

Obesity is one of the risk factors for CVD. In Saudi Arabia, the prevalence of obesity has significantly increased in the past 10-15 years (Alhyas, McKay, Balasanthiran, & Majeed, 2011). Obesity is one of the greatest challenges in Saudi Arabia. Approximately 30% of men and 44% of women are obese (European Society of Cardiology, 2013). Alhyas et al. (2011) attributed the increased prevalence to the socio-economic and lifestyle changes. For instance, there are significant changes in
dietary practices in Gulf countries signified by a shift from the consumption of traditional foods rich in fiber to consumption of foods rich in sugar, Western fast foods and foods with high fat (Musaiger, Takruri, Hassan, & Tarboush, 2010). In a study to determine a typical diet for Saudi Arabians, Hawazen, Patsy, and Robyn (2012) noted that the modern Saudi Arabian diet is characterized by high intake of red meat, high intake of carbohydrates, sugar and fat. According to Shara (2010), the average daily intake of fat in Saudi Arabia was 143.3%. The recommended daily fat intake is between 20 and 25 percent of total calories (Vannice & Rasmussen, 2014). In an earlier study conducted by WHO (2004), the prevalence of obesity among Saudi Arabian women was 43.8%. The study established that 7.6% were severely obese. The high levels of obesity implied the risk of cardiovascular diseases that have been on an upward surge.

The adoption of this high calorie diet and decreased physical activity lifestyle contributes to the high incidence and prevalence rate of CVD marked by the transition from communicable diseases to non-communicable diseases in Saudi Arabia (Mosca et al., 2007). Throughout this transition, women have been affected the most. Evidently, these lifestyle changes are having the greatest implications on the CVD status of women in Saudi Arabia. The various studies conducted in Saudi Arabia have found that women are more exposed to CVD due to the sedentary lifestyle they have adopted and unhealthy eating and cooking habits such as high sugar, high fat, high carbohydrate intake, and frequent consumption of Western fast foods. By continuing these high fat eating and cooking behaviors, Saudi Arabian women are increasing their chances of experiencing CVD and also exposing their families to this risk.
Dietary Fat Intake and CVD Risk

Fats form an essential component of a healthy diet because they are the second major energy source for an individual after carbohydrates (El-Sayed, Elsanhoty, & Ramadan, 2014). Despite their essentiality, the excessive intake of fats and sugar among Saudi Arabian women paired with a sedentary lifestyle has remained a key risk factor for CVD (Al-Nuaim, 2012). There are two main forms of fatty acids: saturated and unsaturated (Tymoczko, Berg, & Stryer, 2013). Unsaturated fatty acids are classified as either monounsaturated fatty acids or polyunsaturated fatty acids such as almonds, avocado, and peanut butter (Tymoczko, Berg, & Stryer, 2013). Saturated fatty acids are found in meat, milk or other dairy products, coconut oil, and commercially prepared foods (e.g., cookies, doughnuts; Michas & Zampelas, 2014). Trans fatty acids are made through hydrogenation of oils to produce margarines and manufactured cooking oils (Mozaffarian, Katan, Ascherio, Stampfer, & Willett, 2006). The consumption of saturated fats and trans fatty acids has been associated with the incidence of cardiovascular disease (Hu & Willett, 2002; Mozaffarian, Katan, Ascherio, Stampfer, & Willett, 2006). High consumption of saturated fats can result in high serum cholesterol, which among other risk factors such as hypertension, obesity, and lack of physical activity, have all been linked to CVD. Eating foods high in saturated fat increases cholesterol because the liver uses the fat to make cholesterol (Berrih-Aknin et al., 2009). Healthy People 2020 recommends dietary changes to prevent or lower blood cholesterol to protect heart health (USDHHS, 2015). These changes include eating a diet low in saturated fat and cholesterol and reducing any excess weight. Dietary fat modification
has been recognized as the key to reduce the risk, delay, and/or prevent of the onset of cardiovascular disease (Hooper et al., 2001; Mozaffarian et al., 2006; Yancey et al., 2004). The research findings discussed previously in relation to high consumption of saturated and trans fats, coupled with low awareness of cardiovascular disease preventative measures among Saudi Arabian women, prompted the decision to target these women for this study.

Acquired dietary habits characterized by excessive intake of animal proteins, sugar, and saturated fat have led to nutrition imbalances leading to CVD in Saudi Arabia (Abdel-Megeid, Abdelkarem, & El-Fetouh, 2011; Alissa, Bahijri, & Ferns, 2005; Aljefree & Ahmed, 2015). According to Memish et al. (2014), maintaining a diet that has low fat and ensuring good patterns of nutrient intake play a significant role in the prevention of CVD. Bearing in mind that Saudi Arabian women are tasked with food preparation, they should be at the forefront in ensuring a low-fat diet and healthy family eating habits.

The traditional dietary patterns of Saudi Arabian women and Saudi Arabians in general presented a situation of balanced nutrition intake (Littlewoods & Yousuf, 2000). The dietary patterns were substantially related to agricultural practices (Musaiger, 2002). However, over the past decades, Saudi Arabia has experienced an industrial revolution and developments in the socio-economic sectors that consequently changed the composition of the typical diet in Saudi Arabia. The implications of the changes have been the increased incidence and prevalence of CVD. The changes are not unique to Saudi Arabia; such transitions continue to be experienced in the developing economies such as Kuwait and United Arab Emirates (Al-Baghili, Al-Ghamdi, Khalid, Ahmad, &
Mahmood, 2010). The unbalanced diet of Saudi Arabian women is directly associated with high levels of degenerative diseases such as obesity, diabetes and hypertension (Crocco, Pervez, & Katz, 2009). Schimiduber and Shetty (2005) noted that promotion and adoption of healthy dietary behaviors will significantly contribute to reduced morbidity and mortality of CVD. In particular, promoting low fat cooking behaviors can help Saudi Arabian women to adopt healthy cooking behaviors and reduce the risk of CVD.

**Women’s Cooking Responsibilities in the Middle East**

Cooking is an activity that is mainly performed by women in many regions of the world, especially in the homes (Sidenvall, Nydahl, & Fjellström, 2000). For centuries, the role of the woman in the family has been to take care of the family in terms of tending to the young ones and cooking for the entire family (Short, 2003). Even though they were not the ones responsible for looking for the food, they were responsible for ensuring there was food readily available for the family every day. This is to say, the decision on what could be eaten on a given day and what could not, rested with them.

In the Middle East, a lot of importance is attached to cooking and is mainly performed by women for their families (Inness, 2001). Offering food to visitors is one of the ways that people in the Middle East region show hospitality. This means that they have a lot of emphasis on the quality of food that is cooked since they are interested in pleasing the visitors that come to their homes. Cooking procedures are different in every region and town that is found in the Middle East (Inness, 2001). People in the rural areas cook the traditional local foods, which in most cases are easy to prepare though there are
different procedures that are used by the women (Keddie, 2007). Middle Eastern women cook their foods with natural fats like ghee and olive oil.

The use of spices is common in almost all towns in the region. Many women like using spices in order to add taste to their foods and make the people eating it have more appetite for meats and vegetables (Heine, 2004). The most common types of foods are rice and meatballs that are mixed together with the spices (Heine, 2004). Cooking is mainly done by the use of charcoal, as it is believed to be a method that produces soft foods that can be eaten by anyone ranging from children to adults (Katz & Weaver, 2003). Since a woman is typically judged based on the type of food she cooks, many women try their hardest to produce the best tasting meals that their families would like to eat over and over again.

Women in the Middle East have the habit of using olives, honey, chickpeas, and parsley in their food (Keddie, 2007). The food they prepare is mainly composed of grains. The grains most used are wheat and rice. In some regions, the women have also taken up cooking barley and maize (Katz & Weaver, 2003). They also crack the wheat and partially cook these wheat grains in water. They use the final product to cook meat pies and salads. Traditionally, Middle Eastern women used butter while cooking. However, today, they use olive oil (Shara, 2010). They add spices to their food such as cloves, coriander, black and chili peppers, sumac, and garlic. Since a majority of the women living in the Middle East are Muslims, they do not cook pork for their families (Katz & Weaver, 2003). The only meat that is included in food is mutton from sheep and
lamb meat. The women grill the meat and then prepare it in what is known as kebabs (Zubaida & Tapper, 2004).

They also prepare the meat together with vegetable stew that they typically serve with rice or bread (Galal, 2003). Middle Eastern women often cook cabbages, spinach and chard. They also use onions, garlic and carrots in the food. Common in many types of salads, stews and broth is tomatoes. Middle Eastern women also often add beans and legumes to the diet. Their choice of cooking beans is second only to grains (Galal, 2003). The type of beans they cook are fava beans (Galal, 2003). They cook them either while they are green or when they are dry. While dry, they are boiled and mashed in oil and chili. While green, they are also boiled and mashed with oil or at times, they are stewed with meat. While preparing soup, split peas and chickpeas are used. A majority of the dishes prepared in the Middle East are stewed or mashed in oil (Roden, 2008). For example, to prepare *Ful medames*, boiled dry fava beans are mashed and dressed in oil and chili. Also, cabbage is stuffed with rice, spices and ground meat and eventually stewed in tomatoes and oil. In addition to the fat content that the women use in their food, they add milk, in yogurt form, in their cooking as well as when dressing their salads (Heine, 2004).

Saudi Arabia is a country where traditional cuisines have been passed on for generations in rural areas. With Saudi Arabians being descendants of tribes that were nomadic sheep and goat herders, meat holds a special place in their meals (Kaufman, 2010). With women still holding the roles of preparing food in this country, they determine the way the food will be cooked and the type of food that will be eaten by the
family (Ibrahim et al., 2014). The amount of fat content that is contained in the diet of the Saudi Arabian people is high (Shara, 2010). This is because the women have a habit of adding broiler chicken to their daily food (Kaufman, 2010). It is estimated that on average, every Saudi Arabian consumes about 88 pounds of chicken per year (Selvanathan, Selvanathan, Albalawi, & Hossain, 2016).

It is also common for food to be served with yogurt or for this yogurt to be used in the preparation of sauces. A regular dish that is prepared by women in this country is kabsah (Kaufman, 2010). This dish is eaten on a daily basis and consists of rice, meat (from either cattle, chicken or camels) vegetables such as carrots and tomatoes and oil from vegetables or animals. Recently, the amount of milk, fish, and eggs found in meals prepared in Saudi Arabia has increased (Selvanathan, Selvanathan, Albalawi, & Hossain, 2016). All of these food items are large suppliers of fat. Additionally, the bread, which is also often eaten in the country, is typically fried in either animal or vegetable oil (Kaufman, 2010). As a result, a majority of the meals prepared by the women in this country have high fat content. According to survey research, the amount of vegetable oil used between 1960 and 1970 has increased from 9 grams per capita per day to 43 grams per capita per day in the years between 2001 and 2007 (Al-Alwan et al., 2013). Animal fat has also risen from 2.41 grams per capita per day to 4.74 per capita per day. Thus the cuisine in Saudi Arabia has experienced an increase in the amount of fat content (Adam, Osama, & Muhammad, 2014).

Women in Saudi Arabia mainly cook for the family since that is one of the main roles they have as home managers (Kaufman, 2010). They are expected to have skills in
cooking; they get these by being taught by their mothers when they are still young. With continued practice, they end up knowing how to cook a variety of foods that can be good for their families. In the earliest methods of cooking, fats were used sparingly, which is also a factor responsible for the absence of the many diseases that have been brought about by the use of the industrial fats that people make use of in the current world (Majeed, 2015).

**History of Dietary Changes in Saudi Arabia**

In the next section, the history of dietary changes in Saudi Arabia is discussed dating back to the 18th century and reasons for these changes.

**The Early Stages of Dietary Changes**

The influence on Saudi Arabian diet dates back to the 18th century. The arrival of traders in the Persian Gulf region brought new ingredients and new food preparation ideas (Peterson, 2004). Subsequently, the spread of Islam in the Arabian Peninsula changed the people’s lifestyle. Even though Islam teaches about healthy eating behaviors, the increased trade from Europeans and Indian merchants brought products that changed the Saudi Arabians’ cuisine (Albakry, 2014). For example, the Islamic faith advocates that Muslims should regularly exercise, abstain from alcohol and eat moderately (Pharaon, 2004). However, the Islamic teachings on healthy eating have been eroded by socio-cultural factors such as increased economic activities. Women were traditionally mandated with food preparation but are currently often employed and find it hard to cook healthy meals (Pharaon, 2004). The principal contributor to dietary changes
is the change in the socio-economic status of Saudi Arabia (Al Othaimeen, Al Nozha, & Osman, 2007).

**Reasons for the Dietary Changes**

In 1938, the Kingdom of Saudi Arabia discovered large oil deposits (Peterson, 2004). The exploration of the oil led to rapid growth of towns and industrialization. Farming and nomadic life was abandoned, and many people migrated to cities. The developed cities needed reliable sources of food and hence processed foods were imported. Dietary patterns of Saudi Arabians have been influenced by the availability of a wide range of foreign workers, imported goods and purchasing power (Al-Shoshan, 1992). The cosmopolitan cities and the western cuisines such as American fast food chains have been blamed for dietary changes. The increase in disposal income among Saudi Arabians coupled with changing to urbanization is driven to create opportunities for the food industry especially processed food industry. Considering all these changes and market potential, many global food companies have set up their business activities to accommodate Saudi culture and promote their food products. To make food more appealing to consumers, these food companies not only change the food items or cooking process but also named their food products to appeal the locals. The global aspect of the company makes the consumers to try their products but adding localization element make them to come again. Thus, the dietary patterns among Saudi people were adopted to include many manufactured and processed foods. This trend is stimulated by the increase rate of urbanization. Increased urbanization and changing eating habits in Saudi Arabia
have created nutrition-related problems such as CVD (Al Othaimeen, Al Nozha, & Osman, 2007).

Cultural influence and rapid economic development was the key driver for the shift from the traditional Saudi Arabian diet that consisted of readily available food in the rural areas (Porman, 2006). The traditional Saudi Arabian diet still prevails, combined with a range of western lifestyle habits (Al-Kanhal & Bani, 1994; Mohieldein, Alzohairy, & Hasan, 2011). For example, vegetable oils such as corn oil were relatively new in the Saudi Arabian diet and they contribute to the total fat and caloric content of the current diet. Grain consumption became the main feature of the Saudi Arabian diet (Al-Shoshan, 1992). The fiber content of the Saudi Arabian diet has been replaced by polished rice and refined bread, which contributed to diabetes and obesity (Al-Kanhal, & Bani, 1994).

**How Dietary Changes Took Place**

The dietary and lifestyle changes in Saudi Arabia have been gradual (Sibai et al., 2010). The changes affected both the qualitative and quantitative dietary practices (Musaiger, Takruri, Hassan, & Tarboush, 2010). There was a shift from healthy diets towards diets high in sugars and saturated fats (Al-Dhaheri, Al-Mawalil, Laleye, & Washi, 2014). The current diet predisposes Saudi people to risks of cardiovascular disease.

Increased integrations of cultures experienced in the 20th and 21st century have made the world a global society. Globalization has resulted in a global culture marked by a sedentary lifestyle and adoption of fast foods for different age groups (Mahfouz et al., 2011). Glocalization is another factor that impact dietary changes in Saudi Arabia. For
example, McDonalds in Saudi Arabia provides foods that are culturally accepted and
relevant to Saudi people diet, such as Mc Arabia (Ibahrine, 2015). McDonalds has
developed a menu especially for Saudi people with food selections to suit Saudi Arabian
tastes and preferences. The fast food chains’ menu adaptations to local/Saudi plates
shape the food consumption in the country and how people eat. Moreover, Saudi people
found easily prepared food in the market that meet their expectations and culture. A
cross-sectional study conducted by Farghally, Ghazeli, Al-Wabel, Sadek, & Abbag
(2007) to assess the nutritional status of adolescents revealed that nearly half of the
studied students were overweight. The study attributed the findings to the dietary
changes and the sedentary lifestyles adopted by many Saudi families. The study included
female and male students in primary and secondary schools within Abha city. In a
similar study, Musaiger and Zagzoog (2013) found that the majority of students’ primary
source of carbohydrates was white bread, sweets, biscuits, and canned juice. The foods
consumed by the students demonstrated the dietary changes in Saudi Arabia. The foods
are a depiction of western culture influence in which many people have adopted highly
processed foods into their diets. Even though the study targeted the students, it pointed to
trends that are adopted by many families and subsequently replicated by younger
generations.

The traditional Saudi Arabian diet included fruits, dates, meat, wheat, beans, rice
and milk that were cultivated in the arable lands (Davis, 2013). Unprocessed grains such
as the wheat, millet, and rice provided complex carbohydrates that presented a better
source of starch compared to the highly processed foods (Amadou, 2011). Schimiduber
and Shetty (2005) indicated that the traditional foods were abundant in dietary fiber, complex carbohydrates, and meat. Farming and the nomadic life ensured that there was enough physical exercise. In addition, the Saudi Arabians living along the coast had access to seafood. The foods were cooked using simple methods that did not add saturated fats. However, the current cooking methods in Saudi Arabia include a significant use of fat (Crocco, Pervez, & Katz, 2009). The high fat consumption predisposes the Saudi Arabians to a high risk of cardiovascular diseases (Al-Moraie, Lietz, & Seal, 2012). The traditional cooking method was boiling where fats and sugars were used modestly. However, the onset of globalization and glocalization changed this trend. Frying using saturated fats and eating processed foods replaced the traditional dietary practices, which has led to the increased risk in CVD we see today.

Glocalization of food promotes new methods and ideas of food preparation among Saudi people. It forms an important aspect of food consumption in Saudi Arabia and how it should be perceived.

Defining risk factors for CVD related to dietary habits could have an effect on developing strategies aimed at limiting the occurrence of the disease and improving Saudi Arabian women’s health. Health educators have a duty to explore women’s health issues such as CVD to identify the risk factors and facilitate the adoption and continuance of behaviors that emphasize a healthy eating lifestyle.

**The Importance of Nutrition in CVD Prevention**

The prevention of CVD is a great concern in dietetics and health education professions. One of the objectives of Healthy People 2020 focuses on CVD and stroke.
The goal for this objective is to, “improve cardiovascular health and quality of life through the prevention, detection, and treatment of risk factors; early identification and treatment of heart attacks and strokes; and prevention of recurrent cardiovascular events” (USDHHS, 2015, para. 1). The risk of CVD can be reduced by health promotion and primary prevention interventions including healthy eating habits and regular physical activity (USDHHS, 2015). The AHA (2015) has established goals for cardiovascular health promotion that can be achieved through encouraging healthy eating and physical activity behaviors. Public health guidance on the prevention of CVD suggests that small lifestyle modifications in diet and activity could prevent about 40,000 early cardiovascular deaths in people under 75 years each year (National Institute for Health and Care Excellence [NICE], 2014).

