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**Abstract**

Limited physical activity is a public health concern. Previous studies indicate that Saudi women are not regularly physically active; however, there is little research on Saudi females’ physical activity in Mecca region. This study’s objectives were to assess physical activity levels of Saudi females aged 18 and older in Mecca region, determine barriers to physical activity, and to determine whether there was a correlation between demographic characteristics and physical activity levels. Data was collected from 1,770 females from Mecca region using an online survey. Results found 87% of the women were sedentary or lightly active and 13% were moderately or vigorously active. The mean physical activity level was $41.35 \pm 27.49$ minutes per day (approximately 291 minutes per week). This result is not consistent with the subjects’ reported activity levels nor with previous research and may be due to a misunderstanding of the study question. Saudi women have awareness of physical activity benefits, but face barriers such as inadequate time, lack of transportation, cultural influences, and the unavailability of facilities or equipment. Additionally, positive correlations exist between physical activity level, living status, and household income. Improving Saudi women’s activity levels requires an investigation into strategies to overcome the barriers.
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Chapter I: Introduction

Physical inactivity is a common worldwide problem that can lead to increased risk of poor health and early death. According to World Health Organization (WHO, 2017), one out of four adults is inactive. Physical inactivity accounts for about 6% of deaths internationally (WHO, n.d.). Physical inactivity can cause significant deterioration of various body functions and lead to "disuse syndrome," which is characterized by depression, obesity, premature aging, cardiovascular vulnerability, and musculoskeletal fragility (Bortz, 1984).

Martin, Church, Thompson, Earnest, and Blair (2009) asserted that physical inactivity causes about 15% of the 1.6 million newly diagnosed chronic diseases annually. These diseases include different types of cancer, diabetes, hypertension, coronary and cerebrovascular diseases, and overweight/obesity. If no laws are passed against sedentary lifestyle, the rate of these chronic diseases, the death rate, and the medical costs will increase (Knight, 2012).

The level of physical inactivity in Saudi Arabia is high (Al-Zalabani, Al-Hamdan, & Saeed, 2015). A survey of health information in Saudi Arabia indicates that the prevalence of low levels of physical activity is 60.3%, which breaks down to 46.0% of males and 75.1% of females (Ministry of Health Kingdom of Saudi Arabia, 2013). Al-Nozha et al. (2007) noted that the physical inactivity rate was around 96% among Saudi population, with the highest rate being in the central region (97.3%) and the lowest in the southern region of Saudi Arabia (94.0%).

Globally, according to WHO (2010), 74.9% of Saudi women were in the lowest female group in reported prevalence of physical activity. Additionally, 74.9% of Saudi women are physically inactive, which places them in the lowest women’s group in reported prevalence of physical activity internationally. In all age groups, women in Saudi Arabia are more physically inactive than men (Al-Nozha et al., 2007).
There are a number of factors that may lead Saudi women to be inactive such as harsh climates, a lack of convenient sports infrastructures, lack of time, and restrictive clothing. Until recently, women in Saudi Arabia did not receive any physical activity education, which contributes to the high rate of sedentary (Al-Harbi & Jackson, 2017).

**Statement of the Problem**

Physical activity plays an important role in improving mental health and numerous chronic diseases like obesity, type 2 diabetes mellitus, and cardiovascular diseases (El-Eisa & Al-Sobayel, 2011). Despite these facts, the level of physical inactivity is high among Saudi women, and the incidents of the chronic diseases have increased in Saudi Arabia (Al-Hazzaa, 2004). The majority of studies conducted Saudi Arabia regarding physical activity have come from males, children, adolescents, and females from other regions other than the Mecca region (El-Eisa & Al-Sobayel, 2012).

It is important to focus on Saudi women in the Mecca region population and study the factors affecting physical activity among them to create intervention and motivation programs that suit the needs of this population. Thus, due to the limited studies regarding the physical activity among women in Mecca region, the purpose of this study was to fill this gap.

**Purpose of the Study**

The purpose of this cross-sectional study was to assess physical activity levels among Saudi Arabian women aged 18 and older in Mecca region, to define the barriers that reduce their physical activity, and to find the correlation between activity level and demographic characteristics. Future researchers may be able to use the results of this study to examine the issues for a specific age group such as children and adolescents. Moreover, the results of this
study can help to establish interventions that diminish common barriers and increase subjects' awareness and knowledge of the importance of physical activity.

**Research Questions**

There were three research questions that this study attempted to answer:

1. What are the levels and types of physical activity among Saudi women in Mecca region?
2. Is there an association between demographic characteristics and the physical activity level among women?
3. What are the barriers that women face to be physically active?

**Definition of Terms**

The following terms are defined for clarity:

**Exercise.** Exercise is a physical activity that is planned, structured, and involves repeated movement to improve or maintain physical fitness (Caspersen, Powell, & Christenson, 1985).

**Non-communicable disease.** Non-communicable diseases are known as chronic diseases that are not transferred between humans and usually slowly progress and last for long period of time (WHO, 2015).

**Physical activity.** Physical activity is any movement by skeletal muscles that require energy expenditure (Caspersen et al., 1985).

**Physical inactivity.** Physical inactivity is defined as physical activity levels less than the recommended levels for optimal health and prevention of early death (Booth, Roberts, & Laye, 2012).
Assumptions and Limitations

There were a number of assumptions and limitations of this study. The first assumption in this study was that the majority of subjects do not perform any physical activity. The second assumption was that some of the subjects did not know that physical inactivity may lead to chronic diseases like heart disease.

A limitation of this study was that some subjects may not be able to answer the survey by themselves. Another limitation was that the use of an internet survey could limit participants to the young generation because they are more able to use the internet. Therefore, it will be difficult to generalize the results. The last limitation was the lack of probability sampling due to the using snowball sampling, which could reduce the validity of this study.

Methodology

This cross-sectional study was reviewed and approved by the Institutional Review Board (IRB) at the University of Wisconsin-Stout (see Appendix A). An online survey questionnaire (see Appendix C) was developed and distributed through social media (like Snapchat and WhatsApp) to Saudi women aged 18 and older who live in Mecca Region. ©The eSurvey Creator website was used to send out the survey to the subjects for one month (from December to January).

Before beginning the survey, participants were presented with an implied consent form, which provided information on risks and benefits, time commitment, confidentiality, right to withdraw, and the information on the research’s approval from the University of Wisconsin-Stout IRB for the Protection of Human Subjects (see Appendix B). The survey collected information about subjects’ demographic characteristics, physical activity levels, physical activity knowledge, health history, and exercise barriers scale. The Statistical Package for the
Social Science (SPSS) Version 23 was used for appropriate data analyses such as frequency distributions (counts and percentages) and descriptive statistics (means and standard deviations).
Chapter II: Literature Review

Physical activity is important in the prevention of chronic disease, yet in Saudi Arabia women are less prone to be active than their male counterparts. The purpose of this study was to determine whether Saudi women in Mecca are physically inactive, and to establish whether there is relationship between socio-demographic factors and the levels of physical activity. Additionally, this study investigated the significant barriers to physical activity in women.

This chapter reviews definitions of physical activity followed by a discussion of the types of physical activity, and the different standards for levels of physical activity set by various organizations. This chapter includes an examination of physical activity in Saudi Arabia, the impact of physical activity and its importance in overall health; specifically, its effect on non-communicable diseases like obesity and overweight, type two diabetes, coronary heart diseases, hypertension, and osteoporosis. Additionally, this chapter examines the role gender plays in physical activity level, disparities between genders in Saudi Arabia, and contributing factors. This chapter concludes by presenting the significance of the study based on the available literature.

The literature was identified through database searches such as UW-Stout Library databases, EBSCO, Google Scholar, and PubMed using keywords such as, physical activity, exercise, health effects, non-communicable diseases, and women and Saudi Arabia.