In the Gulf region, including Saudi Arabia, the supply of cardiovascular centers cannot meet the demand of the number of individuals with current cardiovascular diseases (European Society of Cardiology, 2013). Therefore, it is of the utmost importance to begin implementing preventative measures within this geographic area to stop the continued increase in individuals with CVD. Since people who reside in the Gulf region do not understand what type of diet and exercise regimens are good for their health, it is urgent to develop and implement preventative cardiovascular health programming (European Society of Cardiology, 2013).

**Nutrition Recommendations**

In many developed countries, dietary guidelines and goals are set to improve food consumption patterns and individual wellbeing (Al-quaiiz & Tayel, 2009). The
Department of Health and Human Services, the National Cancer Institute, and the American Heart Association recommend individuals decrease dietary fat intake to less than 30% of total daily calories (Vannice & Rasmussen, 2014). However, the challenge is how to effectively promote adoption of low fat intake behavior. More Saudi Arabians are now eating high amounts of fat-rich foods and saturated fat than in the past (Hanash et al., 2000; Shara, 2010), and more people are dying from CVD (WHO, 2015). The dietary fat is consumed on average in amounts greater than recommended. Saudi Arabians continue to eat high-fat diets, the number of obese people has increased, and the risk of CVD remains high (Al-Alwan et al., 2013; Pharaon, 2004). In light of these facts, it is important to encourage Saudi Arabian women to make low fat food choices to reduce their risk of CVD.

According to Al-Dkheel (2012), the Arab Gulf countries have experienced drastic changes in patterns of food consumption. The shift has led to consumption of high energy density diet in which sugars and fats are added to the daily foods (Brunner, Rees, Ward, Burke, & Thorogood, 2007). As a result, health officials in Saudi Arabia have undertaken extensive steps to develop dietary guidelines to help prevent and control the main nutrition-related diseases in the country. The dietary guidelines are based on a nutrition message that an individual can achieve a healthy diet by eating a balanced diet, consuming a variety of foods from different food groups, and also eating certain foods such as fat in moderation (Al-Dkheel, 2012). The guidelines include the Healthy Food Palm that shows the number of daily health proportions recommended in all meals and importance of exercise alongside food balance (Appendix 1). The Healthy Food Palm
should be supplemented by physical activity of 30-60 minutes every day depending on the individual health status (Al-Dkheel, 2012).

Despite the provisions for fat intake as provided in the Saudi Arabian dietary guidelines, Shara (2010) noted that the percent of energy from fat was approximately three times higher than the recommended allowance and contrary to the guideline of limiting fat and sugar intake as much as possible.

According to Khanan and Costarelli (2008), many Saudi Arabian women have adopted diets with saturated fats, high sugar and red meat. Even with the awareness of the implications of consuming an unhealthy diet, Al Dhereri, Al-Mawalil, Laleye, and Washi (2014) indicated that the adopted diets are presumed to be the best lifestyle that matches the current socioeconomic status of Saudi Arabian women. Notably, CVD in Saudi Arabia is etiologically linked with the practices of cooking food and dietary patterns that affect women (Mahmood, Johan, & Habibullar, 2014). Sibai et al. (2010) noted that public health interventions should leverage on perception and intentions of Saudi Arabian women to adopt low fat diets. Al-Hazzaa (2004) found that 53.4% of adults in Saudi Arabia are exposed to chronic heart diseases due to unhealthy diet and reduced physical exercise. In a follow-up study by Shara (2010), Saudi Arabian women were found to have lower physical activity compared to women from other countries. Shara (2010) noted that the reason behind the lower activity is attributable to the social roles (i.e., home maker and care taker) that further predispose them to CVD. In addition, Saudi Arabian women face many cultural factors (i.e., prohibited from driving and require a guardian for commuting) that could limit or prohibit exercise activities, thus
leading to high prevalence of physical inactivity among such population (Al-Nozha et al., 2007).

The increased level of obesity has been due to the adoption of new eating habits, changes in socioeconomic status, changes in traditional food styles and a sedentary lifestyle (Al-Alwan et al., 2013). A cross-sectional study carried out in the European Union (EU) established that information on the difficulties that relate to eating healthier diets is imperative in helping public health professionals in designing nutrition intervention programs that are effective (Kearney & McElhone, 1999). The study participants interviewed in this study cited common barriers for healthy eating, which included time, taste and the socioeconomic changes within the country. Lack of knowledge was not mentioned in the study. Such a study, though not carried out in Saudi Arabia, points to a common trend in the developed world. The same finding could be generalized to Saudi Arabian women who have the intention to take up low fat diets but the socioeconomic, taste and time factors may be the main barrier to healthy eating as pointed out in the teenage female study (Brug, Assema, & Kok, 1994). Therefore, a comprehensive study on the risk perception of cardiovascular diseases and intentions to consume a low fat diet could provide real data on the actual barriers to a healthy diet and subsequently help in drawing informed recommendations for Saudi Arabian diets.

Studies on CVD carried in Saudi Arabia indicate that lifestyle changes are the leading causes of cardiovascular diseases among the female population (Al-Alwan et al., 2013; Al-Nozha et al., 2004; Alquaiz et al., 2015). The studies point to a significant level of awareness of unhealthy diets (Al-Alwan et al., 2013; Bakhotmah, 2012; Shara,
Diets high in fats, sugar, and excessive consumption of red meat and adoption of fast foods continue to be prevalent. Thus, there is need for nutrition education that touches on attitude and lifestyle change in relation to eating. The change in attitude and perception to achieve the ultimate goal of healthy diet and cooking practices should be guided by informed campaigns that target women. The studies should be evidence based and hence the necessity for the research on risk perception of cardiovascular disease among Saudi Arabian women in relation to home cooking and intention to use low fat cooking methods.

**Low Fat Cooking Behavior**

As previously stated, unhealthy diet has been associated with excess weight, negative health outcomes, and increased risk of diseases including cardiovascular disease (AHA, 2015; U.S. Department of Agriculture, Center for Nutrition Policy and Promotion [CNPP], 2011). Addressing diet quality could be a very effective way to preventing diseases associated with unhealthy diet. Healthy dietary practices have been consistently suggested as a preventive strategy for CVD (Jakulj et al., 2007; Mokdad, Marks, Stroup, & Gerberding, 2004). Larson, Perry, Story, and Neumark-Sztainer (2006) found a positive relationship between food prepared at home and meeting the dietary recommendations. Increased food preparation by individuals was associated with an increased likelihood of meeting recommended levels of calcium, fruit, vegetables and whole grains. Among those who reported high food preparation frequency, 31% consumed five servings of fruits or vegetables daily, compared to only 3% who reported very low food preparation (Larson, Perry, Story, & Neumark-Sztainer, 2006). There is a
need to ensure that individuals are able to adopt healthy eating habits related to food preparation (Erlich, 2012). Lowering dietary fat intake, especially saturated fat, has been recommended to decrease the risk of CVD (AHA, 2015; Melanson, 2007; Mensink, Zock, Kester, & Katan, 2003). This can be achieved by adopting low fat cooking behaviors such as choosing lean cuts of meat and trimming all visible fat. Cooking can be an important part of a healthy eating lifestyle (Erlich, 2012). Through adopting low fat cooking behaviors, Saudi Arabian women can reduce their fat intake and the risk of CVD.

Data addressing cooking behaviors of women are scarce in Saudi Arabia. Based on previous literature, at home, Saudi Arabian women cook a variety of recipes that use similar ingredients: meat, rice, chicken, and bread (Kaufman, 2010; Mohieldein, Alzohairy, & Hasan, 2011). Women should be motivated to practice cooking behaviors that promote cooking foods in a healthier way. This includes using lean cuts of meats, substituting ingredients like olive oil for butter, and reducing the amounts of fat, oil, and salt used in cooking. These strategies will promote healthier food consumption among Saudi Arabian women. Nutrition education programs should teach women how to prepare recipes that include commonly enjoyed meals, but with low fat food choices used in their preparation.

**Theoretical Basis of the Study**

The theoretical basis of this study was the Health Belief Model (HBM) and the Precaution Adoption Process Model (PAPM). Theories are often used in health education and promotion research in an attempt to understand and predict behavior
change. The HBM and PAPM have been selected because they both highlight the role of risk perceptions on behavioral changes.

**Health Belief Model (HBM)**

The HBM is one relevant theory that claims to predict healthy behavior. HBM was created by a group of U.S Health Service social psychologists to understand why few people were participating in free programs to prevent and detect disease (Glanz, Rimer, & Viswanath, 2008). HBM was developed in the 1950s to understand why tuberculosis screening programs were not successful (Hochbaum, 1958). The model assesses individuals’ risk perceptions as they relate to disease development (Rimer & Glanz, 2005). The model proposes that individuals’ health-related behavior is based on their perceptions in four areas (a) the individuals’ susceptibility to disease, (b) the severity of a potential disease, (c) the benefits of taking a preventive action, and (d) the barriers to taking that action (Rimer & Glanz, 2005). The HBM assumes that there is a relationship between individuals’ beliefs and behaviors in which health seeking behavior is influenced by individuals’ perceptions of risk posed by a health problem.

This study used the HBM as a framework to examine the psychological variables of perceived susceptibility and self-efficacy in achieving a particular behavior. The HBM can be a good model for examining health behaviors that evoke health concerns (Rimer & Glanz, 2005). Thus, this model was applied to investigate high fat cooking behavior among Saudi Arabian women and their perceived risk of contracting CVD. The adapted model provides a useful roadmap for understanding Saudi Arabian women’s cooking behaviors related to risk perceptions of CVD and how risk perceptions relates to
the likelihood of influencing actionable behavior to cook low fat meals (see Figure 3). Risk perceptions of CVD can be translated into behavioral intent for cooking low fat food behaviors by using the HBM framework.

Figure 3. Adapted conceptual model of risk perceptions and behavioral intention

The application of the model helps to provide a way to examine and predict how Saudi Arabian women behave in relation to their cardiovascular health and fat-related cooking behavior. The HBM was used to inform the development of the research questions by focusing on the construct perceived susceptibility. This model is made up
of four constructs that include perceived susceptibility, perceived benefits, perceived barriers, and perceived severity (Glanz, Rimer, & Viswanath, 2008). Other constructs have been added to the HBM to include cues to action and self-efficacy (Glanz, Rimer, & Viswanath, 2008). One construct of the health belief model, perceived susceptibility, was used to carry out the purpose of this study. The other construct, self-efficacy, was used to identify participants’ perception of their ability to cook low fat meals. Perceived susceptibility was utilized to study and predict Saudi Arabian women’s perceived susceptibility of cardiovascular disease in relation to cooking and intentions to adopt positive cooking behavior. According to Rimer and Glanz (2005), positive behavior changes can be obtained by increasing individuals’ perceptions of susceptibility or the chances of contracting the disease. Wood (2008) emphasized the importance of studying perceived susceptibility as the key to examining the possible risk associated with not adopting positive behaviors.

HBM is among the most used theories in the area of health promotion because it addresses six key elements, which include perceived susceptibility (Glanz, Rimer, & Viswanath, 2008). Figure 3 depicts how the HBM construct of perceived susceptibility can influence health related behavior. The HBM helps to predict the likelihood of individuals adopting preventative health action (Carpenter, 2010). The predictions of the behavior are based on the uptake of healthy behaviors such as healthy dietary practices (Brewer & Rimer, 2008). HBM stipulates that motivation, skill, and the presence of an enabling environment lead to behavioral change (Brewer, Chapman, Gibbons, Gerard, & McCaul, 2007). The model proposes that individuals will respond best to disease
prevention efforts when they believe that they are at risk for developing the disease (Glanz, Rimer, & Viswanath, 2008). The underlying concept for application of HBM is that health behavior is influenced by individual perceptions (Turner, Hunk, DiBrezzo, & Jones, 2004). Brewer et al. (2007) noted that different attitudes are affected by intrapersonal factors that subsequently determine the probable behavior. It is expected that demographic factors such as age and educational level affect health motivation and perception. However, HBM does not examine demographic factors as direct causes of health behavior but as influences of perceived susceptibility (Glanz, Rimer, & Viswanath, 2008). The likelihood of taking preventive health action is a direct result of perceived susceptibility to the disease. The likelihood of cooking low fat meals among Saudi Arabian women depends on their cardiovascular disease risk perceptions. If these women do not see their fat-related cooking behavior as risky, there is no motivation for them to act to change it.

Health behavior research suggests that perceived susceptibility to cardiovascular risk factors such as excessive intake of fatty foods, hypercholesterolemia, and hypertension are positively associated with behavioral change such as low dietary fat intake (Brunner, Rees, Ward, Burke, & Thorogood, 2007; Meischke et al., 2000; Silagy, Muir, Coulter, Thorogood, & Roe, 1993; Winkleby, Flora, & Kraemer, 1994). This body of evidence supports using this model as the basis for the theoretical construction of this study, through which the researcher hypothesizes that there is a significant relationship between risk perceptions of CVD and fat-related cooking behavior. Also, Saudi Arabian
women’s risk perceptions of CVD are significant predictors of their intentions to cook low fat meals.

Numerous studies focused on the expansion and application of the HBM have indicated that individuals’ perceived susceptibility to a disease is one of the strongest contributors to individuals’ decisions to enact preventive health behaviors (Glaz, Rimer, & Viswanath, 2008; Janz & Becker, 1984; Rimer & Glaz, 2005). Thalacker (2010) pointed out that personal risk perception plays a crucial role in prompting people to adopt healthier behaviors. For example, a dreaded disease will make people explore alternative ways to reduce the risk. However, Thalacker noted that risk perception does not result in the elimination of the problem but may reduce risk behavior. For instance, promoting awareness about HIV in past decades led to both increased awareness and risk perception (Takahashi, Johnson, & Bradley, 2005). Thus, people adopted mitigation practices such as protected sex or abstinence to avoid the risk of contracting HIV. The changes did not eliminate the problem but reduced the infection rates among some individuals.

Theory-based behavioral approaches are effective in lifestyle modification (Glaz, Rimer, & Viswanath, 2008). Self-efficacy has been a useful predictor of health behavior change (AbuSabha & Achterberg, 1997; Strecher, Devellis, Becker, & Rosenstock, 1986). Self-efficacy is described as the belief an individual has regarding his capability to produce or reach certain performance levels in different situations (Strecher et al., 1986). It is the belief in the expectations regarding an outcome of a certain self-motivated behavior. Self-efficacy is conceptually defined as the confidence an individual has in his/her ability to successfully achieve a specific behavior (Banduara,
1997). Self-efficacy has been found to affect behavioral aspects and every area of a person’s life. It is also the power behind the acquisition of new behavior, impediment of existing behavior and resuming past behavior. It determines the strength a person has to face challenges and the choices they may make. The result of these decisions is evident, particularly those related to the health and well-being. Bandura (1997) has emphasized the importance of self-efficacy for the adoption of healthy behavior change. Individuals will persevere in behaviors that they believe they are capable of performing. They will not be involved in behaviors that they have limited confidence to perform.

Self-efficacy was recently adopted into the Health Belief Model. The model suggests that any health-motivated behavior is subject to the existence of a health concern, the belief in susceptibility and the belief that a health recommendation would silence the threat perceived (Strecher et al., 1986). The model previously restricted the behavioral aspect to preventive actions such as taking immunizations, which are regarded as generally accepted behavior. However, when considering chronic illnesses, there are problems involved in modifying lifelong habits that will be more difficult to overcome and require much confidence. Therefore, people must develop the drive to take action and have faith that the expected change will be of benefit, which means that the people must feel capable of going along with the change. In the HBM self-efficacy is, therefore, the basis for the initiation and maintenance of behavioral change.

Self-efficacy is related to behavior change since changing and maintaining the new behavior will depend on of the expectations of a person engaging in certain behavior and their ability to execute the behavior (Rosenstock, Strecher, & Becker, 1988). It is the
perceptions and not the actual capabilities that will determine their next move and their
determination to change behavior. Self-efficacy is therefore a determinant of the new
behaviors that an individual adapts, the old behavior they avoid and those that they may
pick up again (Bandura, 1997). It also influences the behavioral setting, the effort put
into a task and the length of time they withstand the challenge.

Behavioral change is driven by a person’s ability to take control. If the
participants believe that they can perform the needed action and develop a solution to the
existing problem, then they will be more inclined to doing that and also increase their
level of commitment towards the change (Schwarzer & Fuchs, 1995). Self-efficacy can
be used as a predictor of maintaining change after successfully quitting a long-standing
behavior because it is a measure of the confidence to attain the desired goal. This means
that they need to believe in their ability to cope and make sound judgments in coming up
with a coping response. The higher the self-efficacy belief, the higher the success levels
in achieving the goals set and therefore, the firmer the commitment a person will have
towards the intended results. Self-efficacy is a key driver towards long-term maintenance
of behavior.

Self-efficacy application in this study helps to understand the confidence
participants have in their abilities to cook low fat meals. The participants will reduce
their fat intake from the perceived threat heart disease. They understand that they are
susceptible to heart diseases and therefore must take precaution through a dietary
behavior change to cook low fat meals. Sustaining the new behavior will, however,
depend on the participants’ internal locus of control and sense of efficacy. The
underlying assumption is that high self-efficacy to cook low fat meals will likely increase opportunities to perform the behavior.

The HBM has been applied to examine preventive health behaviors such as exercise, breast self-examination, and smoking cessation (Hajian-Tilaki & Auladi, 2014; Kim, Ahn, & No, 2012; Renuka & Pushpanjali, 2014). The model also has been used to predict participation in immunization programs for infectious disease and to investigate health screening behaviors for breast or colon cancer (Glanz, Rimer, & Viswanath, 2008). It has also been used to increase the understanding of sick role behaviors and used to predict compliance with illness control measures for diabetes or hypertension (Adejoh, 2014; Kamran, Ahari, Biria, Malpour, & Heydari, 2015). Becker et al. (1977) used the HBM to explain and predict mothers’ adherence to dietary recommendations for their obese children. The predictive ability of the model has been used on compliance and attendance with education on breast self-examination (Calnan & Moss, 1984). The best predictor of class attendance was perceived susceptibility of breast cancer. Another study applied the HBM to predict perceived and actual dietary quality to inform nutrition education programs aimed at promoting individuals’ health (Sapp & Jensen, 1998). The model could be utilized to study compliance and non-compliance with disease management behaviors such as following diabetic and hypertensive dietary recommendations. The application of the HBM in this study will be useful in predicting the intentions to adopt preventive nutrition practices such as cooking low fat meals.