Physical Activity and Physical Inactivity

Different organizations have presented various definitions of physical activity. According to World Health Organization (WHO, 2017), physical activity is any movement caused by the skeletal muscles in the body and involving energy expenditure. Similarly, the National Heart, Lung, and Blood Institute (NHLBI, 2016) described physical activity as any bodily activity that
works the muscles and demands higher energy than is used while the body is at rest. The U.S. Department of Health and Human Services (1996) definition of physical activity is the movement caused by the skeletal muscle contraction that significantly increases the energy spent by the body.

The Physical Activity Guidelines Advisory Committee classified body movements into two categories: health-enhancing and baseline physical activities. Health-enhancing physical activities are exercises that result in health benefits. These activities include yoga, lifting weights, dancing, rope-jumping, and brisk walking (Office of Disease and Health Prevention, 2017). On the other hand, baseline activities are daily life light-intensity exercises such as lifting lightweight objects, standing and slow walking.

Physical inactivity can be described as when the guidelines for physical activity level are not met. Physical activity guidelines have been established by organizations such as the WHO, The Center for Disease Control (CDC), and the American College of Sports Medicine (ACSM). Physical inactivity is a concern and a crucial factor in the increased mortality risk globally (WHO, 2017).

Dumith, Hallal, Reis, and Kohl III (2011) conducted a study on 300,000 subjects, aged 15 and older in 76 countries to describe the worldwide prevalence of physical inactivity and to evaluate its association with development level of each country. The authors found that one in five individuals in the study was inactive and the prevalence of physical inactivity worldwide was 21.4%. The study also found that physical inactivity level was higher among women (23.7%) than men (18.9%).
Hallal et al.’s (2012) study included 122 countries found that 31.1 % adults of the study population were physically inactive. The authors discovered that females in countries with high income had more inactivity levels compared to males.

**Physical Activity Classifications**

There are different classifications of physical activity, which are based according to the activity type, intensity, and purpose (U.S. Department of Health and Human Services, 1996). For example, in 1996, the U.S. Department of Health and Human Services classified physical activity into two categories based on both mechanical and metabolic properties of the muscle contractions. First, the mechanical physical activity includes the isometric motion where there is no movement in the limb and is caused by the same length or the isotonic motion when a movement in the limb occurs. Second is the metabolic physical activity that involves the presence of the oxygen during contraction, called aerobic or its absence, and known as anaerobic.

Other classifications of physical activity by the National Heart, Lung, and Blood Institute (NHLBI, 2016), identifies the categories of physical activities as aerobic, stretching, muscle strengthening, and bone strengthening. Endurance activity or aerobic activity is when the heart rate increases and breathing becomes heavy. In fact, this type of activity gradually maximizes the ability of the heart and lungs.

The most common types of the aerobic activity are jumping jacks, jumping, dancing, bicycling, walking, swimming, and running. The second type of physical activity is muscle-strengthening activities such as pushups, climbing stairs, and lifting weights that enhance the strength, power, and endurance of the muscles. The third type of physical activity involves bone-strengthening activities like running, walking, and jumping rope. During this type of physical
activity, muscles push against bones which lead to an increase in bones strength. The fourth type includes stretching movements that are believed to progress a person's flexibility and capability to move the joints. Examples include touching toes and yoga exercises (NHLBI, 2016).

**Physical Activity Recommendations for Adults Aged 18-64 Years**

Physical activity guidelines are science-based recommendations that aim to promote people’s health, including health professionals (ODPHP, n.d.). These guidelines specify the types and the amount of physical activity that is important for wellbeing. In fact, physical activity guidelines have been suggested for healthy adults between the ages of 18 to 64 years old, and appropriate for all genders and races. These guidelines could also apply for healthy people with certain medical conditions, pregnant, postpartum women, and patients with cardiac diseases; however, the activities should be dealt with caution and under medical advice (WHO, n.d.).

In general, there are different physical activity guidelines for adults, such as WHO Guidelines, U.S. Department of Health and Human Services (USDHHS) Physical Activity Guidelines, and American College of Sports Medicine (ACSM). The WHO sets recommended levels of physical activity for adults aged between 18 to 64 years old to enhance cardiorespiratory and muscular fitness, increase bone health, decrease the risk of NCDs, and reduce depression.

Among the physical exercises recommended by the WHO include taking a 75-minutes aerobic physical activity, which is immensely intense throughout the week or a 150-minutes aerobic physical activity with a moderate level of intensity. Equivalently, combining immense and moderate-intense exercise can yield the same gains. Aerobic activity should be performed in bouts of at least 10-minutes durations. For additional health benefits, adults should increase their moderate-intensity aerobic physical activity to 300 minutes per week or engage in 150 minutes
of vigorous-intensity aerobic physical activity, or an equivalent combination of moderate-and vigorous-intensity activity. Muscle-strengthening activities should be done involving major muscle groups on two or more days a week.

Another guideline for physical activity is provided by the USDHHS Physical Activity Guidelines for Americans (2008), which emphasizes that all adults should avoid inactivity. Some physical activity is better than inactivity, and adults who participate in any amount of physical activity gain some health benefits. It was suggested that for substantial health benefits, adults should do at least 150 minutes (2 hours and 30 minutes) a week of moderate-intensity or 75 minutes (1 hour and 15 minutes) a week of vigorous-intensity aerobic physical activity or an equivalent combination of moderate- and vigorous-intensity aerobic activity.

The ACSM (2011) has also established physical activity guidelines for healthy adults for health maintenance and promotion. In general, most individuals need moderate-intensity aerobic or endurance physical activity for a minimum of 30 minutes 5 days per week or vigorous-intensity aerobic physical activity for a minimum of 20 minutes 3 days per week. Additionally, ACSM recommends performing 8-10 weight exercises with 8-12 repetition of each exercise two times per week.

In Saudi Arabia, there are no specific guidelines for physical activity; however, the Ministry of Health asserts in the National Diet and Physical Activity Strategy (DPAS) the importance of performing a moderate physical activity at least 5 times a week for 30 minutes or high physical activity 3 times a week for 20 minutes (Ministry of Health Kingdom of Saudi Arabia, 2015). These recommendations were based on the ACSM and the American Heart Association recommendations.
Physical Activity in Saudi Arabia

Physical activity is not common among Saudis of all age groups (Khalaf et al., 2013). Intense change in lifestyle is considered the leading cause of physical inactivity (AL-Hazzaa, 2004). Bahijri, Jambi, Al Raddadi, Ferns, and Tuomilehto (2016) found that 1,420 Saudi and non-Saudi families in Jeddah perform less than 1 hour per week of intentional physical activity of a moderate level and only over a fifth of them meet the recommended duration of physical activity (150 minutes/week). A similar study by Al-Nozha et al. (2007) discovered that the majority of Saudis do not reach the recommended physical activity levels, which is vital for health and preventing diseases.

El Bcheraoui et al. (2013) interviewed 10,735 subjects and learned that 34.5% of Saudis aged 15 years or older report no weekly physical activity, while only 12.9% meet the recommended levels of moderate physical activity. Likewise, Al-Eisa and Al-Sobayel (2012) concluded that the inactivity level is high among Saudi females. Alharbi and Jackson’s (2017) study, conducted in Jeddah, found that physical inactivity is high among women (31.2%).

Physical Activity Impact on Chronic Diseases

Physical inactivity is related to many chronic diseases. There is strong evidence that physical activity plays an integral part in improving health by lowering mortality rate, controlling body weight, decreasing the risk of fracture, and reducing the chances of chronic diseases like coronary heart diseases, diabetes mellitus, obesity, high blood pressure, and other diseases (WHO, n.d.). Physical activity is an important element recommended for preventing and managing chronic diseases (Durstine, Gordon, Wang, & Luo, 2013).
Physical Activity and Weight

The role of physical activity in maintaining body weight, preventing weight gain, or contributing to weight loss has been assessed in numerous studies. Maples and Houmard (2014) discovered that adopting aerobic (resistance-oriented) exercises combined with energy restriction helps in weight loss and maintains reduced body mass after weight loss. McTiernan et al. (2007) conducted a randomized controlled study for 12 months and concluded that moderate to vigorous intensity exercise (60 minutes daily) significantly reduces body weight, Body Mass Index (BMI), waist and hip circumferences, and total body fat. Similarly, Lee et al. (2010) noted that women who consume a usual diet, and their BMI is less than 25 kg/m2 with 60 minutes of moderate-intensity physical activity only gain 2.3 kg over 13 years. Memish et al. (2013) ascertained that 75.1% of women are either inactive or are involved in only low physical activity.

A number of studies have shown that overweight and obesity rates have increased in Saudi Arabia. Memish et al. (2013) conducted a cross-sectional study on 10,735 Saudi subjects and learned that 28% are obese. Obesity prevalence is higher in women compared to men (33.5%, 24.1% respectively). The Ministry of Health in Saudi Arabia (2013) established that for BMI, 61.5% of females have $\geq 25.0$ kg/m2 and 33.5% have $\geq 30$ kg/m2.

Physical Activity and Type 2 Diabetes Mellitus

Physical activity plays a vital role in blood glucose regulation and the overall health of people with Type 2 Diabetes Mellitus (T2DM) and people with prediabetes. Villegas et al. (2006) found that high leisure-time physical activity is negatively associated with an increased risk of diabetes. Fan et al. (2015) conducted a study to investigate the relationship between physical activity level and the incident of type 2 diabetes. The results suggested that higher levels of physical activity are associated with a reduced risk of type 2 diabetes.
Similar to the findings of Villegas et al. (2006), Mainous, Tanner, Anton, Jo, and Luetke (2016) discovered that physical activity plays a critical role in preventing diabetes. To clarify, the researchers performed a study to examine the correlation between low physical activity levels and the risk of abnormal blood glucose levels in healthy weight adults. They learned that 23.7% of the subjects who had abnormal blood glucose levels also had low physical activity, whereas 25.4% of physically inactive participants were more likely to develop abnormal glucose levels compared to active participants. In other words, physical activity is vital in the management of abnormal blood glucose levels.

In Saudi Arabia, diabetes mellitus rate has increased and is considered as an epidemic disease (Bahijri et al., 2016). It was estimated in a study that 8.6% of the females in the population in Jeddah city in Saudi Arabia have prediabetes while 11.4% have diabetes. Also, Bahijri et al. reported the importance of establishing some adequate plans to address these problems with attention to physical activity promotion among the Saudi population.

**Physical Activity and Coronary Heart Diseases (CHD)**

The CDC (2015) reported that physical activity affected reducing the risk of cardiovascular diseases by decreasing hypertension, the risk of heart attack and stroke. According to Zhao, Ford, Li, and Mokdad (2008), physical activity is an effective method to prevent and treat atherosclerotic cardiovascular disease. Manson et al.’s (2002) study showed that both walking and vigorous exercise reduces the risk of cardiovascular diseases. Furthermore, Lee, Rexrode, Cook, Manson, and Buring (2001) concluded that physically active females have a lower rate of CHD than inactive women. The researchers also discovered that light to moderate activity reduces CHD rates in women. Equally important, physical activity remarkably reduces
the incidence of CHD among overweight women who have high cholesterol levels or who are smokers.

Sundquist, Qvist, Johansson, and Sundquist (2005) reported a positive long-term effects of physical activity on CHD in both males and females after an 11 to 12 years of follow up. The researchers found that increased leisure-time physical activity reduces the occurrence rates of CHD. Gaziano, Bitton, Anand, Abrahams-Gessel, and Murphy (2010) conducted a study in the Eastern region of Saudi Arabia. The results revealed that 26% of deaths are caused by coronary heart diseases of which 27% are males and 23.5% are females. Also, the mortality rate was expected to increase in the future. In 2016, Kalaf et al. found in a study conducted in Saudi Arabia that the common risk factor for cardiovascular diseases is physical inactivity.

**Physical Activity and Hypertension**

According to Souto et al. (2015), one of the most effective factors that contribute to the treatment of high blood pressure is physical activity. In fact, in the last few years, several organizations such as the American Heart Association, the European Society of Hypertension/European Society of Cardiology, and the Canadian Hypertension Education Program have recommended exercise and physical activity as an important early intervention in the management of hypertension (Pescatello, 2015). Pescatello also noted that the American Heart Association recommends moderate to high intensity aerobic physical activity of maximum 150 minutes per week most days of the week. The European Society of Hypertension/European Society of Cardiology, on the other hand, advocates for taking only moderate aerobic physical activity for 30 or more minutes per day, 5 to 7 days per week for adults.

There is a growing consensus supporting that aerobic exercise, for example, walking, jogging, swimming, and dancing, are the primary type of physical activity for preventing,
treating, and controlling hypertension (Pescatello, 2015). Many researchers (Brook et al., 2013; Chobanian et al., 2003; Dasgupta et al., 2014; Eckel et al., 2013; James et al., 2014; Mancia et al., 2013; Pescatello et al., 2004) have reported that the antihypertensive effect of aerobic exercise has consistently been found to lower blood pressure 5 to 7 mmHg among people with hypertension compared to the dynamic resistance training.

In aerobic exercise, large muscles are used to enhance the cardiovascular system function and balance the pressure within the arteries (Souto et al., 2015). Alsaira, Alshamali, and Al-rashed (2010) found that more than half of their study subjects, 156 patients who were physically inactive, had uncontrolled hypertension. The researchers concluded that only 14.8% of the subjects who had unchecked hypertension exercised only 3 to 4 days per week while 30.8% of the hypertensive patients trained more than 5 days per week.

The prevalence of hypertension is estimated to be high in Saudi Arabia. Approximately 52.9% of Saudi women are with undiagnosed hypertension, and 21.7% of women have uncontrolled hypertension (El Bcheraoui et al., 2014). High blood pressure is a common risk factor for cardiovascular disease, which is costly but preventable (Pescatello, 2015).

**Physical Activity and Osteoporosis**

In 2014, the prevalence of osteoporosis worldwide was estimated at approximately 200 million people who were diagnosed with this disease (Moreira et al., 2014) of which 14 million people were only in the United States (Burge et al., 2007). It was reported that many of the mechanical stimuli, for example, physical activities as in water and on the ground exercises are beneficial to bone tissue (Moreira et al., 2014). In fact, Velez et al. (2008) compared 44 elderly runners to sedentary control subjects who were over 65 years of age and discovered that runners show a significantly better total body BMD than control subjects.
Ksenija et al. (2013) learned that 25% of women older than age 50 years had osteoporosis in the world in 2010, and the rate of osteoporosis was expected to increase by 30% every 10 years. It is estimated that 34% of Saudi women are osteoporotic, and the prevalence is estimated to increase in future (Alwahhabi, 2015). Physical activity is one of the lifestyle factors that help the mineral buildup in bone.

During the first 20 years of life, physical activity increases mineral accumulation in bone (Karlsson & Rosengren, 2012). Aerobic exercises and resistance exercises increase bone density and improve bone strength. Physical activities help to reduce sclerostin, which is a protein secreted by osteocytes to inhibit bone formation by osteoblasts. Physical activity increases bone formation preserves bone mass in adults and prevents bone loss in the elderly, thus reducing the chances of bone fracture and improving quality of life (Ksenija et al., 2013). In a study conducted by Tolomio, Ermolao, Travain, and Zaccaria (2008), 49 osteopenic/osteoporotic postmenopausal women were assigned to a 20-week physical training program. The study concluded that physical activity provides beneficial effect on bone health and can reduce the progressive loss of bone and muscle mass.