According to Hanson (2002), the HBM provides a framework in which differences in compliance and non-compliance are established. The agreement to change
depends on the perceived susceptibility of the risk (Stephan, Boiche, Trouilloud, Deroche, & Sarrazin, 2011). Pirzader and Mostafavi (2014) argued that there is no relationship between risk perception and behavior change. However, in a study to find out the risk perception of prescription drugs and vaccines, the study participants were found to consider vaccines beneficial depending on their level of knowledge (Hanson, 2002). Exposure to risk determines the outcome of the intended change. Thus, without knowledge of the risk, substantial behavioral change cannot be realized. Bond & Nolan (2011) conducted a stratified study to identify the risk perception of mothers in relation to immunization of their infants. The study included 45 Australian parents with children who were undergoing several staged immunizations. The mothers with high-risk perception were willing to have their children undertake all the immunization stages. The parents without adequate knowledge of risks used some vaccines for their children and withdrew from the remaining stages. The parents who were not aware of the danger caused by diseases did not immunize their infants. The study established that the construct of risk perception among the parents played a crucial role in determining completion of the vaccination process (Bond & Nolan, 2011).

Chen, Fox, Cantrell, and Kagawa, (2007) carried out a study to establish risk perception of skin cancer and the use of sunscreens. They found that perceived susceptibility acts as motivation for people to use sunscreens in order to prevent skin cancer. The risk perception is not absolute; it is influenced by the exposure and the knowledge accumulated by the target audience. For instance, if the magnitude of the perceived risk is high, the chances of adopting the behavior to reduce the risks posed are
also great (Tuner et al., 2004). The HBM asserts that if individuals perceive themselves as being at risk for CVD, it is likely they will take recommended dietary action. As a result, the HBM is an appropriate framework for this study to determine whether Saudi Arabian women’s perceptions of CVD risk will be associated with intentions to adopt low fat cooking behavior.

**Precaution Adoption Process Model (PAPM)**

The PAPM is a seven-stage model that explains how individuals make decisions and the transition process of making decisions (Sniehotta, Luszczynska, Scholz, & Lippke, 2005). The PAPM describes the adoption of health-related behavior as a developmental process through seven distinct behavioral stages that result in the adoption and maintenance of a precautionary behavior (Glanz, Rimer, & Viswanath, 2008). The model was utilized in this study to investigate readiness among Saudi Arabian women to follow low fat cooking behavior. The model describes the pathway of stages in the adoption of health-protective behavior such as cooking low fat meals. It applies seven stages to determine and explain awareness of health. The stages range from “unaware” to “acting” and “maintenance.” The knowledge and exposure influences the outcome decision (i.e., either changing or deciding not to change; Mauck et al., 2002). Mauck et al. (2002) stated that the PAPM model explains the seven stages in terms of psychological processes that take place.

The seven stages that were tested in this study are: Stage 1, unaware of the issue; Stage 2, aware of the issue but not engaged; Stage 3, undecided; Stage 4, not planning to
act; Stage 5, planning to take an action; Stage 6, acting; and Stage 7, maintenance (Figure 4).

![Diagram of the Precaution Adoption Process Model]

**Figure 4. Precaution Adoption Process Model**

The PAPM was used to classify the participants in stages in relation to their intentions to cook low fat meals. PAPM was utilized as a tool to determine the readiness of Saudi Arabian women to adopt positive cooking behavior to protect their heart health. In addition, the model was useful in predicting who has the intent of cooking low fat meals as well as identifies different stages for the other study participants. This theoretical model was applied because it places individuals in one of seven stages based on their thoughts and behaviors associated with their perceptions of a specific issue. Figure 5 presents the stages of the PAPM as applied to cardiovascular risks of high fat cooking behavior.
Using PAPM, the stage-based behavior change theory, this study examined the intentions of Saudi Arabian women to adopt low fat cooking behavior. The model was selected because it recognizes that these women may be in different stages of readiness with respect to adopting low fat cooking behavior. The information collected on the readiness of these women will not only provide a better understanding of Saudi Arabian women’s intentions to adopt low fat cooking behaviors, but also inform the future development of effective and appropriate intervention programs that will motivate and resonate with women regardless of which stage of the PAPM they are in.

The PAPM has been applied in many studies as a theoretical framework for examining and predicting health related actions. Although the PAPM is a relatively new model, it has been successfully utilized in many studies such as mammography studies (Clemow et al., 2000; Constanza et al., 2009) effects of colon cancer risk screening
(Glanz, Steffen, & Taglialtela, 2007) and home radon testing (Glanz, Rimer, & Viswanath, 2008). Costanza et al., (2005) examined colorectal cancer screening adoption based on the PAPM. The researchers indicated that 85% of the study participants in stage 6 and 7 (action and maintenance) had had a full examination for colon cancer. They concluded that the PAPM constructs were useful when applied to such a complex behavior screening as colorectal cancer screening. Another study explored the relationship between psychosocial variables, PAPM stages and stage transitions, and fruit intake (de Vet, de Nooijer, Oenema, de Vries, & Brug, 2008). The findings of the study indicated significant baseline differences between the PAPM stages in all psychosocial variables (i.e., risk perception, attitude, pros, cons, perception of own fruit intake level, subjective norms, social support, modeling, and self-efficacy). Using the PAPM, Sniehotta, Luszczynska, Scholz, and Lippke (2005) examined the assumption that health behavior changes occur in distinct stages. They examined stages from the PAPM along with two additional stages (Stages 6a—acting with no intention of maintenance) and 6b—acting with intention of maintenance) in terms of reducing meat consumption during a livestock epidemic and change patterns in social-cognitive variables, such as perception of vulnerability. The results of the study showed significant differences between the stages for vulnerability (Sniehotta, Luszczynska, Scholz, & Lippke, 2005). Participants in the study classified as unengaged by the issue perceived lower vulnerability than those deciding about action and those who had decided to act. Participants who decided not to act did not differ significantly from those who were making their decisions and those who had already decided to act (Sniehotta, Luszczynska, Scholz, & Lippke, 2005).
Respondents who are acting with intention of maintenance were less exposed to potential risk and perceived the lowest vulnerability (Sniehotta, Luszczynska, Scholz, & Lippke, 2005). The PAPM has been applied to investigate community engagement with the health benefits of dietary fiber and receptiveness to resistant starch in Australia (Mohr, Quinn, Morell, & Topping, 2010). Resistant starch refers to dietary starch that “escapes digestion in the small intestine and becomes available for fermentation by microflora present in the large bowel” (Mohr et al., 2010, p. 1916). The researcher concluded that the application of the PAPM to awareness of dietary fiber showed a ready-made target group for health messages about resistant starch. A study of 1,488 adolescents applied the PAPM to cyber bullying to test the model with adolescents (Chapin, 2014). The study found that most adolescents were aware of cyber bullying and recognized it as a problem in their school. Approximately half of the respondents did not move beyond stage 2 in the PAPM (aware of the issue, but have not thought about it). Also, adolescents revealed optimistic bias, underestimating the likelihood they would experience cyber bullying. The PAPM was used to examine the predictors of calcium consumption and weight-bearing exercise behaviors in relation to reduce the risk of developing osteoporosis among premenopausal women (Blalock et al., 1996). The study found that 50% of the women in stage 6 and 7 (acting and maintenance), taking calcium supplements and exercising to reduce the risk of the osteoporosis. Only 5% were unaware of the benefits of the target behaviors. Participants in stage 3 (engaged and deciding what to do) showed the highest perceived susceptibility of the disease. Results of the study provided substantial support for the PAPM in relation to calcium intake. The
authors suggested using the model to increase the understanding of why some women do not practice behaviors to prevent osteoporosis (Blalock et al., 1996). The stages of PAPM applied to provide a framework to categorize different levels of perceived risk of recombinant bovine growth hormone in milk (rbGH), a food-related biotechnology used in milk production (Grobe, Douthitt, & Zepeda, 1999). The researchers concluded that risk perceptions of recombinant bovine growth hormone are affected by age, educational level, and gender (Grobe, Douthitt, & Zepeda, 1999). Moreover, self-protective behavior is substantially affected by household size and identification with environmental groups.

Another study used the PAPM to examine home testing for radon (Weinstein, 1988). The researcher indicated that home testing for radon was more likely to occur over time by respondents in stage 5 (decided to act) than by respondents in the earlier (undecided) stages (Glanz, Rimer, & Viswanath, 2008). The radon study supported the theoretical principle of the model that being undecided and having decided to act represent distinct stages, with different barriers to moving to the next stage (Glanz, Rimer, & Viswanath, 2008).

The concepts of the PAPM have been applied in many health intervention programs such as prevention of osteoporosis, cancer screening, and consumption of foods (i.e., meat and fruit; Blalock et al., 1996; Costanza et al., 2005; Sniehotta et al., 2005; de Vet et al., 2008). There are differences in the extent the PAPM stages are applied to health interventions and health promotion. Blalock (2005) conducted a study in which PAPM was used to assess a behavior change intervention for osteoporosis, a disorder that leads to decreased bone density. The study was aimed at understanding the factors that
make women not engage in enough physical activity or take enough calcium and to predict the progression of decision-making process from awareness to action. The research was based on the implementation of the seven PAPM stages. The study established that awareness of the health impact of a given situation determines the probable course of action. Women who did not have adequate awareness of the risk of osteoporosis did not have diets and supplements rich in calcium (Blalock, 2005). In addition, the women did not engage in physical activity. In a review of osteoporosis health beliefs, McLeod and Johnson (2011) found that men and women who reached the decision-making stage were aware of the health issue.

In a similar study, Sasaëinasab et al. (2013) stated that the PAPM’s seven stages present a dynamic behavior change process. In the processes, there is no predetermined time for transition from one stage to the next. Elliot, Seals, and Jacobson (2007) conducted a study to assess behavior change and intervention processes for osteoporosis. The study evaluated health beliefs, knowledge and stages of precaution in the adoption of protective osteoporosis behaviors among women. In relation to calcium intake, Elliot et al. (2007) noted that perceived susceptibility to osteoporosis and the knowledge of benefits of calcium was in the higher stages among women who had prior knowledge. Health motivation and knowledge mostly predicted the decision to engage in physical activity among the women. The study provided a basis for understanding PAPM and established how people can be influenced to transition from the unaware stage to the stages of taking action and maintaining protective behaviors. Weinstein and Sandman
(1992) asserted that a small change in perception of risk or personal susceptibility was enough to impact individuals’ decision to act on health behaviors.

In yet another study on low impact fractures among postmenopausal women, Mauck et al. (2002) found that 62% of the women were in stages one and two of PAPM. Only the women previously diagnosed with osteoporosis were ready to seek treatment. Awareness played a crucial role in determining the process of transition to seek medication. For instance, lack of knowledge accounted for the high number of women being in the first stages (Mauck et al., 2002). Thus, to transition to the positive behavior change, adequate education is required to achieve action.

The PAPM has been applied in health education and promotion programs. The target audience is educated about the prevailing health concern and presented with options to act (Sniehotta et al., 2005). For instance, Saudi Arabian women are mandated with preparation of family foods; however, the western influence has resulted in the adoption of high-fat cooking practices. Thus, the PAPM model presents a framework for measuring the readiness of the women to change to low-fat cooking and maintain the healthier practice. The stage of decision-making is the core turning point in ascertaining the direction of behavior change.

To date there has been no published literature documenting the relationship between risk perceptions of CVD and intentions to cook low fat meals by utilizing the HBM and the PAPM as a framework to understanding the association. This study was the first to apply the PAPM and the HBM to investigate the risk perceptions of CVD in relation to home cooking and intentions to cook low fat meals with Saudi Arabian
women. The application of risk perception construct of HBM and PAPM was incorporated in defining the stages of change and determining the influence of the construct of risk perception for fat-related dietary behavior change on these stages. Risk perceptions of cardiovascular disease, dietary fat cooking behaviors, and stages of change were assessed among the sample of Saudi Arabian women.

Research Questions, Hypotheses, and Data Analysis Approach

The research questions that direct this study are:

1. What will be the risk perceptions of CVD among Saudi Arabian women?
2. What are Saudi Arabian women’s fat-related cooking behaviors?
3. What will be the intentions of Saudi Arabian women to cook low fat meals?
4. Is there a significant relationship between risk perceptions of CVD and fat-related cooking behaviors?
5. Are Saudi Arabian women’s risk perceptions of CVD a significant predictor of their intentions to cook low fat meals?

These research questions reflect the following hypotheses:

1. Saudi Arabian women will indicate low risk perceptions of CVD.
2. Saudi Arabian women will indicate high fat cooking behaviors.
3. Saudi Arabian women will indicate low intentions to cook low fat meals.
4. H₀: There is no statistically significant relationship between risk perceptions of CVD and fat-related cooking behaviors
   H₁: There is a statistically significant relationship between risk perceptions of CVD and fat-related cooking behaviors.
5. **H₀:** Risk perceptions of CVD will not be a significant predictor of Saudi Arabian women’s intentions to cook low fat meals.

   **H₁:** Risk perceptions of CVD will be a significant predictor of Saudi Arabian women’s intentions to cook low fat meals.

   In order to examine the correlations between the independent variables, risk perception/perceived susceptibility of cardiovascular disease and fat-related cooking behaviors, the Pearson Correlation Coefficient was applied. A multiple regression model was used to predict the dependent variable, intentions to cook low fat meals. Data from the PAPM algorithm were analyzed to classify the participants into stages in terms of readiness and intentions for cooking low fat meals.
CHAPTER III

METHODOLOGY

Purpose of Study

The purpose of this study was to examine risk perceptions and cooking habits of Saudi Arabian women in relation to cardiovascular disease and intentions to cook low fat meals. Examining Saudi Arabian women’s risk perceptions of cardiovascular disease and intentions to cook low fat meals is an important step to the recognition and management of the disease. This chapter will include descriptions of sampling, setting of the study, instrumentation, pilot study, data collection procedures and analysis, research design, limitations, and delimitations.

Research Questions

1. What will be the risk perceptions of CVD among Saudi Arabian women?
2. What are Saudi Arabian women’s fat-related cooking behaviors?
3. What will be the intentions of Saudi Arabian women to cook low fat meals?
4. Is there a significant relationship between risk perceptions of CVD and fat-related cooking behaviors?
5. Are Saudi Arabian women’s risk perceptions of CVD a significant predictor of their intentions to cook low fat meals?

Research Hypotheses

1. Saudi Arabian women will indicate low risk perceptions of CVD.
2. Saudi Arabian women will indicate high fat cooking behaviors.
3. Saudi Arabian women will indicate low intentions to cook low fat meals.
4. H₀: There is no statistically significant relationship between risk perceptions of CVD and fat-related cooking behaviors
   H₁: There is a statistically significant relationship between risk perceptions of CVD and fat-related cooking behaviors.

5. H₀: Risk perceptions of CVD will not be a significant predictor of Saudi Arabian women’s intentions to cook low fat meals.
   H₁: Risk perceptions of CVD will be a significant predictor of Saudi Arabian women’s intentions to cook low fat meals.

**Limitations and Delimitations**

The study was based on quantitative correlational design. Correlation does not imply causation and there is no way to determine or prove causation from a correlational study. The variables interact with each other and correlation design does not determine how they react. Thus, the impact of the independent variable, risk perception on intentions to cook low fat meals is only inferred and measured through the statistical tests of association. Moreover, the variables of interest were measured by self-report, and therefore, subject to bias, underreporting and over reporting. In addition, this was a convenience sample of individuals attending a primary clinic at one hospital. Therefore, the results cannot be generalized to Saudi Arabian women, or women from the targeted city or hospital.

The delimitation of this study emerged from selecting participants that were recruited for convenience from the population of interest. This study was conducted in a
primary care clinic’s waiting room in a single hospital (King Khalid University Hospital) providing services to patients mainly from the Riyadh district of Saudi Arabia.

**Study Population**

The population of Saudi Arabia was estimated to be 31 million people (General Authority for Statistics in Kingdom of Saudi Arabia, 2016). Currently, about 13 million (44.8%) Saudi Arabian women live in Saudi Arabia (General Authority for Statistics in Kingdom of Saudi Arabia, 2016). The study population included Saudi Arabian women, who were between the ages of 22-55, who frequently cook meals at home, and who are available at the primary care clinic’s waiting room of King Khalid University Hospital. The sample of interest for this study was Saudi Arabian women living in the city of Riyadh, Saudi Arabia. Here, as in other cities in Saudi Arabia, women are responsible for cooking and food preparation. In Saudi Arabia, it is a common expectation for women in the age range of 22 to 55 to take on the primary responsibility of cooking and providing nutrition to their families. Women who are 22 years old and older have recently graduated from college and/or they are recently engaged or married and are mature enough and ready to take the responsibility of cooking for their families. Women who are over the age of 55 are no longer expected to manage the cooking and nutrition of their families due to the fact that they pass on the tradition to younger family members.

**Participants**

The study participants consisted of a convenience sample of 400 Saudi Arabian women ages 22 to 55. Saudi Arabian adult women were recruited from a primary care
clinic’s waiting room in a single hospital (King Khalid University Hospital). Participants recruited for this study were chosen for the following reasons:

1. The sample is one of convenience. There is easy access to the target population because King Khalid University Hospital operates under King Saud University where the researcher is currently employed.
2. Family expectations for women in the age range of 22 to 55 to be responsible for cooking meals for their families; and
3. The women in Riyadh represent a diverse group since the hospital provides health services for the Saudi community from various regions of the city.
4. Even though Saudi Arabian women who visit the primary care clinic’s waiting room of King Khalid University Hospital are there for health concerns, follow-up appointments, or serving as a supportive caregiver, these women have been chosen and will be recruited as a representative sample of the target population due to the fact that they have common characteristics (i.e., frequently cook meals at home, married, and have at least a middle school education) that are typically seen in all women between the ages of 22 and 55 across the Kingdom of Saudi Arabia.

**Eligibility Criteria**

Eligible participants in this study included Saudi Arabian women. Additional inclusion criteria were: minimum of 22 years old, maximum of 55 years old and able to read Arabic. Participants who reported they have “never cooked at home” or cook “less than once per month” were excluded from the study. The respondents who said “never”
or “less than once per month” of cooking at home were thanked for their interest in this study but told their current cooking behaviors do not match the participation criteria for the study.