**Physical Activity and Socio-demographic Status**

Socio-demographic status (SDS) and education level are two additional important factors that affect physical activity level (Maciel et al, 2017). Kim and So (2014) reported a positive relationship between household income and physical activity among both males and females in Korea. In the study, 9,000 Korean were examined, and the findings revealed that people who lived in low-income families were more likely to be physically inactive. Similarly, Kari et al (2015) examined the relationship between income and physical activity among 753 adults in
Finland (mean age 41.7 years; 64% women). They found higher income is associated with higher self-reported leisure-time physical activity for both women and men.

Sequeire, Cruz, Pinto, Santos, and Marques (2012) conducted a study in Portugal and discovered that barriers to physical activity are more prevalent in people with low SDS. Regarding marital status, Al-Baho et al. (2016) found that married women in Kuwait have lower physical activity level compared to single women, which is caused by increased family responsibilities, a lack of time, and looking after their children.

Finger, Mensink, Lange and Manz (2017) conducted a study in Germany to investigate work-related physical activity among adults. The researchers learned that 47% of German women usually sit or stand during work, which contributes to their physical inactivity. Moreover, subjects who have a high level of education and who are inactive during work tend to exercise more during their leisure time to recompense their lack of physical activity at work.

Gender and Physical Activity

The lower rate of female participation in physical activity might explain their high incidence of poor health compared to their male counterparts (WHO, n.d). Physical activity level has been found to be different between men and women in Saudi Arabia with women being less active (Al-Eisa & Al-Sobayel, 2012). A study conducted by Al-Zalabani et al. (2015) on 4,758 participants in Saudi Arabia—2,340 males and 2,418 females. The results concluded that physical inactivity is higher among women (72.9%) than men (60.1%). This variation between the two genders is related to cultural and social factors. Practicing physical activities in public is not common for women in Saudi Arabia.

Similarly, Al-Hazzaa, Abahussain, Al-Sobayel, Qahwaji, and Musaiger (2011) conducted a study among Saudi adults and reported that females are significantly more sedentary and much
less active compared to men. Females' total sedentary time is 124% of the males, and the total physical activity time for males is 72 minutes per day, whereas females is only 38 minutes per day. Women need to engage in regular physical activity to have a healthy body weight and prevent diseases.

**Physical Activity Barriers**

There is a plethora of barriers that prevent women from being physically active. These barriers can be separated into three categories: personal; organizational, social/cultural; and environmental barriers (Al-Baho, Al-Naar, Al-Shuaib, Panicker, & Gaber, 2016). Defining and understanding these barriers is crucial to developing effective intervention programs (Cerin & Lslie, 2007).

**Personal Barriers**

Personal barriers could be defined as people’s behavioral choices regarding physical activity, which include their beliefs about the outcomes of being physically active or inactive, satisfaction with their current status, and self-efficacy (Dishman, Heath, & Lee, n.d). Personal barriers, also known as the intrapersonal factors, are individual characteristics that affect physical activity like attitudes, knowledge, beliefs, and personality traits (Joseph, Ainsworth, Keller, & Dodgson, 2015).

Sequeire et al. (2012) conducted a study to analyze the prevalence of barriers to physical activity among adults. The population were 2,236 participants (927 men, 1309 women). The results indicated that 55% of the participants do not have time to do physical activity. Also, Alharbi and Jackson (2017) posited that the most common barrier for women (61.7%) in their study was a lack of time. In a study by Al-Baho et al. (2016), 38.6% of all participants indicated that a lack of time is a barrier. Another personal obstacle is a lack of knowledge about physical
activity. Only 57.3% of women have appropriate experience with physical activity (Alharbi & Jackson, 2017).

Alharbi and Jackson (2017) conducted a study to determine personal barriers to physical activity among women in Saudi Arabia. Women mentioned the following barriers: lack of willpower (60.0%), fear of injury (55.9%), lack of energy (52.7%), lack of skills (50.5%), lack of self-confidence (43.8%), having health problems (38%), and lack of enjoyment (34.1%). Lack of money and the high cost of a gym membership limits women’s physical activity. In Amin, Suleman, Ali, Gamal, and Al Wehedy (2011) 28.2% subjects indicated that money one of the personal barriers. Similarly, cost was noted most often as a barrier among women by Sequeire et al. (2012).

Social/Cultural Barriers

Social and cultural barriers are also known as interpersonal factors and are defined as social groups and cultural influences on physical activity, including family, friends, and cultural norms (Joseph et al., 2015). Due to social rules, women may be unable to be physically active and that leads to myriad of health complications (Mobaraki & Soderfeldt, 2010). Women are expected to take care of family and do household chores (Benjamin & Donnelly, 2013). Also, family responsibilities represented 36.1% of the reported barriers in a study by Al-Baho et al. (2016). Amin et al. (2011) and Ali, Baynouns, and Bernsen (2010) found that 60 % of women reported that traditions and customs are a barrier for them (they need family permission, specifically from their husband).

Other researchers have found a number of other social and cultural barriers. Alharbi and Jackson (2017) discovered lack of support (57.6%), social norms (56.6%), and social influence (55.7%) as typical barriers limiting physical activity. Additionally, lack of company and social
support are barriers for some women (29.1%) because in some Islamic countries like Saudi Arabia, walking alone is unacceptable for women (Amin et al., 2011).

**Environmental Barriers**

Environmental barriers refer to public policy and both physical and social environmental characteristics that influence physical activity include real neighborhood, community structures, social institution, and weather (Joseph et al., 2015). Weather is a permanent environmental barrier to physical activity in Saudi Arabia. Alharbi and Jackson (2017) reported that 59.9% of Saudi’s assert that hot weather prevents them from being active. Similarly, Al-Baho et al. (2016) conducted a cross-sectional study in Kuwait and found that the common barrier is hot weather (75.9%). Likewise, Amin et al. (2011) conducted a study in Al-Hassa, Saudi Arabia, and learned that weather is the largest barrier among the participants (65.9%) for not participating in physical activities.

Another environmental barrier that affects physical activity level is lack of resources and lack of transportation. Alharbi and Jackson (2017) purported that lack of resources and lack of transportation (53.3% and 52.7%, respectively) are barriers for females to be active. In the same study, 55.4% of women indicated that a lack of necessary facilities presents another barrier to physical activity.

A lack of appropriate places for exercising is a changeable barrier in Saudi Arabia. Amin et al. (2011) noted that lack of appropriate places for exercising is a barrier for Saudi adults. Moreover, Samara, Nstrup, Al-Rammah, and Aro (2015) found the most critical barrier among Saudi females is the lack of appropriate facilities for physical activity. However, in other countries, infrastructure is not a barrier. The Sequeire et al. (2012) study showed that only 15% of participants consider the lack of infrastructures near where they live as a barrier. Although
women may encounter various challenges when they want to do some exercises, they need to ensure that they get an opportunity to engage in physical activities.

Summary

This review of literature provided an overview of research related to the physical activity level among Saudi women. Studies indicate that women in Saudi Arabia are not as physically active as they should be despite the health benefits associated with physical activity. However, there are only a scant number of studies conducted on barriers to physical activity among Saudi women. In this respect, conducting research on barriers to physical activity among Saudi women is useful in helping develop intervention measures seeking to promote physical activity among women in Mecca region in Saudi Arabia.
Chapter III: Methodology

University of Wisconsin-Stout’s IRB approved this study. The objectives of this study were to assess physical activity levels among Saudi women aged 18 and older in the Mecca region, define the barriers that reduce their physical activity, and to determine whether knowledge correlates with physical activity levels. The research design was cross-sectional that used an online survey questionnaire to collect data. This chapter describes the subject selections and description, instrumentation, data collection procedures and analysis, and the limitations of this study.