**Setting**

The setting was the primary care clinic’s waiting room of King Khalid University Hospital in Riyadh, Saudi Arabia. The hospital provides free primary, secondary, and tertiary care services to Saudi Arabian patients mainly from Riyadh. It includes a special outpatient building (Al-Doghaither, 2000). The participants attending the primary care clinic were recruited through personal contact by the researcher during appointment wait times. A cross-sectional study conducted by Al-Sakkak et al. (2008) to assess patient satisfaction with primary health care services in Riyadh indicated that 92% of studied patients think that the waiting time for the health services is long. The participants were asked to complete a 15-minute paper survey to measure their risk perceptions of cardiovascular disease in relation to home cooking and intentions to cook low fat meals. They were contacted once in person and they had the opportunity to complete the survey with the researcher present to clarify any questions or concerns.

**Instrumentation**

The study was conducted by using a structured and self-administered paper and pencil survey. The survey was used as the research tool to measure participants’ risk perceptions of cardiovascular disease in relation to home cooking and intentions of adopting low fat food choices when cooking. Current cooking behavior was also inquired.
The purpose of the study had proposed three constructs as its main target factors of study. The first construct was fat-related cooking behavior. The second construct was risk perceptions of CVD in relation to cooking low fat meals. The third construct was intentions to cook low fat meals. Each construct was previously analyzed and operationalized for measurement of risk perceptions of CVD in relation to home cooking and intentions to cook low fat meals through a pilot study.

The instrument for this study was previously pilot tested in 2014, under a Kent State University (KSU) Institutional Review Board (IRB) and King Saud University approved protocol. The survey for this study included 24 items. These items were organized into five sections, each of which had been developed and validated by the researcher through the pilot study.

The first section of the survey was Fat-Related Cooking Behaviors Scale to measure the first construct (fat-related cooking behavior) with three items that examine behaviors related to dietary fat intake. Item #1 asked the participants how frequently they cook at home. Everyday was scored as 3, a few times per week was scored as 2, and a few times per month was scored as 1. Item #2 asked participants to identify what type of foods they had and how often they were consumed in the previous three months. Participants were given the following choices (a) Vegetables, (b) Fruits, (c) Foods low in fats, (d) Foods high in fats, (e) Other. If participants choose other, they were provided with a blank space to write in their specific food. Item #3 asked the participants to select their cooking behavior over the last three months through multiple checklist statements. The participants were given the following options (a) I chose lean meats (scored as 6), (b)
I keep fats to minimum (scored as 5), (c) I used coconut oil (scored as 4), (d) I used whole dairy products (scored as 3), (e) I used processed meats (scored as 2), and (f) I used fried food (scored as 1).

The second section of the survey was Risk Perceptions of CVD in Relation to Cooking Low Fat Meals Scale to measure the second construct (risk perceptions of CVD in relation to cooking low fat meals). The scale included eight items (from item #4 to item #11) to measure risk perceptions in terms of heart health and fat-related cooking behaviors. Risk perceptions in this study included examining the target population’s perceptions of the risk of CVD and fat-related cooking habits. Risk perceptions of CVD are relevant beliefs of the Saudi Arabian women related to their cooking behaviors of high fat foods. These questions relate to the target population’s perception of risk of CVD and their fat-related cooking habits. The item response options included a 5-point Likert scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*).

The third construct (intentions to cook low fat meals) was measured by two different ways, through the use of the Behavioral Intention Scale and the Precaution Adoption Process Model algorithm. The Behavioral Intention Scale was the third section of the survey to measure behavioral intentions to cook low fat meals with three items. Item #12 asked the participants to report how likely or unlikely the following statement applies to them: “In the coming three months, I intend to cook low fat meals.” To measure the intentions, a 5-point scale was used with very unlikely and very likely as endpoints. Item # 13 asked the respondents to report how often they intend to choose low fat meals when cooking. Item # 14 asked the participants to indicate how often they will
choose low fat food when cooking. The responses were ranged using a 4-point scale ranging from 1 (Never) to 4 (Always). Items were scored as Never = 1, Sometimes= 2, Most of the time = 3, Always = 4. Higher composite scores on the overall scale indicated increased intentions to follow low fat cooking behavior. The Precaution Adoption Process Model algorithm, the fourth section was framed to classify participants according to their current stage in terms of readiness for cooking low fat meals with four items (Weinstein, Sandman, & Blalock, 2008). Item #15 asked the participants the question “Have you heard about high fat cooking – related cardiovascular risk?” with Yes/No responses. Participants who reported No were classified in stage 1 and who reported Yes were classified in stage 2. Item #16 asked the participants the question “Have you started to cook low fat meals?” with Yes/No responses. Participants who reported No were directed to go to item #17. It included the following options: (1) “I have never thought about cooking low fat meals.” Participants who chose option (1) were classified in stage 2. (2) “I am undecided about cooking low fat meals,” participants who chose option (2) were classified in stage 3. (3) “I have decided don’t want to cook low fat meals,” participants who chose option (3) were classified in stage 4. (4) “I have decided I want to cook low fat meals,” participants who chose option (4) were classified in stage 5. Participants who answered Yes to item #16, were directed to answer item #18 “Have you been cooking low fat meals for more than 6 months” with Yes/No responses. Participants who selected No were classified in stage 6. Participants who selected Yes were classified in stage 7.
The last section of the survey consisted of demographic questions. They included the followings:

1. Age, item # 19: “what is your age in years?” Participants were provided a blank space to write in their specific age. Participants who listed an age below 22 or above 55 were excluded from the study.

2. Marital Status, item #20: “What is your marital status?” Participants were given the following choices (1) Single, (2) Married, (3) Separated/Divorced, (4) Widowed, (5) Other. If participants chose other, they were provided a blank space to write in their specific marital status.

3. Educational Level, item #21: “What is the highest degree or level of school you have completed?” The selected options were (1) No schooling completed, (2) Some high school, no diploma, (3) High school graduate, diploma or the equivalent, (4) Some college credit, no degree, (5) Associate degree, (6) Bachelor’s degree, (7) Graduate degree.

4. Number of Persons in Household, item #22 “How many persons—including yourself—live in your household?” Participants were given a blank space to write in the specific number of persons living in the household.

5. Cardiovascular Disease History, item #23 “Have you ever been diagnosed with cardiovascular disease by your physician?” Respondents selected the following options (1) Yes, (2) No, (3) I don’t know.
6. Family History of Cardiovascular Disease, item #24, “Do you have a family history of cardiovascular disease?” Respondents were given the choices of (1) Yes, (2) No, (3) I don’t know.

All sections were combined to formulate the survey, the Home Cooking and Intentions to Cook Low Fat Meals Survey. The five sections that were included in the current survey were the (1) Fat-Related Cooking Behaviors Scale (3 items); (2) Risk Perceptions of CVD in Relation to Cooking Low Fat Meals Scale (8 items); (3) Behavioral Intention Scale (3 items); (4) Algorithm Classification (4 items); and (5) Demographic Questions (6 items).

The instrument was developed in English. But prior to its use, it was translated into Arabic. The translation of the survey into Arabic was completed by an experienced translator, proficient in both Arabic and English.

To exam the feasibility of the instrument implementation in field, to test the survey data collection process, and to test the accuracy of the translation, the instrument was pilot tested in summer 2014. The next section discusses the pilot study from four aspects: validity and reliability, data collection, and results.

**Pilot Study**

The pilot study was conducted in 2014 among 210 Saudi Arabian women in Riyadh, Saudi Arabia. The location and the women samples fit to the same study population definition of this study. As literature suggested, a pilot study can provide valuable insights for the researcher to identify where the research protocols may not be followed and potential problems might occur using proposed methods (Wiersma & Jurs,
2009). The pilot study of the instrument does provide valuable information, and provide evidence for its validity and reliability.

**Validity and Reliability**

The content of the instrument and its subscales were developed based on the Health Belief Model (HBM) and the Precaution Adoption Process Model (PAPM). The content of the instrument was formulated to be relevant to Saudi Arabian’s culture specificity in diet and cooking. Confounding factors, such as having CVD and a family history of the disease, were taken into account. Perception of Risk of Heart Disease Scale (PRHDS) a 20-item instrument was used as a reference to develop the Risk Perceptions of CVD in Relation to Cooking Low Fat Meals Scale. The original scale reliability is .80 (Ammouri & Neuberger, 2008). The Behavioral Intention Scale was adapted from Rise, Kovac, & Moan (2008) with a total scale reliability of .97. The Fat-Related Dietary Behaviors Scale that measures of substituting high-fat foods with manufactured low-fat equivalents ($\alpha = .80$) was used to develop the Fat-Related Cooking Behavior Scale (Noia & Contento, 2010).

Before developing the survey, the conceptual/theoretical framework, assumptions, and questions of the study are considered to determine if each question in the survey is providing the information that is needed. Any question that did not provide related or necessary information was removed. During writing the selection of responses for the survey questions, the list includes all possible alternatives that the participants might select and the answers did not overlap. For example, for the question, “How often do you cook meals at home” every option on how many times is included from (everyday to
never). The survey responses to measure the predictor variable, risk perception in relation to cooking low fat meals are based on a Likert scale with five ordered response levels. The format of five-level Likert items, for example include responses such as:

1 - *Strongly disagree*, 2 - *Disagree*, 3 - *Neither Agree or Disagree*, 4 - *Agree*, 5 - *Strongly Agree*.

Consistency is an important aspect that has been considered in developing the survey. All of the items under the same construct are similar or related to that construct. In order to measure internal consistency or coefficients of reliability, Cronbach’s alpha was used. The high value of alpha is evidence that the items measure the underlying construct (perception of risk).

The Fat-Related Cooking Behavior scale was developed to measure fat-related cooking behaviors during the last three months. It was considered to not increase participants’ burden by asking intensive assessment methods (i.e., food records, 24-hour recalls, and Food Frequency Questionnaires). The scale was quick to complete (about 3 minutes). The scale includes 3-items addressing the following 4 dimensions of dietary fat behavior: (1) Avoidance of high-fat foods (2) Modification of foods to make them lower in fat (3) Substitution of lower fat foods (4) Replacement of higher fat cooking techniques with lower fat ones. Cronbach’s alpha for the scale was .394 from the pilot study, which indicates inconsistency of what type of food the participants eat and their cooking habits rather than the inconsistency of the measurement. For example, who eats vegetables and doesn’t eat fruits or vice versa. Also, who chooses lean meats and fries foods or vice versa.
The second scale, Risk Perceptions of CVD in Relation to Fat Cooking, was developed to assess perceived susceptibility of CVD in relation to fat cooking behavior. The scale was designed to measure beliefs regarding the susceptibility of cardiovascular disease in terms of low fat cooking behavior. A 5-point Likert scale was selected because it is widely used in the Health Belief Model research field, forms a continuum, and can have a neutral middle point (Sharma & Petosa, 2012). Responses were rated on a scale ranging from 1 (Strongly agree) to 5 (Strongly disagree) with a neutral middle point 3 (Neither agree nor Disagree). To maximize confirmation of participants’ responses, the items were either negatively or positively worded. All responses were scored so that higher scores were related with higher risk perceptions of CVD in relation to fat cooking behavior. The Cronbach’s alpha for the scale is .61 via the pilot study, which is acceptable for such type of affective measurement.

The third scale measured intentions to cook low fat meals. For example, participants were asked to report how likely or unlikely the following statement applies to them: “In the coming three months, I intend to cook low fat meals.” To measure the intentions, a 5-point scale was used with very unlikely and very likely as endpoints. Higher composite scores on the overall scale indicated increased intentions to follow low fat cooking behavior. The total reliability was .617 which indicated an acceptable level of reliability. Precaution Adoption Process Model algorithm is single-item measures used to facilitate the intention measurement. Cronbach’s alpha test was not performed because it is a single item scale.
**Data Collection Process**

In the pilot study, the survey was placed through the investigator’s Google web page and then distributed through a link to social networks (Twitter, Instagram, WhatsApp). The IRB approval was obtained for this survey from Kent State University and King Saud University. The investigator sent a letter to the College of applied Medical Sciences, King Saud University requesting permission to distribute the survey. The pilot test used a convenience sample ($n = 210$) of Saudi Arabian women. The average completion time of the survey was about 15 minutes. There were no issues emerged from respondents such as confidentiality or anonymous in nature.

**Example Findings**

Based on this pilot test, the researcher found that the majority of participants (60%) cook meals at home every day. The survey revealed that nutritional risk factors for CVD were evident. This is apparent from the data showing that participants reported making high fat food choices “Always” and “Often” (24%) and “Never” (9%) in the last three months. Similarly, the participants did not often make choices of healthy foods such as vegetables, fruits, and foods low in fat when cooking or preparing food in the last three months. Also, the data showed that a high percentage of participants fry foods and use whole dairy products when preparing foods. At the same time, a low percentage of participants keep fats to a minimum through a variety of cooking techniques such as using cooking spray or adding a small amount of olive oil with a pastry brush. According to staging algorithm data, most participants were classified in the stage where they were aware of high fat food-related cardiovascular risk but undecided in cooking low fat
meals. The survey indicated that even though most participants were aware of high fat
food cooking-related cardiovascular risk, this awareness does not directly translate into a
perception of risk. Many participants revealed low perceptions of risk to many survey
items. For example, 29% of participants strongly agree that they made conscious low fat
food choices to improve their families’ heart health, followed by 27% neither agreeing
nor disagreeing. In measuring their willingness to make low fat food choices to improve
their families’ heart health, 49% strongly agree, 21% agree, and 21% neither agree nor
disagree. Responses given by the participants in the pilot study showed a positive linear
relationship between risk perceptions of CVD and intentions to cook low fat meals ($r =
.56$). The results of the pilot test inform the present study.

The pilot test showed the survey’s ability to measure the study variables in a clear
and accurate manner. No changes were made to the survey. The pilot study participants
did not report any comments. Respondents did not provide comments regarding
clarification or difficulties for the survey. Thus, wording of questions was not changed
and the level of difficulty of questions was not simplified for better understanding.
Reading level was appropriate for the target population. The wording of the questions
was clear, instructions were easy to follow, and the layout of the instrument was proper.

Data Collection Procedures

The data were collected after the study was approved by the Institutional Review
Boards (IRB’s) of Kent State University and King Saud University. Since King Khalid
University Hospital is a part of King Saud University, the IRB approval that was obtained
can be applied to both institutions. The survey research was conducted at a primary care
clinic associated with King Khalid University Hospital, Riyadh, Saudi Arabia. The study was carried out in summer 2016 during the months of June, July, and August. The data were collected five days a week (Sunday-Thursday) from 9:00 AM to 5:00 PM. The Home Cooking and Intentions to Cook Low Fat Meals Survey was used as the method to collect or obtain the data for statistical analysis. The participants were approached at the primary care clinic’s waiting room by the principal investigator. They were given an anonymous, self-report survey. Participants who met the inclusion criteria were asked to read the informed consent or the researcher read it to them and clarified any information that was not clear. Participants were notified that their participation in this study is voluntary and they may decline answering questions or withdraw from the study at any time. After informed consent was obtained, the researcher was present in the waiting room to answer questions. The survey took approximately 15 minutes to complete. Finally, the surveys were collected and placed in a sealed envelope and locked in a secure desk at the researcher’s home.

Data Analysis

The data were entered and stored in a computer database on the principal investigator’s computer. The data were checked for missing values and data entry errors. Statistical analysis was performed using SPSS Version 24. Descriptive and inferential statistical data analyses were applied in the study with $p < 0.05$ considered significant.

The independent variables in this study included risk perception/perceived susceptibility of cardiovascular disease, fat-related cooking behavior, PAPM stages, and demographic characteristics. The dependent variable was the intentions to cook low fat
meals. The research hypotheses, independent variables, and statistical analyses that were used to test each relationship were summarized in Table 1.

Table 1

Research Hypotheses, Variables, and Analysis

<table>
<thead>
<tr>
<th>Research Hypotheses</th>
<th>Item #</th>
<th>Statistical Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Saudi Arabian women will indicate low risk perceptions of CVD.</td>
<td>4,5,6,7,8,9,10,11</td>
<td>Descriptive &amp; One sample t-test</td>
</tr>
<tr>
<td>2. Saudi Arabian women will indicate high fat cooking behaviors.</td>
<td>1,2,3</td>
<td>Descriptive &amp; One sample t-test</td>
</tr>
<tr>
<td>3. Saudi Arabian women will indicate low intentions to cook low fat meals.</td>
<td>12, 13, 14, 15, 16, 17, 18</td>
<td>Descriptive &amp; One sample t-test</td>
</tr>
<tr>
<td>4. There is a statistically significant relationship between risk perceptions of CVD and fat-related cooking behaviors</td>
<td>1,2,3,4,5,6,7,8,9,10, 11</td>
<td>Pearson Correlation</td>
</tr>
<tr>
<td>5. Risk perceptions of CVD will be a significant predictor of Saudi Arabian women’s intentions to cook low fat meals</td>
<td>4,5,6,7,8,9,10,11,12, 13,14</td>
<td>Regression Test</td>
</tr>
</tbody>
</table>

Based on research questions, this study analyzed the relationships between risk perceptions of CVD in relation to fat-related cooking behavior and intentions to cook low fat meals. A multiple regression was used to examine which of the key constructs of this study are significant predictor(s) of the intention. The Pearson Correlation Coefficient was applied to specify how two variables vary together, the risk perceptions of CVD and fat-related cooking behavior. Frequencies were run to determine how many respondents cook at home, how often they cook, and what they cook. In addition, frequencies were to
identify participants’ demographic characteristics including identification of age, educational level, number of persons living in household, and marital status. Data from the Precaution Adoption Process Model algorithm were analyzed to classify the participants into stages in terms of readiness for low fat cooking.

To answer research question #1, what will be the risk perceptions of CVD among Saudi Arabian women, a descriptive statistic, one sample t-test, and frequencies were run to evaluate the mean and standard deviation of the items in Risk Perceptions of CVD in Relation to Cooking Low Fat Meals Scale. Composite scores on overall of Risk Perceptions of CVD in Relation to Cooking Low Fat Meals Scale were calculated. The mean of the composite scores was taken of the eight items to calculate a total risk perceptions score. The question response options included a 5-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The questions were scored as Strongly Disagree = 1, Disagree = 2, Neither Agree or Disagree=3, Agree = 4, Strongly Agree = 5 with 2.5 as an average score. Higher numbers indicated higher levels of risk perceptions in relation to cooking low fat meals. For research question #2, a descriptive statistic, one sample t-test, and frequencies were run to evaluate the mean and standard deviation of the items in Fat-Related Cooking Behavior Scale. Two different data analyses were performed to answer research question # 3. The Precaution Adoption Process Model staging algorithm analyses and calculations of composite scores on overall of Behavioral Intention Scale. Research question #4 was answered by using Pearson Correlation Coefficient Test to identify the relationship between the independent variables, risk perceptions of CVD and fat-related cooking behavior. Finally, to answer research
question #5, a multiple regression was performed to ascertain the efficacy of the risk perception/perceived susceptibility of CVD in relation to low fat cooking construct in predicting the intentions to cook low fat meals.