Subject Selection and Description

The population of this study consisted of only Saudi women aged 18 and older who live in the Mecca region. A total of 1,770 participants were selected by using through snowball method to participate in an online survey. The survey was translated from English to Arabic and was pilot tested with a sample of eight Saudi women. They were asked to complete the survey and provide their feedback or comments about the clarity and the flow of the survey questions.

Confidentiality was guaranteed for the participants, and there was not any identifiable information about them. Participation was voluntary, and participants had the right to leave the survey whenever they wanted. Compensation was not provided to participate.

Approximately 6-12 minutes were needed to complete the survey. Only completed surveys were included in the study. The protocol for this study was approved by University of Wisconsin-Stout's IRB (See Appendix A).

Instrumentation

Several surveys were used to develop the survey used in this study. The online survey consisted of five main sections that included 28 multiple choice and fill in the blank questions.
The main sections were the informed consent form, the demographic data, physical activity, health history, knowledge about physical activity, and exercise barriers scale.

The first section of the survey was the informed consent form. Subjects had to read and sign the consent form first to be able to complete the survey.

The second section of the survey included nine questions about the demographic characteristics. These questions were developed to investigate some possible factors that could affect the activity level of Saudi women. These questions included age, weight, height, marital status, the city of residence, educational level, living companions, occupation, and total household income.

The third section of the survey included 16 questions about health history, family history, physical activity measures, physical activity beliefs and lifestyle measures. Measures of physical activity level included questions about frequency of exercising, the motivations and obstacles of physical activity, and type of physical activity. Lifestyle measures asked about cigarette smoking and the hours of sitting and reclining. Health history questions included the presence of non-communicable diseases (type 2 diabetes mellitus, hypertension, osteoporosis, heart diseases, and obesity).

The fourth section of the survey consisted of 11 questions and aimed to gather information about participant physical activity knowledge. Participants choose either true, false, or not sure for each question.

In the fifth section, Exercise Barrier Scale (EBBS) was used. This tool was created by Sechrist, Walker, and Pender (1987) to understand how people perceive engaging in exercise. Originally, this instrument consisted of 43 questions divided into two sections, a benefits section that had 29 items, and a barriers section that has 14 items. In this study, only barriers section was
used. This tool used in the EBBS was a Likert scale from 1 (strongly disagree) to 4 (strongly agree) with no neutral option. The score ranges are from 14 to 56. A higher score on the EBBS correlates to a higher perception of barriers to exercise. The validity and reliability of the EBBS has been found to be consistent.

Data Collection Procedures

The eSurvey Creator, web-based survey tool, was used to collect the data. After the pilot test and approval from the IRB, the link to the online survey was distributed via social media through Snapchat and WhatsApp from December to January. The participants were asked to recruit future subjects from among their acquaintances (snowball sampling). Subjects who agreed to participate in the study were asked to read the consent form and their rights as participants before completing the online survey. Subjects had the right to leave the survey whenever they wanted, participation was voluntary.

This study was anonymous. Participants' names were not included in the survey, and their responses were not shared. Participants took approximately 6-12 minutes to complete the survey.

Data Analysis

The SPSS Version 23 and Excel Version 15.32 were used for data analysis. Frequency distributions (counts and percentages) were used to summarize the categories of the demographic characteristics of the participants. Descriptive statistics (means and standard deviations) were used to summarize the EBBS.

Limitations

Some limitations of this study were unavoidable. First, the majority of the participants were from the two big cities in Mecca region (Mecca city and Jeddah), which prevents generalization of the results. The second limitation was lack of probability sampling due to using
snowball sampling, thus there is no guarantee the sample is representative of the population.

Third, there was some missing data due to incomplete surveys, which could have led to inaccurate results.
Chapter IV: Results

The purpose of this study was to determine whether Saudi women in Mecca are physically inactive, and to establish whether there is relationship between socio-demographic factors and the levels of physical activity. The following research questions were asked in this study:

1. What are the levels and types of physical activity among Saudi women in Mecca region?
2. Is there an association between demographic characteristics and physical activity level among women?
3. What are the barriers that face women to be physically active?

Participant Demographic Characteristics

The study sample size included 1,770 Saudi women. One hundred eighty-four surveys were excluded because the subjects weren’t from Mecca region, and 309 participants did not sufficiently complete enough of the survey to be included in the analysis. Thus, there were 1,277 surveys included in the analysis. Most of the sample (30.95) was women between the ages of 31 and 40 followed by 25.8% between the ages of 21-30, 4.5% between the ages of 18-20, and 14.2% aged 51 or over. Marital status was 65.2% married followed by 22.6% single, 8.3% divorced, and 4% widowed. The education level of the subjects was 60.2% with a bachelor’s degree, 27.7% with a high school degree or equivalent, 6% with a master’s degree, and 2.3% with a Ph.D. degree. Most participants were living in Mecca city (65.1%), followed 37.8% in Jeddah. Additionally, 48.3% of the subjects lived with their family, and only 1.2% lived just with their children and no spouse. The household income for most of participants (42.9%) was more than 10,000 Saudi Riyal/ month (2666 U.S $). Table1 provides the statistical breakdown of the
participants.

Table 1

Descriptive Statistics of the Study Sample (N = 1,277)

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-20</td>
<td>58</td>
<td>4.5</td>
</tr>
<tr>
<td>21-30</td>
<td>330</td>
<td>25.8</td>
</tr>
<tr>
<td>31-40</td>
<td>394</td>
<td>30.9</td>
</tr>
<tr>
<td>41-50</td>
<td>314</td>
<td>24.6</td>
</tr>
<tr>
<td>51 or over</td>
<td>181</td>
<td>14.2</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>832</td>
<td>65.2</td>
</tr>
<tr>
<td>Widowed</td>
<td>51</td>
<td>4.0</td>
</tr>
<tr>
<td>Divorced</td>
<td>106</td>
<td>8.3</td>
</tr>
<tr>
<td>Single</td>
<td>288</td>
<td>22.6</td>
</tr>
<tr>
<td>Education level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school degree or equivalent</td>
<td>354</td>
<td>27.7</td>
</tr>
<tr>
<td>Bachelor’s degree</td>
<td>769</td>
<td>60.2</td>
</tr>
<tr>
<td>Master’s degree</td>
<td>76</td>
<td>6.0</td>
</tr>
<tr>
<td>Ph.D. degree</td>
<td>29</td>
<td>2.3</td>
</tr>
<tr>
<td>Non-graduate</td>
<td>13</td>
<td>1.0</td>
</tr>
<tr>
<td>Variable</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>----</td>
<td>-----</td>
</tr>
<tr>
<td><strong>Living status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alone</td>
<td>35</td>
<td>2.7</td>
</tr>
<tr>
<td>With husband</td>
<td>610</td>
<td>47.8</td>
</tr>
<tr>
<td>With family</td>
<td>617</td>
<td>48.3</td>
</tr>
<tr>
<td>No spouse just children</td>
<td>15</td>
<td>1.2</td>
</tr>
<tr>
<td><strong>City</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mecca</td>
<td>717</td>
<td>56.1</td>
</tr>
<tr>
<td>Jeddah</td>
<td>483</td>
<td>37.8</td>
</tr>
<tr>
<td>Taif</td>
<td>69</td>
<td>5.4</td>
</tr>
<tr>
<td>Bahrah</td>
<td>4</td>
<td>0.3</td>
</tr>
<tr>
<td>Asfan</td>
<td>2</td>
<td>0.2</td>
</tr>
<tr>
<td>Al-Jumum</td>
<td>1</td>
<td>0.1</td>
</tr>
<tr>
<td>Khlays</td>
<td>1</td>
<td>0.1</td>
</tr>
<tr>
<td><strong>Household income</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 5000 SR</td>
<td>280</td>
<td>21.9</td>
</tr>
<tr>
<td>5000-10,000 SR</td>
<td>449</td>
<td>35.2</td>
</tr>
<tr>
<td>&gt;10,000 SR</td>
<td>548</td>
<td>42.9</td>
</tr>
</tbody>
</table>

The largest percentage of the respondents were housewives comprising 31.6% of the sample population. Additionally, 17.5% of the sample were teachers. Similarly, students comprised 12.8% of the total population. The smallest portion of the respondents was 0.1% of the women who were engaged in the private sector job as shown in Figure 1.
Figure 1. Occupation.

**Contextual Characteristics of Participants**

Participants contextual characteristics that were addressed included membership of sports club, smoking, and receiving physical activity education or health education, which are summarized in Table 2. Most of the women in Mecca region were not a member of sports clubs (90.7%). Fifty percent of the women indicated that they received physical activity and health education. Approximately 86.2% of the participants were not smokers.
Table 2

*Contextual Characteristics of Participants*

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Membership of sport club</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>119</td>
<td>9.3</td>
</tr>
<tr>
<td>No</td>
<td>1158</td>
<td>90.7</td>
</tr>
<tr>
<td>Smoking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>176</td>
<td>13.8</td>
</tr>
<tr>
<td>No</td>
<td>1101</td>
<td>86.2</td>
</tr>
<tr>
<td>Receiving physical activity education or health education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>638</td>
<td>50.0</td>
</tr>
<tr>
<td>No</td>
<td>639</td>
<td>50.0</td>
</tr>
</tbody>
</table>

Research Question 1: What are the Levels and Types of Physical Activity Among Saudi Women in the Mecca Region?

Mean physical activity level among the participants was 41.35 ±27.49 minutes. While, mean daily sitting on reclining hours was 6.99± 5.15 hours (see Table 3).

Table 3

*Subjects Time Spent Being Active or Inactive*

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minutes of physical activities daily</td>
<td>675</td>
<td>41.35 min</td>
<td>27.49</td>
</tr>
<tr>
<td>Hours of sitting or reclining daily</td>
<td>1150</td>
<td>6.99 h.</td>
<td>5.15</td>
</tr>
</tbody>
</table>
Most women in Saudi Arabia practice a sedentary lifestyle. Those who were found to be practicing a sedentary lifestyle in the Mecca region constitute 55.4% of the sample population. Additionally, participants who engaged in light physical activities are comprised of 32.6% of the sample population. Thirdly, 7.8% of study participants indicated that they are moderately active. Subsequently, only a small fraction of participants indicated that they engage in vigorous physical activities, which was only 4.2% of the sample population (see Figure 2).

![Figure 2. Physical activity level.](image)

For the solitary exercise or with a companion, most of the women (52.9%) indicated that they usually exercise alone, 24.3% exercise in pair, and 21.8% exercise with a group as shown in Figure 3.
Figure 3. Solitary exercise or with others.

There were different types of exercise that the participants performed. The most frequent physical activity reported was walking (81.1%), followed by swimming (32.4%), then dancing (27%), aerobics (23.3%), running (18.6%), lifting weight (9.7%), and Pilates (4.2%) as indicated in Figure 4.

Figure 4. Type of exercise.
Research Question 2: Is There an Association Between Demographic Characteristics and Physical Activity Level Among Women?

The relationship between demographic characteristics and physical activity level among Saudi women was determined using the Spearman correlation coefficients. Physical activity level is positively correlated with the participant living status ($r = 0.097; n = 1248; p = 0.001$). Similarly, a positive correlation exists between physical activity level of the participants and total household income ($r = 0.059; n = 1250; p = 0.036$) with higher levels of physical activity being correlated with a greater household income. The correlation was significant at the 0.05 level (2-tailed) for the total household income, while it was significant at the 0.01 level (2-tailed) for the living status (see Table 4).

Table 4

<table>
<thead>
<tr>
<th>Correlation between Demographic Characteristics and Physical Activity Level among Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Physical activities level --</td>
</tr>
</tbody>
</table>

Note. * Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed).

Participation in activity level varies significantly between youngest age group and the other age groups. Only 2.5% of participants in the age group of 18-20 practice a sedentary lifestyle. While 14.8% participants who practice a sedentary lifestyle are in the age group 21-30.
Similarly, 16.4% of the participants in the age group 31-40 practice a sedentary lifestyle. Of the participants in the age group 41-50, 13.7% practice a sedentary lifestyle. Also, of the elderly or senior most women members over age 51 in the Mecca region, 7.9% practice a sedentary lifestyle. The participants who often practice vigorous physical activity were at 4.2%.

The results also show that there are only 0.15% women among the participants who vigorously practice physical activity between the ages of 18-20 years. This group was followed by 0.62% women who were in the age group of 21-30 and practice vigorous physical activities. Further, 2% participants in the age group of 31-40 reported to practice vigorous physical activity. At the same time, 0.94% women between the ages of 41-50 practice vigorous physical activity. Participants who practiced vigorous physical activity and where the senior most members of society, age 51 and above, were 0.5% as shown in Table 5.
Table 5

*Comparison of Activity Level by Age*

<table>
<thead>
<tr>
<th>Physical Activity Level</th>
<th>Age 18-20</th>
<th>Age 21-30</th>
<th>Age 31-40</th>
<th>Age 41-50</th>
<th>Age 51 or over</th>
<th>Total Physical Activity Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedentary</td>
<td>32 (2.5%)</td>
<td>189 (14.8%)</td>
<td>210 (16.4%)</td>
<td>175 (13.7%)</td>
<td>101 (7.9%)</td>
<td>707 (55.3%)</td>
</tr>
<tr>
<td>Light Physical Activity</td>
<td>21 (1.6%)</td>
<td>104 (8.1%)</td>
<td>123 (9.6%)</td>
<td>102 (8%)</td>
<td>66 (5.2%)</td>
<td>416 (32.6%)</td>
</tr>
<tr>
<td>Moderate Physical Active</td>
<td>3 (0.23%)</td>
<td>29 (2.3%)</td>
<td>36 (2.8%)</td>
<td>25 (2%)</td>
<td>7 (0.5%)</td>
<td>100 (7.8%)</td>
</tr>
<tr>
<td>Vigorous Physical Activity</td>
<td>2 (0.15%)</td>
<td>8 (0.62%)</td>
<td>25 (2%)</td>
<td>12 (0.94%)</td>
<td>7 (0.5%)</td>
<td>54 (4.2%)</td>
</tr>
<tr>
<td>Total</td>
<td>58 (4.5%)</td>
<td>330 (25.8%)</td>
<td>394 (30.8%)</td>
<td>314 (24.5%)</td>
<td>181 (14.2%)</td>
<td>1277 (100%)</td>
</tr>
</tbody>
</table>

The relationship between physical activity level and education level is 16.4% participants who had high school degree or its equivalent practice a sedentary lifestyle, 32.9% women who have a bachelor’s degree also practiced sedentary lifestyle, and 2% of women with a master’s degree practice a sedentary lifestyle. The results also indicate that 1.4% of women with a Ph.D. degree practice a sedentary lifestyle. Additionally, 2.6% of non-graduate women practice a sedentary lifestyle.