It was expected that the majority of Saudi Arabian women will indicate high fat cooking behaviors. The expected finding was that there is a relationship between risk perceptions of cardiovascular disease among Saudi Arabian women and fat-related cooking behaviors. Data from regression tests were expected to indicate risk perception as a predictor of Saudi Arabian women’s intentions to cook low fat meals. Also, it was expected that the participants will indicate low risk perceptions of CVD and intentions to cook low fat meals.

**Research Design**

A quantitative, exploratory, descriptive, correlational, and cross-sectional research design was used. The quantitative method was used in conjunction with the Health Belief Model and Precaution Adoption Process Model to appropriately answer the research questions. A survey was used to collect data from the participants. The goal of using quantitative survey research is to determine the potential predictive power of the psychological variable, risk perception in cooking low fat meals. The study is specifically a correlational design to determine whether or not the variables are correlated. The relationship between the independent variables, risk perception/perceived susceptibility of cardiovascular disease and fat-related cooking behaviors was measured through the use of Risk Perceptions of CVD in Relation to Cook Low Fat Meals Scale and Fat-Related Cooking Behaviors Scale. The dependent variable of intentions to cook
low fat meals was examined in two different ways, through the use of the Precaution Adoption Process Model algorithm and Behavioral Intention Scale. Dietary behavior was assessed using the Fat-Related Cooking Behaviors Scale. All of these instruments were combined to form the Home Cooking and Intentions to Cook Low Fat Meals Survey. The survey was pretested prior to its use with Saudi Arabian women. The instrument was administrated to the recruited sample and the resulting data was used to examine relationships between variables and prediction of the target behavior. Descriptive statistics and one sample t-test were used to determine means and standard deviations of all variables. Quantitative data were analyzed by using the Pearson Correlation Coefficient to determine the relationship between the variables. Multiple regression was applied to indicate if risk perceptions of CVD is a major contributor toward intentions to cook low fat meals.

**Summary**

This chapter provides comprehensive information regarding the procedures for conducting this study and the survey instrument used to assess the risk perceptions of cardiovascular disease in relation to home cooking and intentions of the sample to cook low fat meals. The procedures, instrumentation, pilot study, and data collection are discussed. Furthermore, this chapter explained the sample selection and setting and provides an explanation of the statistical procedures used to analyze the data. The next chapter presents findings of the study and results of the statistical analyses.
CHAPTER IV

RESULTS

The purpose of the present study was to investigate the risk perceptions and cooking behaviors of Saudi Arabian women in relation to cardiovascular disease and intentions to cook low fat meals. In addition, the study examined perceived self-efficacy of Saudi Arabian women in predicting fat-related cooking behavior. The HBM was used in this study as the theoretical framework for examining the psychological variables of perceived susceptibility and self-efficacy to predict the intentions to cook low fat meals.

Data were collected through self-administered paper-pencil surveys in the summer of 2016 during the months of June, July, and August. Sampling occurred over the three months in the primary care clinic’s waiting room of King Khalid University Hospital, Riyadh, Saudi Arabia. The Home Cooking and Intentions to Cook Low Fat Meals Survey instrument was used in data collection. Both descriptive and inferential statistical data analyses were conducted using SPSS version 24.

Variables studied included current cooking behavior, risk perceptions of CVD, and intentions to cook low fat meals. Fat-related cooking behaviors were measured using the Fat-Related Cooking Behaviors Scale. Risk perceptions of CVD in relation to cooking low fat meals were measured using the Risk Perceptions of CVD in Relation to Cooking Low Fat Meals Scale. Intentions to cook low fat meals were measured by two different instruments; the Behavioral Intention Scale and the Precaution Adoption Process Model algorithm. The three scales, the Fat-Related Cooking Behaviors Scale, Risk Perceptions of CVD in Relation to Cooking Low Fat Meals Scale, and the
Behavioral Intention Scale were developed by the investigator to measure the risk perceptions of CVD in relation to cooking low fat meals, cooking behaviors, and intentions to cook low fat meals among Saudi Arabian women. All scales used in the data collection process were pilot tested in summer 2014 among 210 Saudi Arabian women in Riyadh, Saudi Arabia.

In order to prepare the dataset for analysis, data cleaning was conducted. After completing data entry into SPSS, the data cleaning process commenced by which errors and anomalies (i.e., number of persons 0 and the age was placed under educational level column) were corrected to obtain efficient overall data analysis. Missing data were transcribed or excluded from the analysis. Data were also prepared for analysis in SPSS by the process of running frequencies for missing data observations, and recoding items for reverse coding when necessary. Two items (4&7) were recoded on the Risk Perceptions of CVD in Relation to Cooking Low Fat Meals Scale to reverse the scale of negatively worded items so that a large numeric value has the same meaning across all items. The responses to the two items were measured on a 5-point scale and coding was reversed so that 1 became 5, 2 became 4, and so on.

Descriptive statistics, one sample t-test, measures of central tendency, frequencies, Pearson Correlation, and Multiple Linear Regression were used for statistical analyses. The findings of the analysis of study data are presented in this chapter. This chapter includes a description of the sample and findings relative to research questions and hypotheses.
Research Questions and Hypotheses

Research Question #1: What will be the risk perceptions of CVD among Saudi Arabian women?
Hypothesis #1: Saudi Arabian women will indicate low risk perceptions of CVD.

Research Question #2: What are Saudi Arabian women’s fat-related cooking behaviors?
Hypothesis #2: Saudi Arabian women will indicate high fat cooking behaviors.

Research Question #3: What will be the intentions of Saudi Arabian women to cook low fat meals?
Hypothesis #3: Saudi Arabian women will indicate low intentions to cook low fat meals.

Research Question #4: Is there a significant relationship between risk perceptions of CVD and fat-related cooking behaviors?
Hypothesis #4: H₀: There is no statistically significant relationship between risk perceptions of CVD and fat-related cooking behaviors
H₁: There is a statistically significant relationship between risk perceptions of CVD and fat-related cooking behaviors.

Research Question #5: Are Saudi Arabian women’s risk perceptions of CVD a significant predictor of their intentions to cook low fat meals?
Hypothesis #5: H₀: Risk perceptions of CVD will not be a significant predictor of Saudi Arabian women’s intentions to cook low fat meals.
H1: Risk perceptions of CVD will be a significant predictor of Saudi Arabian women’s intentions to cook low fat meals.

**Description of Study Sample**

A total of 420 women who met the study criteria and agreed to participate in the study were invited to complete the survey as they were waiting for their appointments in the primary health care clinic. The data collection process progressed as originally anticipated. No issues occurred in the invitation, self-administration of survey, and return of survey process. Most completed surveys were collected during morning hours from Sunday to Thursday. To be included in the sample, the participants had to identify as a woman between the ages of 22-55, a Saudi Arabian citizen, someone who frequently cooks meals at home, and were available at the primary care clinic’s waiting room of King Khalid University Hospital. Of the 420 surveys distributed, 413 were returned, representing a response rate of 98.3%. Seven participants did not provide adequate responses to the survey by leaving a majority of the questions blank; therefore, a total of 406 surveys were considered complete. Incomplete surveys occurred because seven of the participants did not have the required time for participation. They were called in to their appointments when they had just started the survey. A total of 400 surveys were usable for data analysis. All surveys (400) were entered into SPSS by the investigator.

**Demographic backgrounds of the study samples (n = 400) are presented as follows.**

**Age, Marital Status, and Original Region**

The mean age of participants was 37 years with a standard deviation of 9.9 years. Ages ranged from 22 to 55 years (see Table 2).
Table 2

*Frequency Distribution by Age Category (n=400)*

<table>
<thead>
<tr>
<th>Age Category</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 25</td>
<td>47</td>
<td>11.7</td>
</tr>
<tr>
<td>25-35</td>
<td>139</td>
<td>34.8</td>
</tr>
<tr>
<td>36-45</td>
<td>116</td>
<td>29.0</td>
</tr>
<tr>
<td>46-55</td>
<td>98</td>
<td>24.5</td>
</tr>
<tr>
<td>Total</td>
<td>400</td>
<td>100.0</td>
</tr>
</tbody>
</table>

As seen in Table 3 Marital Status, a majority of the participants were married at the time of survey, followed by single, divorced/separated, and widowed.

Table 3

*Marital Status (n=400)*

<table>
<thead>
<tr>
<th>Marital Status</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single</td>
<td>77</td>
<td>19.3</td>
</tr>
<tr>
<td>Married</td>
<td>283</td>
<td>70.7</td>
</tr>
<tr>
<td>Divorced/Separated</td>
<td>27</td>
<td>6.7</td>
</tr>
<tr>
<td>Widowed</td>
<td>13</td>
<td>3.3</td>
</tr>
<tr>
<td>Total</td>
<td>400</td>
<td>100.0</td>
</tr>
</tbody>
</table>

As shown in Table 4, most of the participants were originally from the central region of Saudi Arabia. Since the study took place in Riyadh city (central region), there
was a concern that the vast majority of participants would come from this region. After conducting the study, however, results indicated that 26.0% \((n = 104)\) of the respondents came from other regions.

Table 4

*Original Region \((n=400)\)*

<table>
<thead>
<tr>
<th>Regions</th>
<th>(n)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>North</td>
<td>27</td>
<td>6.7</td>
</tr>
<tr>
<td>South</td>
<td>51</td>
<td>12.8</td>
</tr>
<tr>
<td>Central</td>
<td>296</td>
<td>74.0</td>
</tr>
<tr>
<td>West</td>
<td>24</td>
<td>6.0</td>
</tr>
<tr>
<td>East</td>
<td>2</td>
<td>0.5</td>
</tr>
<tr>
<td>Total</td>
<td>400</td>
<td>100.0</td>
</tr>
</tbody>
</table>

**Educational Attainment, Persons Living in Household, Diagnosis or History of CVD**

As demonstrated in Figure 6, most of the study participants had received at least a high school diploma or its equivalent, while a smaller segment of the sample had an educational level below high school.

Figure 7 shows the number of persons who live in the participants’ households. The numbers range from 1-16 persons. Three cases were found a bit extremely where one respondent lived alone and one case with the maximum number of 16 persons living in a household.
Figure 6. Educational attainment

Figure 7. Numbers of persons living in household
Of this sample, a majority of the participants do not have CVD (81.5%, \( n=326 \)) or family history of CVD (60.3%, \( n=241 \)). Since the present study was conducted in a primary care clinic rather than a cardiovascular specific department of the hospital, such findings were expected. Only 11.5% (\( n=46 \)) of participants reported having been diagnosed with CVD and 29.7% (\( n=119 \)) reported having a family history of the disease. Another 17% did not know their CVD status or family history.

Table 5

*Having CVD and Family History of CVD (\( n=400 \))*

<table>
<thead>
<tr>
<th></th>
<th>Yes n(%)</th>
<th>No n(%)</th>
<th>I do not know n(%)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have CVD</td>
<td>46 (11.5)</td>
<td>326 (81.5)</td>
<td>28 (7.0)</td>
<td>400 (100.0)</td>
</tr>
<tr>
<td>Family History</td>
<td>119 (29.7)</td>
<td>241 (60.3)</td>
<td>40 (10.0)</td>
<td>400 (100.0)</td>
</tr>
</tbody>
</table>

**Confidence in Cooking Low Fat Meals**

To identify how confident participants feel in their ability to cook low fat meals, the participants were asked to answer the statement “Do you feel confident in your ability to cook low fat meals?” The results showed that the majority of the participants were confident in their ability to cook low fat meals.
Figure 8. Confidence in cooking low fat meals

Descriptive Statistics of Dependent and Independent Variables

Fat-related cooking behavior was measured using the Fat-Related Cooking Behaviors Scale. This scale consisted of three items. The first item asked the participants how frequently they cook at home. Participants were given the following choices (1) Everyday, (2) A few times per week, and (3) A few times per month. The majority of participants 70.0 % (n=280) reported cooking meals at home every day, 25.0% (n=100) cook a few times per week, 5.0% (n=20) cook a few times per month. Participants who reported they cook “less than once per month” or “never cooked at home” were excluded from the study because their current cooking behaviors do not match the participation criteria.

The second item is related to the food categories participants chose and how often they had cooked. Participants were given the following choices (1) Vegetables, (2)
Fruits, (3) Foods low in fats, (4) Foods high in fats, (5) Other. The choice of foods high in fats when cooking was reported as “Sometimes” by 35.4% (n= 140) of the participants and “Always & Often” by 20% (n= 80). Low fat food choices when cooking was reported as “Sometimes” by 28.7 % (n= 114), “Rarely” by 23.2 % (n= 92) of the participants, followed by, “Often” 22.9% (n= 91), and “Always” by 19.6% (n= 78). The choice of vegetables was reported as “Always” by 38.4% of the participants (n= 153) and reported as “Sometimes” by 28.9 % (n= 115).

The third item asked the participants to select their cooking behavior over the last three months. Participants were asked if they (1) Chose lean meats (2) Used whole fat dairy products, (3) Used processed meats, (4) Used butter or coconut oil, (5) Kept fats to a minimum, and (6) Fried food. Participants reported choosing lean meats 56.5 %, using whole fat dairy products when cooking 55.3%, using processed meats 11.6%, using coconut, palm oils, and butter 32.8%, keeping fats to a minimum 45.3%, and frying foods 51.0%.

**Risk Perceptions of CVD in Relation to Cooking Low Fat Meals**

The independent variable, risk perceptions of CVD in relation to cooking low fat meals, was measured using the Risk Perceptions of CVD in Relation to Cooking Low Fat Meals Scale, which consisted of eight items. The question response options include a 5-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The questions were scored as *Strongly Disagree* = 1, *Disagree* = 2, *Neither Agree or Disagree* =3, *Agree* = 4, *Strongly Agree* = 5.
As shown in Table 6, in measuring risk perceptions of CVD in relation to cooking low fat meals, 62.9% of participants agreed or strongly agreed that they made conscious low fat food choices to improve their family’s heart health, while 21.6% disagreed or strongly disagreed. The majority of participants 75.8% agreed or strongly agreed that they were willing to make low fat food choices to improve their family heart health in the coming three months, while 11.1% disagreed or strongly disagreed. Over thirty percent 32.4% of participants agreed or strongly agreed that when they cook food they avoid red meat. In contrast, 42.5% of the participants disagreed or strongly disagreed that when they prepare or cook food, they avoid red meat. The results showed that 45.0% of participants agreed or strongly agreed and 35.0% disagreed or strongly disagreed that they would rather use whole milk in cooking than skim milk. The majority of participants 79.0% agreed or strongly agreed that they have to be careful about the amount of fat when cooking, while 7.0% disagreed or strongly disagreed. The majority of the participants 81.6% agreed or strongly agreed that they have to be careful about what they cook for the sake of protecting their families’ heart health, while 5.3% disagreed or strongly disagreed. In the response to the question “Family is less likely to have cardiovascular disease because of the high fat food I prepare for them,” 40.0% of participants agreed or strongly agreed, while 44.0% disagreed or strongly disagreed. For the statement “In general, the chance of developing cardiovascular disease will be lessened if I choose low fat food when cooking,” 87.8% of participants agreed or strongly agreed, while 2.5% disagreed or strongly disagreed.
Table 6

Risk Perceptions of CVD in Relation to Cooking Low Fat Meals

<table>
<thead>
<tr>
<th>Risk Perception</th>
<th>Strongly Agree or Agree</th>
<th>Strongly Disagree or Disagree</th>
<th>Neutral</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Made conscious LFF choices</td>
<td>250 (62.9)</td>
<td>86 (21.6)</td>
<td>61 (15.5)</td>
<td>397 (100.0)</td>
</tr>
<tr>
<td>Will make LFF choices</td>
<td>301 (75.8)</td>
<td>44 (11.1)</td>
<td>52 (13.1)</td>
<td>397 (100.0)</td>
</tr>
<tr>
<td>Avoid red meat when cooking</td>
<td>129 (32.4)</td>
<td>169 (42.5)</td>
<td>100 (25.1)</td>
<td>398 (100.0)</td>
</tr>
<tr>
<td>Use whole milk than skim milk</td>
<td>180 (45.0)</td>
<td>140 (35.0)</td>
<td>80 (20.0)</td>
<td>400 (100.0)</td>
</tr>
<tr>
<td>Careful about the amount of fat</td>
<td>312 (79.0)</td>
<td>28 (7.0)</td>
<td>55 (14.0)</td>
<td>395 (100.0)</td>
</tr>
<tr>
<td>Careful in cooking for family’s health</td>
<td>323 (81.6)</td>
<td>21 (5.3)</td>
<td>52 (13.1)</td>
<td>396 (100.0)</td>
</tr>
<tr>
<td>Less CVD because of HFF</td>
<td>160 (40.0)</td>
<td>176 (44.0)</td>
<td>64 (16.0)</td>
<td>400 (100.0)</td>
</tr>
<tr>
<td>Less CVD with LFF</td>
<td>351 (87.7)</td>
<td>10 (2.5)</td>
<td>39 (9.8)</td>
<td>400 (100.0)</td>
</tr>
</tbody>
</table>

Intentions to Cook Low Fat Meals

The dependent variable, intentions to cook low fat meals, was measured by two different instruments: the Behavioral Intention Scale and the Precaution Adoption Process Model algorithm. The Behavioral Intention Scale consisted of three items and the Precaution Adoption Process Model algorithm consisted of four items.
In relation to the intentions to cook low fat meals and how often participants intend to choose low fat meals when cooking, (57.5%, \( n = 230 \)) of participants reported “Likely & Somewhat Likely,” followed by “Neutral” (16.8%, \( n = 67 \)), and “Somewhat Unlikely” (15.0%, \( n = 60 \)) to intend to cook low fat meals. Approximately (21.0 %, \( n = 84 \)) of participants reported “Always” to their intention and willingness to choose low fat food when cooking and about (34.0 %, \( n = 136 \)) reported “Most of the Time & Sometimes.”