Women who practice light physical activity, 8.1%, have a high school degree or its equivalent, and 20.7% women with a bachelor’s degree practice light physical activity. There are 1.3% of Saudi women in the Mecca region who vigorously practice physical activity and have a high school degree or its equivalent (see Table 6).
### Table 6

*Comparison of Activity Level by Education Level*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Education Level</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HS</td>
<td>BS</td>
</tr>
<tr>
<td>Physical Activity Level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sedentary</td>
<td>209</td>
<td>421</td>
</tr>
<tr>
<td></td>
<td>(16.4%)</td>
<td>(32.9%)</td>
</tr>
<tr>
<td>Light Physical Activity</td>
<td>104</td>
<td>264</td>
</tr>
<tr>
<td></td>
<td>(8.1%)</td>
<td>(20.7%)</td>
</tr>
<tr>
<td>Moderate Physical Active</td>
<td>24</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td>(1.9%)</td>
<td>(4.3%)</td>
</tr>
<tr>
<td>Vigorous Physical Activity</td>
<td>17</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>(1.3%)</td>
<td>(2.3%)</td>
</tr>
<tr>
<td>Total</td>
<td>354</td>
<td>769</td>
</tr>
<tr>
<td></td>
<td>(27.7%)</td>
<td>(60.2%)</td>
</tr>
</tbody>
</table>

*Note.* High School degree or equivalent, BS = Bachelor’s degree, MS = Master’s degree, Ph.D. = PhD degree, NG = Non-graduate.

The highest percentages of women who are sedentary are those who live with their husbands and their family (28.1% and 25.5.5% respectively). This is in opposition to those who vigorously exercise and live with their husbands and with their family, with numbers 2.1% and 1.9% respectively as shown in Table 7.
Table 7

Comparison of Activity Level by Living Status

<table>
<thead>
<tr>
<th>Physical Activity Level</th>
<th>Living Status</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Alone</td>
<td>with Husband</td>
<td>with Family</td>
<td>Total</td>
</tr>
<tr>
<td>Sedentary</td>
<td>24</td>
<td>354</td>
<td>322</td>
<td>707</td>
</tr>
<tr>
<td></td>
<td>(1.9%)</td>
<td>(28.1%)</td>
<td>(25.5%)</td>
<td>(56.0%)</td>
</tr>
<tr>
<td>Light Physical Activity</td>
<td>4</td>
<td>189</td>
<td>216</td>
<td>416</td>
</tr>
<tr>
<td></td>
<td>(0.3%)</td>
<td>(15.0%)</td>
<td>(17.1%)</td>
<td>(32.9%)</td>
</tr>
<tr>
<td>Moderate Physical Active</td>
<td>3</td>
<td>41</td>
<td>55</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>(0.23%)</td>
<td>(3.2%)</td>
<td>(4.4%)</td>
<td>(7.9%)</td>
</tr>
<tr>
<td>Vigorous Physical Activity</td>
<td>4</td>
<td>26</td>
<td>24</td>
<td>54</td>
</tr>
<tr>
<td></td>
<td>(0.3%)</td>
<td>(2.1%)</td>
<td>(1.9%)</td>
<td>(4.3%)</td>
</tr>
<tr>
<td>Total</td>
<td>35</td>
<td>610</td>
<td>617</td>
<td>1262</td>
</tr>
<tr>
<td></td>
<td>(2.8%)</td>
<td>(48.3%)</td>
<td>(48.9%)</td>
<td>(100%)</td>
</tr>
</tbody>
</table>

The results show that 13.9% of women who have a household income less than 5,000 Saudi Riyal have a low physical activity level (sedentary). Most of the participants who are lightly active have an income level of more than 10,000 Riyals. On the other hand, the women who engage in moderate physical activity and have a household income of fewer than 5,000 Saudi Riyals are only 1% of the population. Furthermore, only 1.9% women who make more than 10,000 Riyals are vigorously physically active as indicated in Table 8.
Table 8

*Comparison of Activity Level by Income Level*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Income Level</th>
<th></th>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt; 5,000 SR</td>
<td>5,000 - 10,000 SR</td>
<td>&gt; 10,000 SR</td>
<td></td>
</tr>
<tr>
<td>Physical Activity Level</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sedentary</td>
<td>178</td>
<td>248</td>
<td>281</td>
<td>707</td>
</tr>
<tr>
<td></td>
<td>(13.9%)</td>
<td>(19.4%)</td>
<td>(22.0%)</td>
<td>(55.4%)</td>
</tr>
<tr>
<td>Light Physical Activity</td>
<td>79</td>
<td>145</td>
<td>192</td>
<td>416</td>
</tr>
<tr>
<td></td>
<td>(6.2%)</td>
<td>(11.3%)</td>
<td>(15.0%)</td>
<td>(32.6%)</td>
</tr>
<tr>
<td>Moderate Physical Active</td>
<td>13</td>
<td>37</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>(1.0%)</td>
<td>(2.9%)</td>
<td>(3.9%)</td>
<td>(7.8%)</td>
</tr>
<tr>
<td>Vigorous Physical Activity</td>
<td>10</td>
<td>19</td>
<td>25</td>
<td>54</td>
</tr>
<tr>
<td></td>
<td>(0.8%)</td>
<td>(1.5%)</td>
<td>(1.9%)</td>
<td>(4.2%)</td>
</tr>
<tr>
<td>Total</td>
<td>280</td>
<td>449</td>
<td>548</td>
<td>1277</td>
</tr>
<tr>
<td></td>
<td>(21.9%)</td>
<td>(35.1%)</td>
<td>(42.9%)</td>
<td>(100%)</td>
</tr>
</tbody>
</table>

*Note.* SR = Saudi Riyal

**Research Question 3: What Are the Barriers That Face Women to be Physically Active?**

Most of the participants disagreed with the barriers in the EBS, indicating that those statements do not represent barriers (e.g., “Exercising takes too much of my time” (65.2%); “I am fatigued by exercise” (55%); “Exercise takes too much time from my family relationships” (57.9%)). Participants’ agreed most with: “Places for me to exercise are too far away” (37.9%) as indicated in Table 9.
### Table 9

*Exercise Barriers Scale*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Level of agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SA (4.7%)</td>
</tr>
<tr>
<td>Takes too much time.</td>
<td>60</td>
</tr>
<tr>
<td>Tires me.</td>
<td>94</td>
</tr>
<tr>
<td>Places are too far away.</td>
<td>396</td>
</tr>
<tr>
<td>Embarrassed to exercise.</td>
<td>52</td>
</tr>
<tr>
<td>High costs</td>
<td>302</td>
</tr>
<tr>
<td>No convenient schedules for me.</td>
<td>210</td>
</tr>
<tr>
<td>Fatigued by exercise.</td>
<td>78</td>
</tr>
<tr>
<td>No encouragement from spouse.</td>
<td>182</td>
</tr>
<tr>
<td>Takes time from family relationships.</td>
<td>71</td>
</tr>
<tr>
<td>Exercise clothes look funny.</td>
<td>41</td>
</tr>
<tr>
<td>Family do not encourage me</td>
<td>109</td>
</tr>
<tr>
<td>Takes time from family responsibilities.</td>
<td>77</td>
</tr>
<tr>
<td>Exercise is hard</td>
<td>88</td>
</tr>
<tr>
<td>Few places to exercise.</td>
<td>391</td>
</tr>
</tbody>
</table>

*Note.* SA = Strongly Agree, A = Agree, D = Disagree, SD = Strongly Disagree

Results of questions related to motivation to exercise indicate that 62.9% of women are motivated by healthy benefits, 58.8% want to control their body weight, and 47.6% want to improve their physical appearance, which motivates them to be active. Medical reasons were the motive for 21% of the participants. Table 10 shows the details.
### Table 10

*Physical Activity Motivation*

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Motivations</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical reasons</td>
<td>269</td>
<td>21</td>
</tr>
<tr>
<td>Improve physical appearance</td>
<td>609</td>
<td>47.6</td>
</tr>
<tr>
<td>To be healthy</td>
<td>804</td>
<td>62.9</td>
</tr>
<tr>
<td>Mimic friends</td>
<td>9</td>
<td>0.7</td>
</tr>
<tr>
<td>It is a trend in social media</td>
<td>6</td>
<td>0.4</td>
</tr>
<tr>
<td>Fun and enjoyment</td>
<td>97</td>
<td>7.5</td>
</tr>
<tr>
<td>For mental health/stress relief</td>
<td>542</td>
<td>42.4</td>
</tr>
<tr>
<td>To control weight</td>
<td>751</td>
<td>58.8</td>
</tr>
</tbody>
</table>