According to staging algorithm data, 91.0 % of participants (\( n = 364 \)) were aware of high fat food cooking-related cardiovascular risk and only (9.0 %, \( n = 36 \)) were in Stage 1, that is they were not aware of the risk. Approximately 56.0% of the 91.0% of participants (\( n = 224 \)) who were aware of the issue have started to cook low fat meals, the other 44.0 % (\( n = 176 \)) have not started to cook low fat meals. Of those participants that have not been making low fat choices, 21.0% of them (\( n = 84 \)) were in Stage 2, that is that they are aware of high fat food cooking-related cardiovascular risk but not engaged in healthy behavior to choose low fat food when cooking. Approximately 41.0 % of participants (\( n = 164 \)) not making low fat food choices were in Stage 3, they were undecided on whether or not to make low fat food choices when cooking. Stage 4 included 10.0% of participants (\( n = 40 \)) who reported that they had decided not to act or make low fat food choices when cooking. The remaining 28.0 % (\( n = 112 \)) were in Stage 5, that is they had decided to take action in making low fat food choices when cooking. Of the participants who were aware of the issue and had started to make low fat food choices, 27.0% (\( n = 108 \)) were following low fat food cooking behavior for less than 6
months, thus at Stage 6, and 73.0 % ($n=292$) of the participants were in maintenance stage, Stage 7, following low fat food cooking behavior for more than 6 months (Figure 7).

Figure 9. Staging algorithm

Research Question 1

The first research question evaluated the risk perception levels in relation to CVD and fat-related cooking behaviors among the participants. Their level of risk perceptions of CVD was measured using the Risk Perceptions of CVD in Relation to Cooking Low Fat Meals Scale. The scale consisted of eight items to identify their level of risk perceptions of CVD in relation to low fat cooking behavior. Each item on the scale has a 5-point Likert scale response option ranging from 1 (strongly disagree) to 5 (strongly agree). Item scores were summed for total scale score. Higher scores on the overall scale indicate increased perception of risk. The total score of eight items are 40 points with 20 points as the average score. After analysis of participants’ responses, the mean
total score on the Risk Perceptions of CVD in Relation to Cooking Low Fat Meals Scale was 28.78 (SD = 4.6). The range of this score was 16–40. The participants’ level of risk perceptions of CVD in relation to low fat cooking behavior was above the average score. A one sample t test suggested the obtained mean of 28.8 is significantly higher than the average 20 ($p < 0.001$).

![Frequency Distribution of Risk Perceptions Scale](image)

*Figure 10. Frequency distribution of risk perceptions of CVD in relation to cooking low fat meals scale*

**Research Question 2**

The second research question examined fat-related cooking behavior of the participants. To measure whether the Saudi Arabian women demonstrate high fat cooking behaviors, the participants were asked to answer two questions. The first item in the survey asked the participants how frequently they cook at home. Participants were given the following choices (1) Everyday, (2) A few times per week, and (3) A few
times per month. The question was scored as *A few times per month* = 1, *A few times per week* = 2, *Everyday* = 3. The second question in the survey is related to participant’s choice of high fat foods for cooking and how often that was. Participants were given the following choices (1) Always, (2) Often, (3) Sometimes, (4) Rarely, (5) Never. The question was scored as *Never* = 1, *rarely* = 2, *sometimes* = 3, *Often* = 4, *always* = 5. The fat-related cooking behavior score was obtained by multiplying how frequently they cook at home (item #1) by the choice of high fat food when cooking (item#2). Fat-related cooking behavior would be considered high fat-related cooking behavior if a score were 15 = 3 (cooking everyday) x 5 (always choosing high fat foods for cooking) and 7.5 as an average score. A higher score on the two items indicated a higher fat-related cooking behavior. The mean total score on the two items was 8.80 with a standard deviation of 3.58. The range of this scale score was 1–15. In this sample, fat-related cooking behavior was above the average score. Therefore, Hypothesis #2 was accepted. Saudi Arabian women demonstrated a higher than average high fat-related cooking behaviors. A one sample t test suggested the obtained mean of 8.8 is significantly higher than the average 7.5 (*p* < 0.001).

**Research Question 3**

The third research question examined participants’ intentions to cook low fat meals. The intentions to cook low fat meals were measured in two different ways, through the use of the Behavioral Intention Scale and the Precaution Adoption Process Model algorithm. The Behavioral Intention Scale included three items. In the first item of the scale, the participants were asked to report how likely or unlikely the following
statement applies to them: “In the coming three months, I intend to cook low fat meals.” To measure the intentions, a 5-point scale was used with very unlikely and very likely as endpoints. The second item on the scale asked the respondents to report how often they intend to choose low fat meals when cooking. The last item on the scale asked the participants to indicate how often they will choose low fat food when cooking. The responses are ranged using a 4-point scale ranging from 1 (Never) to 4 (Always). Items are scored as Never = 1, Sometimes= 2, Most of the time = 3, Always = 4. A composite variable was created by calculating the mean of the three Behavioral Intention Scale items ($M = 3.33; S.D. = 1.08$). Higher composite scores on the overall scale indicate increased intentions to cook low fat meals. In this sample, the intentions to cook low fat meals were above the average score of 2.5. A one sample t test suggested the obtained mean of 3.33 is significantly higher than the average 2.5 ($p < 0.001$).

On the Behavioral Intention Scale, the first item is a five-point item and the other two items 4-point items. A 4-point item was rescaled to a five-point scale. On this scale, a score of 2.5 was considered average. A higher score on this scale indicated a higher intention to cook low fat meals. The data analysis revealed that the total mean was 3.32 with a standard deviation of 1.26. The range of this scale score was 1–5. These findings indicated a consensus that the intentions to cook low fat meals among the participants were above the average. As a result of these findings, Hypothesis #3 was rejected. Saudi Arabian women had actually a higher than average intentions to cooking low fat meals.
The Precaution Adoption Process Model algorithm was framed to classify participants according to their current stage in terms of readiness for cooking low fat meals with four items. Staging algorithm data showed that more than half of the participants 56.0% \((n = 224)\) have started to cook low fat meals, the other 44.0 % \((n = 176)\) have not started to cook low fat meals. The following results further emphasize that over half of the participants have the intent to cook low fat meals.

**Research Questions 4 and 5**

The fourth and fifth research questions examined (1) whether there were significant association between the risk perceptions of CVD and fat-related cooking behaviors and intention to cook low fat meals, and (2) whether risk perceptions of CVD, confidence in cooking low fat meals, and fat-related cooking behaviors are significant predictors of the intentions to cook low fat meals while controlling for demographic variables.

**Relationship Between Key Variables**

For the fourth research question, a Pearson Correlation \((r)\) test was used to specify how two variables vary together, the risk perceptions of CVD and fat-related cooking behavior. For research question 5, a Multiple Linear Regression was performed. The statistical significance level was defined at \(p \leq 0.05\).

**Research Question 4**

Responses given by the participants in this study showed a moderate negative correlation \((r = -0.366, p<0.05)\) between Risk Perceptions of CVD and Fat-Related Cooking Behavior. The correlation is statistically significant with a significance level of
p<0.001. Thus null hypothesis #4 was rejected while alternative hypothesis #4 was accepted. The alternative hypothesis suggests that there is a statistically significant relationship between risk perceptions of CVD and fat-related cooking behaviors. This indicates that Saudi Arabian women with lower risk perceptions of CVD are more likely to demonstrate high fat cooking behaviors.

Responses given by the participants in this study showed a positive correlation between risk perceptions of CVD and intentions to cook low fat meals (r = .612). The correlation is statically significant at p< 0.001. This suggests that Saudi Arabian women with a high-risk perception of CVD are more likely to have an intention to cook low fat meals in the future. This correlation was further examined in Research Question #5.

**Research Question 5**

This research question seeks to investigate which of the key constructs of this study, namely the risk perceptions of CVD, fat-related cooking behavior, and confidence of cooking low fat meals, are significant predictor(s) of the intention. A multiple regression was used. It is assumed that certain demographic backgrounds may predict one’s intention of cooking low fat meals; then often cooking low fat meals already may add additional predictive value into the equation, and finally one or both confidence of cooking low fat meals and perception of CVD may have their contribution in predicting the intention while demographic variables and cooking behavior are in the model. Due to such an assumption, a hierarchical multiple regression test option was chosen, where block one included demographic variables, block two included the behavior variable, and
block three included perception and confidence. Intention was used as a dependent variable.

For model one, the $F(2, 363) = 2.354$ ($p > 0.05$) when only demographic variables in the model. Thus demographics alone did not have a significant value in predicting the intention. When cooking behavior was entered into model at step 2, the overall test $F(3,362)$ increased to 12.442 with a $p<0.05$, and $R^2=0.081$. Therefore, the behavior alone explained 8.1% of the variance of the intention. The third model contributed significantly to the predictive value when the model $F(5,360) = 65.687$, $p < 0.05$ and $R^2 = 0.384$. For model three, neither demographics nor high fat-related cooking behavior were remained in the equation. Therefore, risk perceptions and confidence in cooking low fat meals were the only two predictors of the behavior intention under study. The predictors of intentions were risk perceptions of CVD with a standardized test statistic $\beta$ of 0.440, followed by confidence in cooking low fat meals $\beta$ was 0.334. The higher the value of $\beta$, the higher the impact of the independent variable on the dependent variable (Brace, Kemp, & Snelgar, 2000); therefore, risk perceptions of CVD was the number one predicting variable for intentions to cook low fat meals. Confidence in cooking low fat meals was the second predictor for intentions to cook low fat meals. Thus null hypothesis #5 was rejected while alternative hypothesis #5 was accepted. The alternative hypothesis suggests that risk perceptions of CVD are a significant predictor of Saudi Arabian women’s intentions to cook low fat meals.
Table 7

Summary of Hierarchical Multiple Regression Analysis to Predict Intentions

<table>
<thead>
<tr>
<th>Model</th>
<th>R²</th>
<th>Δ R²</th>
<th>F</th>
<th>β</th>
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</tr>
</thead>
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<tr>
<td>1</td>
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<td>.013</td>
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<td>-0.30</td>
<td>.602</td>
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<tr>
<td>Age</td>
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<td></td>
<td></td>
<td>.097</td>
<td>.093</td>
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<tr>
<td>Education</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>.093</td>
<td>.081</td>
<td>12.442</td>
<td>-0.025</td>
<td>.646</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td>.059</td>
<td>.293</td>
</tr>
<tr>
<td>Education</td>
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<td></td>
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<tr>
<td>Cooking</td>
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<td>.563</td>
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<td>3</td>
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<tr>
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</tr>
<tr>
<td>Education</td>
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<td></td>
<td></td>
<td>.440</td>
<td>.000</td>
</tr>
<tr>
<td>Cooking</td>
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<td></td>
<td></td>
<td>.334</td>
<td>.000</td>
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<tr>
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<td></td>
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<tr>
<td>Confidence</td>
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<td></td>
</tr>
</tbody>
</table>

Note. Dependent Variable = Intentions

Overall, findings from the current study showed that risk perceptions of CVD, high fat-related cooking behavior, and intentions to cook low fat meals among Saudi Arabian women were above the mean. The two constructs, risk perceptions of CVD and confidence in cooking low fat meals, significantly predicted the intentions to cook low fat meals. The multiple regression analysis was found to be statistically significant, indicating that risk perceptions of CVD and confidence in cooking low fat meals are good
predictors of intentions. Risk perceptions of CVD was a major contributor toward intentions to cook low fat meals among Saudi Arabian women.

The following chapter presents the study’s conclusions and recommendations as suggested by the results presented in this chapter. The next chapter also presents the study’s findings, its limitations, and implications for health education practice and research.
CHAPTER V
DISCUSSION

In the category of non-communicable diseases, cardiovascular disease (CVD) is the number one cause of death in Saudi Arabia (WHO, 2015). CVD related mortality can be prevented by eliminating known, modifiable risk factors such as smoking, hypertension, excess body weight, high dietary fat intake and lack of physical activity (AHA, 2015). The increase in the incidence and prevalence of these factors in Saudi Arabia has elicited a corresponding increase in risk for CVD (Al-Baghli et al., 2010; Aljefree & Ahmed, 2015; Kumosani, Alama, & Iyer, 2011). Among Saudi Arabian women, an epidemic of obesity, poor diet and inactivity (Alquaiz et al., 2015; Ibrahaim, 2014; Kalaf, AlMesned, Soomro, Lasheen, Ewid, & Al-Mohaimeed, 2016) as well as nutritional risk factors (Ibrahaim, 2014; Kalaf et al., 2016) are at play. Studies conducted in Saudi Arabia thus indicate a high prevalence of CVD among women in particular (Al Nozha et al., 2005; Kumosani, Alama, & Iyer, 2011; Mahmood, Jahan, & Habibullah, 2014).

Unhealthy eating habits, namely increased caloric, sugar and high dietary fat intake in lieu of the traditional high-fiber, low-fat diet, are developing in Saudi Arabian women (Al-Haramlah, Al-Bakr, & Merza, 2015; Al Nozha et al., 2007; Alzeidan, Rabiee, Mandil, Hersi, & Fayed, 2016;). These nutritional problems are attributed to a change in eating habits, illiteracy, and ignorance (Kumosani, Alama, & Iyer, 2011). A deeper understanding of Saudi Arabian women’s awareness of the relationship between
cardiovascular health and cooking behaviors is prerequisite to establishing healthy eating patterns among these women.

To counteract these trends, interventions should be implemented that increase Saudi Arabian women’s awareness of the relationship between cardiovascular health and cooking behaviors. In addition, identifying and understanding the magnitude of the risk factors contributing to CVD, including high fat intake, are important aspects of creating targeted interventions for this particular population. Therefore, this study was conducted to examine the perceptions and cooking behaviors of Saudi Arabian women in relation to CVD and intentions to cook low fat meals. Results of this study may be used to inform population-based strategies, to integrate these strategies into regional prevention frameworks, and to translate these strategies in locally delivered healthcare services.

The variables of interest in the study were (1) current cooking behavior, (2) risk perceptions of CVD in relation to home cooking, and (3) intentions to cook low fat meals. This study was carried out using a 24-question, researcher-developed survey that measured each participant’s risk perceptions and cooking behaviors in relation to CVD and her intentions to cook low fat meals. The 24 items were organized into five sections, and each section was validated through a pilot study in the summer of 2014 among 210 Saudi Arabian women in Riyadh, Saudi Arabia. In the present study, a total of 400 surveys were usable for data analysis.

The surveys were examined and data were analyzed using descriptive statistics, measures of central tendency, frequencies, Pearson Correlation, and Multiple Linear Regression to examine the risk perceptions of CVD and fat-related cooking behaviors of
Saudi Arabian women and their intentions to cook low fat meals. It was found that the participants in this sample had perceived susceptibility, intentions to cook low fat meals, and high fat cooking behavior that was above the average. The Pearson Correlation (r) test was run to specify how two variables vary together, the risk perceptions of CVD and fat-related cooking behavior. The analysis on the sample used in this study revealed an (r) value of -.366, which indicates a moderate negative correlation between risk perceptions of CVD and fat-related cooking behavior. Multiple regression was used to identify the significant predictor(s) of the intention to cook low fat meals. The analysis on the sample used in this study indicated that risk perception of CVD was the greatest predictor of the intention.

**Interpretation of the Findings**

The following section interprets the findings of the study based on the relationship of the results to the conceptual framework, the research questions, and to the previous literature. The purpose of this study was to investigate the risk perceptions and cooking behaviors of Saudi Arabian women in relation to cardiovascular disease (CVD) and intentions to cook low fat meals.

**Relationship of the Results to the Conceptual Framework**

The Health Belief Model (HBM) and the Precaution Adoption Process Model (PAPM) served as the conceptual framework for the current research study. The HBM has been found useful in the prediction of different preventative health behaviors. The two constructs of the HBM, perceived susceptibility and perceived self-efficacy, were used to identify the participants’ risk perceptions of CVD and participants’ perception of
their ability to cook low fat meals. The perceived susceptibility to CVD and the self-efficacy constructs regarding low fat cooking were then used to predict if the participants would engage in low fat cooking behavior. In this study, the HBM asserts that if individuals perceive themselves as at risk for CVD and able to cook low fat meals, it is likely that the individuals will take recommended dietary action to cook low fat meals. Moreover, as individuals’ perceived susceptibility to CVD increases and as individuals’ belief in their ability to cook low fat meals increases, so should their intentions to cook low fat meals.

The HBM proved an effective theoretical underpinning for evaluating risk perceptions of CVD and confidence in cooking low fat meals. The multiple regression analysis was statistically significant (F (5,360) = 65.687, p<0.05 with $R^2=0.38$), indicating that risk perception of CVD and confidence in cooking low fat meals are good predictors of intentions. Risk perception of CVD was the number one predictor variable and confidence in cooking low fat meals was the second predictor for intention to cook low fat meals. In short, the model accurately predicted intention to cook low fat meals with the perceived susceptibility and self-efficacy constructs.

The PAPM was an effective tool in this study to categorize the participants in seven stages based on their readiness and intention to adopt low fat cooking behavior. The PAPM model was able to confirm the findings of the Behavioral Intention Scale emphasizing that over half of the participants have the intention to cook low fat meals. The fact that more than 50% of the participants were planning to cook low fat meals (stages 5&6) within the next six months supports the findings from this sample that
although the participants were cooking high fat meals at the time of the study, they intended to cook low fat meals in the near future. Staging algorithm data were consistent with risk perception results that the study participants are aware of high-fat food and cooking-related cardiovascular risk. In addition, about 50% of the participants have not started to cook low fat meals (stages 1, 2, 3, & 4) at the time of survey.

**Relationship of the Results to Research Questions**

The major findings of this study showed a moderate negative correlation (r = -0.366, p < 0.05) between risk perception of CVD and fat-related cooking behavior, suggesting that people who have higher perceived risk of CVD have lower fat cooking behavior. A significant positive correlation (r = 0.612) is seen between risk perception of CVD and intention to cook low fat meals, suggesting that people who have perceived a higher risk of CVD have higher intention to cook low fat meals. However, there were participants who still demonstrated high fat cooking behavior even with a desired risk perception of CVD. It seems that risk perception of CVD did correlate with intention well, but risk perception of CVD alone was not enough to warrant that people were cooking low fat meals.

These findings revealed participants’ levels of risk perception in relation to CVD and fat-related cooking behavior and participants’ intention to cook low fat meals are higher than what was expected. These results were unexpected, since it was hypothesized that Saudi Arabian women would indicate low risk perception of CVD and low intention to cook low fat meals. These findings suggest that study participants have levels of risk perception of CVD and levels of intention to cook low fat meals that are
slightly above average. It is possible that, due to social desirability bias, most of the participants reported having higher risk perception and intention to cook low fat meals than they actually had. For example, the participants may have reported that they were “careful about what they cook for the sake of protecting their family’s heart health” simply because the participants knew that it was important to do so.

The high fat cooking behavior despite the high risk perception of CVD and the participants’ intention to cook low fat meals could be attributed to the participants being motivated to cook low fat meals but not consistently. In addition, the high risk perception could be related to participants’ familiarity with and participation in wellness or disease prevention programs. As the sample of patients was accessed in a primary care clinic’s waiting room, the participants could be actively engaged in preventive health care. As a result, this sample may have generated different results than those that might have been generated from Saudi Arabian women who do not engage in preventive health care.

**Relationship of the Results to the Literature**

In this sample, Saudi Arabian women demonstrated high fat cooking behaviors. These results are similar to findings reported by Al-Alwan et al. (2013), Al-Haramlah, Al-Bakr, & Merza (2015), and Shara (2010) that Saudi Arabian women practice unhealthy eating behaviors. In addition, half of the participants either “strongly agree” or “agree” that they do not avoid cooking meat. This result also concurs with previous research indicating that in Saudi Arabia, many women prefer preparing meat for their families at nearly every meal (Rawas, Yates, Windsor, & Clark, 2012). Most of the
participants choose to cook high fat foods (lots of red meat, whole dairy, butter/margarine), and they typically prepare those foods by frying them. Correspondingly, previous research has indicated that Saudi Arabians are now eating high amounts of fat-rich foods and consuming more saturated fat than in the past (Hanash et al., 2000; Shara, 2010). Based on this study’s findings, the current cooking behaviors of the sample do not concur with the Dietary Guidelines for Saudi Arabians, which prompt citizens to limit total and saturated fat intake as much as possible (Al-Dkheel, 2012). If Saudi Arabians continue to eat high-fat diets, there is a likelihood of an increase in obesity and an increased risk of CVD (Al-Alwan et al., 2013; Pharaon, 2004). It is therefore important to encourage Saudi Arabian women to make low-fat food choices when cooking to reduce the risk of CVD for both them and their family members.

Regarding how frequently the participants cooked at home, the majority of them reported cooking meals at home every day. Only a few participants cooked a few times per week/month. These findings reflect that women in Saudi Arabia have the primary responsibility to prepare foods for their families (Mobaraki & Soderfeldt, 2007; Sidenvall, Nydahl, & Fjellström, 2000). These findings are also consistent with a previous study indicating that Saudi Arabian women prefer home-cooked meals (Majeed, 2015). Home cooking can be an important part of a healthy eating lifestyle (Erlich, 2012), and home cooking behaviors are a potential area where healthy eating among Saudi Arabian women and their families can be promoted. However, the findings that the current study participants cooked most of their meals at home on a daily basis contradicted the literature that there is more likely a positive relationship between food
prepared at home and the ability to meet dietary recommendations (Larson, Perry, Story, & Neumark-Sztainer, 2006). In this sample, the more often that the participants home-cooked their meals, the greater the likelihood of increased high fat cooking behaviors and the lower the likelihood that participants would meet the dietary recommendations to decrease fat intake.

The responses to the survey questions regarding food categories that the participants choose when cooking indicate that most participants rarely choose vegetables. This result supports the literature that Saudi people do not often choose healthy foods such as vegetables (Al-Otaibi, 2013; Majeed, 2015). Only 38.4% of participants reported “Always” choosing vegetables and 28.9% reported “Sometimes” choosing them. More than half of the participants said that they choose to cook foods high in fats (French fries, croissants, or cakes). Participants choose high fat cooking techniques most frequently. More than half of the participants reported using whole fat dairy products when cooking and frying foods. These results are consistent with the literature that Saudi Arabsians eat foods high in saturated fats (Al-Dhaheri et al., 2014; Crocco, Pervez, & Katz; 2009; Sibai et al., 2010). These findings confirm that cooking with saturated fats and frying foods have replaced the traditional cooking method of boiling, which used fats modestly. This change has increased the risk in CVD in Saudi Arabia (Al-Moraie, Lietz & Seal, 2012; Crocco, Pervez, & Katz, 2009). Overall, the findings of this study that the participants choose high-fat foods when cooking support previous studies by Alwan et al. (2013), Ibrahim et al. (2014), and Majed (2015), who reported that the dietary habits of Saudi Arabian women were not health promoting.
Focusing on risk factors for CVD related to high fat cooking behaviors could help to develop intervention strategies to promote healthy eating behaviors that limit the occurrence of CVD and improve Saudi Arabian women’s health. Strategies that can help Saudi Arabian women cook more heart healthy meals include cooking more fish instead of red meats, cooking more vegetables, avoiding trans fats, limiting sugar and salt, and increasing grains.

The level of risk perception of CVD in relation to low fat cooking behavior was above the average (mean score 3.5 out of 5.0) among the participants, which indicates that they do feel susceptible to CVD. These findings are not consistent with Kumosani, Alama, & Iyer’s (2011) finding that Saudi people do not feel vulnerable to nutrition-related diseases. This study similarly conflicts with Shara’s (2010) finding that understanding and awareness of CVD among Saudi Arabian women is low. Finally, the results of this study are inconsistent with Brown’s (2015) study, which documented that women’s risk perceptions of CVD and awareness of preventive strategies were poor.

As demonstrated by Glanz, Rimer, and Viswanath (2008), people are more likely to engage in healthier behaviors if they perceive the risk of not doing so and if they have the intent. For example, Chen, Fox, Cantrell, and Kagawa (2007) indicated that perceived susceptibility motivates people to be vaccinated for influenza and to use sunscreen to prevent skin cancer. The participants’ levels of risk perception of CVD and their intention to cook low fat meals were above average, which could suggest that the participants are likely to adopt low fat cooking behaviors. This conclusion concurs with the existing literature suggesting that perceived susceptibility acts as a motivation for
people to adopt healthy behaviors (Bond & Nolan, 2011; Chen, Fox, Cantrell, & Kagawa, 2007; Tuner et al., 2004). The conclusion is also consistent with the literature showing that increased risk perceptions help people to adopt healthy lifestyles (Brown, 2015; Vanhecke et al., 2006). However, even though the participants in this study showed above average risk perception levels, they also demonstrated above average high fat cooking behaviors. In other words, the current fat-related cooking behaviors of the participants were not consistent with their risk perceptions. This may be explained by lack of risk perception and nutritional knowledge in relation to specific aspects of food choices. For example, participants may have been aware that lowering dietary fat intake is recommended to decrease the risk of CVD, but they could still lack the nutritional information about the types of fat in types of food necessary to connect their risk perception with their cooking behaviors. Another explanation is that participants have the knowledge and do perceive their risk, but the knowledge and risk perception have not translated to a change in behavior to low fat cooking.

**Implications for Practice**

This study has several implications for the development of educational interventions to motivate Saudi Arabian women to practice healthy cooking behavior. Application of the results of this study would be useful for health educators, dietitians, and other health care professionals involved in educating individuals on healthy dietary behaviors. Findings from the study show that the message to avoid high-fat intake has reached the minds of the participants; the great majority of the respondents are aware that the reduction of high fat cooking would be beneficial for the prevention of CVD.
However, this study has also shown that the study participants are not demonstrating healthy fat cooking behaviors. Therefore, more programs with nutrition intervention strategies to teach Saudi Arabian women how to cook healthy meals may be warranted. It is recommended that health education programs address skills-based content for cooking behavior modification in order to improve cardiovascular health.

It is important that health educators and dieticians work together to promote healthy eating behaviors among Saudi Arabian women. Specifically, it would be beneficial to provide nutrition education and teaching about heart-healthy dietary choices, incorporating information about using the Healthy Food Palm, and providing information about the health effects of high fat foods. Emphasis should be placed on cooking practices and how to overcome barriers to cooking healthy. In addition, health educators can promote the use of existing physical activity facilities to help reduce sedentary lifestyles among these women, thus decreasing CVD risk.

Health educators and dietitians could use the information learned in this study to develop education materials that focus on Saudi women who are less aware of the risks of high fat cooking behaviors. Health educators should participate in media and public information campaigns to increase the general awareness of the link between CVD prevention and the consumption of low-fat diets. Health education efforts need to go beyond just imparting knowledge to make actual behavior changes in the targeted population. The fact that Saudi Arabian women in this sample cook frequently at home may help to identify strategies that would encourage and enable the target population to cook healthy foods at home. When individuals prepare and cook meals at home, they
have better control over the nutritional content and the overall healthfulness of the foods they eat and provide for their families (Yaniv, Rosin, & Tobol, 2009). Therefore, providing nutrition education in relation to healthy home cooking and teaching the target population how to select healthy foods when cooking, namely foods that are low in fat and cholesterol, is a potential strategy to reduce the prevalence of CVD.

The primary prevention strategy in the health education curricula in Saudi Arabia should emphasize CVD risk factors in women, especially high-fat dietary intake. To promote healthy eating practices and heart health awareness in women, health educators should understand the nature of CVD risk factors, know what the primary prevention strategy is, and be able to teach methods to reduce risky behaviors such as high fat cooking. Health educators and dieticians in Saudi Arabia should be provided with opportunities for continuing education courses and professional development seminars that teach them how to promote effective adoption of low fat cooking behavior.

The current high fat cooking behaviors of the study participants not only puts them at risk of CVD, but also increases susceptibility to CVD among their families. This disturbing fact and the statistics regarding the high fat cooking behaviors found in this study justify the need for the implementation of effective initiatives to prevent CVD through dietary recommendations and interventions. There is a need to obtain and maintain dietary behavior changes among Saudi Arabian women for the long-term success of a CVD prevention strategy. Even though participants’ levels of risk perceptions of CVD and their intentions to cook low fat meals were above average, these perceptions and intentions were not reflected in participants’ current cooking behaviors.
Therefore, the primary method of prevention involving cooking behavior and risk perception changes should still be targeted to these women.

This study has implications for the Health Education Department, Ministry of Health in Saudi Arabia and for primary health care centers and clinics in Saudi Arabia. Its findings may help these institutions to promote an intervention that targets behavioral change and to educate and prompt the target population to adopt preventive measures that reduce the risk of CVD. Primary health care centers and clinics in Saudi Arabia should explore the possibilities of risk factor screening for Saudi Arabian women to find their blood cholesterol, lipid levels, blood sugar, and blood pressure levels to take early measures to prevent associated risk factors. A primary care clinic would be a suitable place to raise the awareness of the importance of healthier diets. Specifically, the use of dedicated TV networks with targeted health information and take-home brochures and flyers in the primary care clinic’s waiting room could promote healthy eating behavior. Dietary behavioral counseling may also be valuable in encouraging low fat cooking behaviors among patients in primary care settings who are at an increased risk for CVD.

This study provides information for the health education program in the College of Applied Medical Sciences at King Saud University to work with the primary health centers by instituting risk factor modification programs or events for Saudi Arabian women. For example, hosting an American Heart Month event at the primary health centers could spread the message about CVD risk factors. Programs that offer lipid panel screenings in conjunction with activities such as cooking classes on how to choose healthy foods might also attract high attendance and successfully raise awareness.
literature indicates the lack of screening by healthcare providers for women with the potential of developing CVD has resulted in women not being treated effectively to prevent further progression of CVD (Mosca et al., 2009).

The results of the study support greater awareness and prevention of CVD and create targeted areas for future health promotion and education efforts. The risk perception levels in relation to CVD and high fat cooking behaviors among the participants inform the type of nutrition interventions, preventive measures, and behavior change campaigns that target dietary changes and cooking practices.

**Recommendations for Intervention**

Based on the study findings, Saudi Arabian women appear to practice unhealthy cooking behaviors with a moderate level of risk perception and intention to cook low fat meals. Nutritional intervention is needed. Emphasis should be given to developing interventions aimed at increasing awareness of cardiovascular health in relation to cooking behaviors to encourage healthy eating habits among Saudi Arabian women, thereby reducing the risk of CVD. Although it is culturally acceptable to consume a high-fat diet and for women not to participate in exercise or sports, it is unacceptable to allow the people of the Gulf region to continue such a reckless and unhealthy lifestyle (European Society of Cardiology, 2013). The findings of this study support the following intervention strategies: development of nutrition education, implementation of a healthy eating program, and physical activity promotion.
Development of Nutrition Education

Emphasis should be placed on educating Saudi Arabian women about making healthy food choices that would meet Dietary Guidelines for Saudi Arabians that aim to reduce the risks for CVD and other chronic diseases. Specifically, emphasis should be placed on reducing the total fat and saturated fat intakes while increasing the consumption of complex carbohydrates including fruits, vegetables, and dietary fiber. Strategies should focus on substituting foods low in fat and high in complex carbohydrates for foods high in saturated fat. Additionally, focus should be placed on alternative methods of food preparation and cooking to decrease fat intake by baking or steaming rather than frying. Saudi Arabian women should be taught how to read and interpret food labels and determine the nutrient content of the food. This instruction could be incorporated into the high school curriculum and presented in home economics classes or through other appropriate courses to prepare the female students to be healthy cooks. In addition, workshops on interpreting food labels could be conducted at different work sites and at primary health care centers to educate the target population in how to make food and cooking choices that can affect their long-term health. Nutrition and health education clinics at King Saud University could be a potential tool for female college students to learn healthy eating behaviors. A study conducted by Al Qauhiz (2010) concluded that the female college student eating behaviors typically translate to the dietary practices that they will adopt later in their life. The Saudi Arabian Ministries of Health and Education should be encouraged to incorporate healthy food choices for students that are low in fat and saturated fat to promote healthy eating and low fat eating
behaviors and thereby reduce the burden of CVD. This investment in the younger generations could help to encourage and support the adoption and maintenance of healthy eating habits into later adult life and control the widespread prevalence of CVD.

Implementation of a Healthy Eating Program

Health education programs in Saudi Arabian universities have an obligation to provide lectures, workshops, and cooking classes to the community. The focus should be on a variety of topics such as the risks of CVD associated with the consumption of high dietary fat foods and unhealthy cooking techniques and methods.

The health education program at King Saud University should implement a healthy eating program that focuses on families rather than individuals, specifically mothers and their children. Nutrition classes should be taught at King Saud University campus so that family members can be taught how to make healthy food choices and prepare healthy meals. Emphasis should be placed on the high fat cooking-related cardiovascular risk. Moreover, important preventive strategies should be promoted such as alternative methods to frying and how to adopt low fat cooking behaviors. The rationale for this program is that the majority of participants in the current study cooked meals at home on a daily basis but lacked healthy cooking behaviors. More than half of them fried foods, used whole fat dairy products when cooking, used coconut, palm oils, and butter, and they did not keep fats to a minimum when preparing their meals.

Physical Activity Promotion

Risk factors for CVD in Saudi Arabia include a lack of physical activity in addition to excessive fat intake (Kumosani, Alama, & Iyer, 2011). The literature
revealed a high level of physical inactivity among Saudi Arabian women (Al-Hazzaa, 2004; Al-Haramlah, Al-Bakr, & Merza, 2015; Al-Nozha et al., 2007; Hawazen, Patsy, & Robyn, 2012; Majeed, 2015; Midhet, Al Mohaimeed, & Sharaf, 2010). A recent study conducted by Al-Zalabani, Al-Hamdan, & Saeed (2015) indicated that 90.2% of Saudi Arabian women are physically inactive. Therefore, promoting physical activity among Saudi Arabian women is another way to encourage healthy habits to prevent and lower the risk of CVD. The adoption of a healthy lifestyle, which is associated with physical activity, might help reduce the high fat cooking behavior and its risk of CVD. Physical activity could be promoted using various approaches: informational, behavioral, social, environmental, and policy change. The planning, development and implementation of this promotion would require the coordinated efforts of the various government Ministries in Saudi Arabia (i.e., Health, Education, Planning and Economy, Municipal and Rural Affairs, and Social Affairs).

**Recommendations for Further Research**

The findings from this study have illuminated some of the important issues related to Saudi Arabian women’s health, particularly concerning their dietary patterns and cooking behaviors. However, the findings have also raised some serious concerns regarding prevention and intervention strategies for this particular population. Further research is needed to determine the prevalence of CVD risk factors in the Saudi Arabian female population so that a careful intervention program, aimed at primary prevention, can be established to reduce these risk factors. The findings of this study should be considered in the design of comparative studies on women in other settings and from
other countries in the Middle East to identify whether these populations have cooking behaviors, risk perceptions, and intentions to cook low fat meals that are similar to the ones identified in the current study. Living in urban areas might impact on the dietary habits and the risk perceptions of Saudi Arabian women regarding CVD, as Saudi Arabian women living in urban areas tend to have higher educational attainment that might expose them to information regarding better nutrition choices. These women may also have a greater opportunity to attend disease prevention programs. It is recommended to conduct a further in-depth analysis of a much larger population across Saudi Arabia taking into account regional variations.

Very little is known about the dietary behaviors of Saudi Arabian women, particularly their cooking behaviors. This knowledge is necessary before considering any nutrition program for these women. More data are needed on the dietary choices of Saudi Arabian women, particularly their dietary fat intake. Because this sample revealed a large percentage of women with high fat cooking behaviors, it is important to investigate further the types and amounts of fat intake per day of a representative sample of Saudi Arabian women. If the amount of saturated fat and trans fat is high, the Saudi Arabian women in the present study might be at a higher risk for CVD. The food sources of dietary fat among Saudi people might be different across various regions of the country, and these sources need to be explored in future studies as well. A larger, more diverse sample could help to identify additional and more specific high fat cooking behaviors.

Longitudinal studies are recommended to see how risk perceptions and their intentions to cook low fat meals change over time as the current study participants
showed inconsistency with their risk perceptions and current cooking behaviors. Future low fat dietary interventions for CVD education might include a longitudinal design to capture additional data about how the target population attains and maintains CVD risk reduction over a greater period of time.

It is also important to explore different nutritional intervention styles that may influence CVD risk reduction. Future studies are needed in settings other than a primary care clinic to ascertain whether study findings are representative of other populations, especially those who do not visit clinics. Moreover, it may be beneficial to conduct a study in two different locations and compare the results. Many questions regarding the risk perceptions of CVD and the intentions of the participants to cook low fat meals have not been addressed in this study and are recommended for further research. The results from this single study cannot ascertain the entire nature of the risk perception levels in the Saudi Arabian female population. More research on the perception of risk factors of CVD is needed to enrich the existing research on the cardiovascular health of Saudi Arabian women. Further studies are needed to investigate the differences in the risk perception levels based on different demographics. In addition, future research should include multiple methods of high-fat dietary intake assessment to examine the consistency of the responses.

Further study is also needed to understand and determine why the participants demonstrate high fat cooking behaviors. For example, a qualitative method could be incorporated with a quantitative study aimed at exploring the barriers among Saudi Arabian women in adopting low fat cooking behaviors and how to reduce those barriers.
Studies should be conducted to explore and understand the determinants of healthy eating habits among Saudi Arabian women and the kind of factors that promote healthier eating habits, including personal, social, and environmental factors. Perhaps a qualitative study targeting this population would provide more detailed information about why women are eating higher fat foods and not cooking in a healthful manner.

**Study Limitations**

The current study was a cross-sectional study; therefore, no inference of cause and effect can be made. The participants were recruited in a primary care clinic, which is one of the best places available to promote good health through preventative medicine, health screenings, and health education. This location for recruitment of participants may explain their above average level of risk perception of CVD and their high level of intention to cook low fat meals. For example, participants may have already been involved in nutrition awareness programs or preventative health measures. All participants in the study were volunteers, which may also indicate that the participants already possessed an interest in health that contributed to higher CVD risk perception and higher intention to cook low fat meals. This study could not address the potential over-reporting of risk perception and intention to cook low fat meals since the variables of interest were measured by self-report. The study was conducted in one city (Riyadh) from the central region of Saudi Arabia. While the study included participants who live in other regions of Saudi Arabia, most of the participants were originally from the central region of Saudi Arabia.
Participants sat in close proximity to one another while completing the survey. The physical proximity of the survey participants could have resulted in sharing of answers, looking at one another’s surveys to find an answer, or discussion of the answers with each other. While there was a high risk perception and intention among the participants to cook low fat meals, it is unknown whether these levels of perception and intention will be sustained over time. Data were collected in the summer and may be an underestimation or overestimation of some variables. For example, fat-related cooking behavior might have been overestimated due to the fact that there are more family gatherings in the summer time, so more emphasis may be placed on pleasing family visitors with tasty foods higher in fat rather than serving more healthy foods.

The HBM served as a framework to guide the present study; however, not all constructs contained in the theory were used. Including all of the constructs of the HBM would have likely provided more valuable information to predict the likelihood of engaging in health behavior changes, such as cooking low fat meals. To find differences on the issue of CVD among Saudi Arabian women, future studies could apply other theoretical models used in Health Education and Promotion practice such as the Theory of Planned Behavior, Theory of Reasoned Action, and Social Cognitive Theory.

**Conclusion**

This study examined the perceived risk of CVD in relation to cooking behaviors and intention to cook low fat meals. It found that the current cooking behaviors of Saudi Arabian women predispose these women and their families to the risks of CVD.
This study offers new insights applicable to health institutions and health professional practice. Findings from the current study can inform health educators about Saudi Arabian women’s cooking behaviors, risk perception of CVD, and intention to cook low fat meals. These findings can help health educators to design appropriate programs, awareness messages, and community campaigns to increase the knowledge and health beliefs about this disease and its consequences.

The results of this study indicate that continued research in this area is warranted. Future research could, for example, determine dietary fat intake risk factors for CVD, fat-related eating patterns, and cooking behaviors in Saudi Arabian women. This information would support the development of effective health education programs to reduce the risks of CVD associated with high consumption of dietary fat among these women. It is important to study how perceptions are formed among Saudi Arabian women and why they do not practice behaviors that could reduce their chance of developing CVD and promote overall wellness and optimal health.

This study was a first step in looking at Saudi Arabian women’s cardiovascular health in relation to dietary behaviors. It is hoped that the findings from this study will be a springboard for future research, contribute greater insight into the association between risk perceptions, intentions to cook low fat meals, and cooking behaviors in Saudi Arabian women. Health education professionals should collaborate with governmental, non-governmental, and non-profit agencies to better understand the issues of CVD and work collaboratively to reduce the risks. Emphasis on dietary fat intake as a main risk factor of CVD and the use the social media to disseminate information to Saudi Arabian
women, as well as public health campaigns run through social networks like Facebook and Twitter, will be helpful to these women. Health educators are excellent resources for providing information, planning, implementing, and evaluating programs on health-promoting behaviors and are key to preventing nutrition-related chronic diseases to set the foundation for a healthier future in Saudi Arabia.
APPENDICES
APPENDIX A

DIETARY GUIDELINES
Appendix A

Dietary Guidelines

Table A1

*Daily recommended food servings according to age groups*

<table>
<thead>
<tr>
<th>Food group Age group</th>
<th>Cereals and Bread</th>
<th>Vegetables and Fruits</th>
<th>Milk and Products</th>
<th>Meat and Substitutes</th>
<th>Sugar and fat Minimal amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children 2-3 years</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Children 4-8 years</td>
<td>4</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Children 9-13 years</td>
<td>6</td>
<td>6</td>
<td>3-4</td>
<td>1-2</td>
<td></td>
</tr>
<tr>
<td>Adolescents 14-18 years, Females</td>
<td>6</td>
<td>7</td>
<td>3-4</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Adolescents 14-18 years, Males</td>
<td>7</td>
<td>8</td>
<td>3-4</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Adults 19-50 years Females</td>
<td>6</td>
<td>7-8</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Adults 19-50 years Males</td>
<td>8</td>
<td>8-10</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Adults &gt;50 years Females</td>
<td>6</td>
<td>7</td>
<td>3</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Adults&gt;50 years Males</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Pregnant women</td>
<td>8</td>
<td>8-10</td>
<td>4</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Lactating mothers</td>
<td>8</td>
<td>8-10</td>
<td>4</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

Source: Al-Dkheel (2012)
### Table A2

**Rations Allowable Daily Food Groups in The Healthy Food Palm**

<table>
<thead>
<tr>
<th>No.</th>
<th>Food groups</th>
<th>Serving numbers</th>
<th>The amount of serving size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cereals &amp; Bread</td>
<td>6-11</td>
<td>=25 grams of bread&lt;br&gt;=1/4 Arabic bread medium size&lt;br&gt;=one slice of toast&lt;br&gt;=½ cup of cereals such as rice</td>
</tr>
<tr>
<td>2</td>
<td>Vegetables</td>
<td>3-5</td>
<td>1 cup of raw leafy vegetables&lt;br&gt;=1/2 cup of other vegetables, cooked or chopped raw&lt;br&gt;¼ cup of vegetables juice</td>
</tr>
<tr>
<td>3</td>
<td>Fruits</td>
<td>2-4</td>
<td>= 1 medium apple, banana, orange.&lt;br&gt;=1/2 cup of chopped or canned fruits.&lt;br&gt;=medium dates&lt;br&gt;¼ cup of vegetable juice</td>
</tr>
<tr>
<td>4</td>
<td>Milk and products</td>
<td>2-4</td>
<td>= 1 cup of milk or laban or yogurt&lt;br&gt;= spoons of milk powder&lt;br&gt;=60 gram of processes cheese</td>
</tr>
<tr>
<td>5</td>
<td>Meat &amp; substitutes</td>
<td>2-3</td>
<td>=60-90 grams of cooked lean meat, poultry or fish.&lt;br&gt;= 1 egg&lt;br&gt;=1/2 of cooked dry beans&lt;br&gt;=4-6 tablespoon of peanut butter</td>
</tr>
<tr>
<td>6</td>
<td>Fat &amp; sugar</td>
<td>-</td>
<td>Lower amount possible</td>
</tr>
<tr>
<td>7</td>
<td>Water</td>
<td>6</td>
<td>At least 6 cups daily.</td>
</tr>
</tbody>
</table>

Source. Al-Dkheel (2012)
APPENDIX B

HOME COOKING AND INTENTIONS TO COOK LOW FAT MEALS SURVEY
Appendix B

Home Cooking and Intentions to Cook Low Fat Meals Survey

Please provide your honest responses to each survey item. Your responses will remain completely confidential and anonymous.

Section 1: Fat-Related Cooking Behaviors Scale

1- How often do you cook meals at home?
Please check the box that best corresponds to your answer
☐ Everyday  ☐ A few times per week  ☐ A few times per month
☐ Less than once per month  ☐ Never

*If you have checked “Less than once per month” or “Never,” we thank you for your interest in this study. Your current cooking behaviors do not match the participation criteria. Please return this survey to the researcher.

2-Please check all that apply to the food you cook and how often that is. Please consider your food choices over the past three months

<table>
<thead>
<tr>
<th>Food Choices</th>
<th>Always</th>
<th>Often</th>
<th>Sometimes</th>
<th>Rarely</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetables (carrots, peas, spinach,…..)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fruits (banana, orange, apple,…..)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foods high in fats (french fries, croissants, cakes,…..)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foods low in fats (lean protein products, low fat dairy products,…..)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (_____ )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3-When cooking over the past three months, 
Please select all that apply 
☐ I chose lean meats (lean meat is just meat with very little fat such as chicken breast, fish, and turkey). 
☐ I used-whole fat dairy products (such as whole-fat yoghurt or whole-fat milk). 
☐ I used processed meats (sausage and canned meats). 
☐ I used coconut oil, palm oil and butter. 
☐ I keep fats to a minimum (use cooking sprays or apply a small amount of olive oil with a pastry brush). 
☐ I fried foods.

| Section 2: Risk Perceptions of CVD in Relation to Cooking Low Fat Meals Scale |
|---------------------------------------------------------------|---------|---------|-----------------|---------|---------|
| How much do you agree or disagree with the following statements? | Strongly Disagree | Disagree | Neither Agree or Disagree | Agree | Strongly Agree |
| Over the past three months, I made conscious low fat food choices to improve my family’s heart health | ☐ | ☐ | ☐ | ☐ | ☐ |
| In the coming three months, I will make low fat food choices to improve my family’s heart health | ☐ | ☐ | ☐ | ☐ | ☐ |
| When I prepare or cook food, I avoid red meat | ☐ | ☐ | ☐ | ☐ | ☐ |
| If it is available, I’d rather use whole milk in cooking than skim milk | ☐ | ☐ | ☐ | ☐ | ☐ |
| I have to be careful about the amount of fat I use when cooking | ☐ | ☐ | ☐ | ☐ | ☐ |
| I am careful about what I cook for the sake of protecting my family’s heart health | ☐ | ☐ | ☐ | ☐ | ☐ |
| My family is less likely to have cardiovascular disease because of the high fat food I prepare for them | ☐ | ☐ | ☐ | ☐ | ☐ |
| In general, the chance of developing cardiovascular disease will be lessened if I choose low fat food when cooking | ☐ | ☐ | ☐ | ☐ | ☐ |
Section 3: Behavioral Intention Scale

Please circle the number that represents your response to each question.

1. In the coming three months, I intend to cook low fat meals.
   1  2  3  4  5
   Unlikely  Likely

2. How often do you intend to choose low fat food when cooking?
   Never  Sometimes  Most of the time  Always

3. How often will you choose low fat food when cooking?
   Never  Sometimes  Most of the time  Always

Section 4: Algorithm classification
Please put a check next to your responses to the following:

1. Have you heard about high fat food cooking-related cardiovascular risk?
   □ No (Go to Demographic Questions, section 5)  □ Yes (Go to 2)

2. Have you started to cook low fat meals?
   □ Yes (Go to 4)  □ No (Go to 3)

3. Choose one of the following. Which statement best describes your thoughts about cooking low fat meals:
   □ I have never thought about cooking low fat meals.
   □ I am undecided about cooking low fat meals.
   □ I have decided I don’t want to cook low fat meals.
   □ I have decided I want to cook low fat meal

4. Have you been cooking low fat meals for at least 6 months?
   □ Yes  □ No

5. Do you feel confident in your ability to cook low fat meals?
   □ Yes very confident  □ Yes somewhat confident  □ Neutral
   □ No not very confident  □ No not confident at all

Section 5: Demographic Questions
1. What is your age in years? ______________

2. What is your marital status?

☐ Single  ☐ Married  ☐ Separated/Divorced  ☐ Widowed  ☐ Other __________

3. What region are you from?

☐ Northern  ☐ Southern  ☐ Central  ☐ Western  ☐ Eastern

☐ What is the highest degree or level of school you have completed?

☐ No schooling completed
☐ Some high school, no diploma
☐ High school graduate, diploma or the equivalent
☐ Some college credit, no degree
☐ Associate degree
☐ Bachelor’s degree
☐ Graduate degree

6. How many persons - including yourself - live in your household? ______________

6. Have you ever been diagnosed with cardiovascular disease by your physician?

☐ Yes  ☐ No  ☐ I don’t know

7. Do you have a family history of cardiovascular disease?

☐ Yes  ☐ No  ☐ I don’t know
استبيانة طبخ الاطعمة في المنزل والنوايا لطبخ اطعمة قليلة الدسم

القسم الأول: قياس سلوكيات الطبخ المرتبطة بالدهون

1- كم بالعاده تطبخين وجبات غذائيه بالبيت:
   - كل يوم   □
   - عدة مرات في الأسبوع □
   - عدة مرات بالشهر □
   - أقل من مرة بالشهر □
   لا أطبخ □
* إذا كنت تطبخين أقل من مرة بالشهر أو لاتطبخين ابدا، نشكر رغبتك بالمشاركة بالاستبيانه ولكن سلوكيات طبخت لا تنافق مع معايير الدراسة.

2- ضعي إشارة صح للأطعمة التي تطبختها وكم بالعاده تقومين بذلك مع مراعاة ان خياراتك خلال ثلاثة الأشهر الماضية:

<table>
<thead>
<tr>
<th>الخيارات الغذائية</th>
<th>دائمًا</th>
<th>عادة</th>
<th>بعض الأوقات</th>
<th>نادراً</th>
<th>ابداً</th>
</tr>
</thead>
<tbody>
<tr>
<td>الخضراوات (خيار، جزر)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>فواكه (موز، برتقال ..)</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>اطعمة عالية الدهون (بطاطس مقلية، كيك، كوروسن ..)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>اطعمة قليلة الدهون (لحم منزوع الدهن، منتجات الحليب قليلة الدهم)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>اطعمة أخرى</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

3- ضعي علامة صح امام العبارة التي تتطبق على طبخت خلال ثلاثة أشهر الماضية:
   - لقد قمت باختيار لحوم تحتوي على كميات قليلة من الدهن (صدر دجاج، سمك، ديك رومي) □
   - استخدمت منتجات الألبان كاملة الدسم (حلب كامل الدسم، زبادي كامل الدسم ..) □
   - استخدمت اللحوم المصنعة (السجق، اللحوم المعلبة ..) □
   - استخدمت زيت جوز الهند، نخيل، الزبدة □
   - حاولت تقليل كميه الدهون (باستخدام بخار الطبخ، أو اضافه كميه قليله من الزيت الزيتون) □
   - قمت بقلبي □
القسم الثاني: قياس تصور مخاطر أمراض القلب فيما يتعلق بطبخ اطعمة كليلة الدسم

<table>
<thead>
<tr>
<th>لا موافق ولا نتائج</th>
<th>موافق</th>
<th>موافق بشده</th>
<th>غير موافق</th>
<th>غير موافق بشده</th>
<th>إلى أي حد تتفق أو لا تتفق مع العبّارات؟</th>
</tr>
</thead>
<tbody>
<tr>
<td>خلالي الثلاثة اشهر الماضية ، قمت باستخدام خيارات واعية لأطعمه قليله الدسم لتحسين صحة قلب عائلتي.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>كما ستجدر الإشارة، سوف أقوم باستخدام خيارات لأطعمه قليله الدسم لتحسين صحة قلب عائلتي.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>عندما أطبخ أو أحضر الطعام اتجنب اللحوم الحمراء.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>إذا كان متوفراً، أفضل استخدام الحليب الكامل الدسم في الطبخ بدلاً من الحليب الخالي الدسم.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>يجب أن تكون حذرًا حول كمية الدهون عند الطهي.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>يجب أن تكون حذرًا حول مابطيخ من أجل حماية صحة قلب عائلتي.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ستكون عائلتي أقل عرضة للأصابات بأمراض القلب بسبب طبخ أطعمة عالية الدهون.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>بشكل عام، سوف نقل فرص الإصابة بأمراض القلب إذا قمت باختيار أطعمة قليلة الدسم عند الطبخ.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

القسم الثالث: قياس النوايا السلوكية

الرجاء وضع دائرة حول إجابتك لكل سؤال.
1- في الثلاثة أشهر القادمة، أنا أنوي بطبخ وجبات غذائيَّة قليلة الدهم. 
غير محتمل 1 2 3 4 5 محتمل
2- كيف بالعادة تنوين اختيار اطعمة قليلة الدهم عند الطهي.
دائماً أغلب الأوقات بعض الأوقات أبداً
3- كيف بالعاده سوف تقومين باختيار اطعمة قليلة الدهم عند الطهي.
دائماً أغلب الأوقات بعض الأوقات أبداً

القسم الرابع: تصنيف الخوازميات
الرجاء وضع علامته بجانب اجابتك للعبارات التالية

1- هل سمعتي عن أمراض القلب والأوعية الدموية وعلاقتها بالطهي بأغذيه عاليه الدهون?
نعم (اذهب إلى سؤال رقم 2) لا (اذهب إلى قسم الاسئله الديموغرافيه)
2- هل بدأتي باختيار الغذاء منخفض الدهون عند الطهي?
نعم (اذهب إلى سؤال رقم 4) لا (اذهب إلى سؤال رقم 3)
3- اختاري عباره واحدة فقط تصف أفكارك لوك حول اختيار الغذاء منخفض الدهون عند الطهي.
انا لم أفكر يوما حول اختيار الغذاء منخفض الدهون عند الطهي
انا مرتدت حول اختيار الغذاء منخفض الدهون عند الطهي
لقد قررت اني لارغ باختيار الغذاء منخفض الدهون عند الطهي
لقد قررت اني ارغب في اختيار الغذاء منخفض الدهون
4- هل تم اختيارك للفى صائغ منخفض الدهون عند الطهي لمدة 6 شهور على الأقل.
نعم
لا
5- هل تشعرين بالثقة في قدرتك لطهي وجبات قليلة الدهم؟
نعم إلى حد ما واثقه جداً محايدة نعم واثقه جداً لا نعم ولا اثقي
لا لا تست واثقه جداً لا تست واثقه على الإطلاق

القسم الخامس: الاسئله الديموغرافيه
1. كم عمرك بالسنين؟ ______________

2. ما هي حالتك الاجتماعية؟
   - عزباء
   - متزوجة
   - مطلقة/منفصلة
   - ارملة
   - غير ذلك ______________

3. من أي منطقة انت؟
   - الشمالية
   - الشرقية
   - الوسطى
   - الجنوبية

4. ما هو أعلى مستوى أو درجة دراسي حصلت عليه أو اكملتها؟
   - تم إكمال دراسي
   - بعض من الثانوي العام
   - الثانوي العام
   - الشهادة الدبلومة
   - شهادة جامعية
   - شهادة دراسات عليا ______________

5. كم عدد الأفراد الذين يعيشون في منزلك، بما فيهم انت؟ ______________

6. هل تم تشخيصك مسبقاً بأمراض القلب والأوعية الدموية من قبل طبيبك؟
   - نعم
   - لا
   - لا أعرف ______________

7. هل لديك تاريخ عائلي بأمراض القلب والأوعية الدموية؟
   - نعم
   - لا
   - لا أعرف ______________
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