*Note. N = 1,277*

There are many obstacles that deter women from being physically active. For example, a lack of time (57.7%), then a lack of transportation (32.4%), and a lack of facility/equipment was the third reason (29.9%). Table 11 provides additional information.
Table 11

Physical Activity Obstacles

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not enough time</td>
<td>737</td>
<td>57.7</td>
</tr>
<tr>
<td>No money</td>
<td>307</td>
<td>24</td>
</tr>
<tr>
<td>Lack of social availability</td>
<td>310</td>
<td>24.2</td>
</tr>
<tr>
<td>Lack of motivation</td>
<td>275</td>
<td>21.5</td>
</tr>
<tr>
<td>Lack of awareness/knowledge</td>
<td>90</td>
<td>7</td>
</tr>
<tr>
<td>Lack of facility/equipment</td>
<td>383</td>
<td>29.9</td>
</tr>
<tr>
<td>Exercising is boring</td>
<td>174</td>
<td>13.6</td>
</tr>
<tr>
<td>Harsh weather</td>
<td>238</td>
<td>18.6</td>
</tr>
<tr>
<td>Family prevents you from exercising outside</td>
<td>105</td>
<td>8.2</td>
</tr>
<tr>
<td>Lack of transportation</td>
<td>414</td>
<td>32.4</td>
</tr>
</tbody>
</table>

Note. N = 1277

Most of the participants agree that physical activity helps in reducing the risk of cardiovascular diseases (96.6%), treating depression and decreasing the feeling of stress and tension (95%), managing T2DM (80.7%), lowering the risk of cancer (55.9%), reducing HTN (64.2%), and helping them to sleep better (89.2%). Moreover, 64.3% of Saudi women believe that physical activity converts fat to muscles, 65.2% agree that regular physical activity increases energy levels. Table 12 provides additional information regarding participants’ positions regarding physical activity.
Table 12

Knowledge about Physical Activity

<table>
<thead>
<tr>
<th>Variable</th>
<th>True N (%)</th>
<th>False N (%)</th>
<th>Not sure N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce the risk of cardiovascular diseases</td>
<td>1233(96.6%)</td>
<td>4(0.3%)</td>
<td>40(3.1%)</td>
</tr>
<tr>
<td>Treat depression, stress, and tension</td>
<td>1222(95%)</td>
<td>7(0.5%)</td>
<td>48(3.8%)</td>
</tr>
<tr>
<td>Manage type 2 diabetes</td>
<td>1030(80.7%)</td>
<td>15(1.2%)</td>
<td>232(18.2%)</td>
</tr>
<tr>
<td>Decreases energy levels</td>
<td>223(17.5%)</td>
<td>833(65.2%)</td>
<td>221(17.3%)</td>
</tr>
<tr>
<td>Reduce the risk of certain cancer</td>
<td>714(55.9%)</td>
<td>101(7.9%)</td>
<td>462(36.2%)</td>
</tr>
<tr>
<td>The only benefit of activity is weight loss</td>
<td>174(13.6%)</td>
<td>1053(82.5%)</td>
<td>50(3.9%)</td>
</tr>
<tr>
<td>Improving health</td>
<td>1244(97.4%)</td>
<td>3(0.2%)</td>
<td>30(2.3%)</td>
</tr>
<tr>
<td>Reduce high blood pressure</td>
<td>820(64.2%)</td>
<td>89(7.0%)</td>
<td>368(28.8%)</td>
</tr>
<tr>
<td>Help in sleeping better</td>
<td>1139(89.2%)</td>
<td>10(0.8%)</td>
<td>128(10.0%)</td>
</tr>
<tr>
<td>Convert fat to muscles</td>
<td>821(64.3%)</td>
<td>128(10.0%)</td>
<td>328(25.7%)</td>
</tr>
<tr>
<td>Adults aged 18–64 should do 150 minutes of</td>
<td>725(56.8%)</td>
<td>58(4.5%)</td>
<td>494(38.7%)</td>
</tr>
<tr>
<td>moderate-intensity physical activity weekly.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Chapter V: Discussion

The objectives of this study were to assess physical activity levels among Saudi women aged 18 and older in the Mecca region, define the barriers that reduce their physical activity, and to determine whether knowledge correlates with physical activity levels. Additionally, this study aimed to examine the relationship between activity level and demographic characteristics of women in this population area in Saudi Arabia. This chapter compares the results to related research, reviews the limitations of the study, and draws conclusions from the results. This chapter will conclude with a recommendation for future research.

Discussion

This study brought to light activity levels of Saudi women in the Mecca region, barriers to physical activity, and the influence of sociodemographic factors. Results of this study indicate some similarities and differences to previous research on activity levels and influences on activity for women in Saudi Arabia.

A main finding in this study is that a significant percentage of Saudi women do not do any physical activity (are sedentary). Approximately 32.6% exercise 1-3 days per week (light physical activity), 7.8% exercise 4-6 days/week (moderate physical activity), and only 4.2% exercise daily (vigorous physical activities). These results are consistent with the results of the El Beheraoui et al. (2013) study, which found that 34.5% Saudis aged 15 years or older reported no weekly physical activity, while only 12.9% meet the recommended levels of moderate physical activity. Moreover, the majority of Saudis do not reach the recommended physical activity levels (Al-Nozha et al., 2007).

Another finding in this study is that the mean time spent in physical activity is well above weekly recommendations of 150 minutes per week according to the U.S. Department of Health
and Human Services Physical Activity Guidelines (2008), although intensity level goals are not met. The mean time spent in activity for the 675 participants in this study is 41.35 ± 27.49 minutes per day (which is around 290.71 minutes per week or 4.8 hours per week), while mean daily sitting or reclining hours is 6.99 ± 5.15 hours per day for 1150 participants. These results are inconsistent with the findings of M. Alsahli (2016) and Bahijri et al. (2016).

Bahijri et al. found that 1,420 Saudi and non-Saudi families in Jeddah preform less than 1 hour per week of intentional physical activity at the moderate level. They also found just over a fifth of the participants meet the recommended duration of physical activity of 150 minutes per week (U.S, Department of Health and Human Services, 2008). Similarly, M. Alsahli (2016) found that the duration of physical activity among 211 Saudi female students from Hafr Al batin University is less than one hour per week (82.29 minutes/ week). An explanation for the differing findings in this study is that this study’s participants may not have understood the question about daily physical activity level in minutes, resulting in an overestimation in the amount of time spent in physical activity.

Based on recent literature, there are numerous barriers to physical activity for Saudi women. The results of this study show that Saudi women’s physical activity in the Mecca region is limited by inadequate time (57.7%), lack of transportation (32.4%), and the unavailability of facilities or equipment (29.9%), which were identified through the participants’ answers to the online survey as the predominate barriers. At the same time, these women indicated that they are aware of the benefits of exercising and would be active if it were not for the barriers they face.

The Saudi women in this study indicated that lack of time is the major barrier to their ability to be physical active. This result is similar to other studies, including S. Alsahli (2016), Awadalla et al. (2014), and Daskapan et al. (2006).
Awadalla et al. (2014), studying barriers to physical activity of 1,257 health college students in south-western Saudi Arabia, found the most significant barrier is time limitation (51.3%). S. Alsahli (2016), also discovered that a lack of time is the most common barrier among Kuwaiti university students. The majority of the participants in the S. Alsahli study were housewives, and they had to wait for their spouse to return home from work to take them to the gym. Additionally, gym hours are limited thereby decreasing opportunities to be active.

In this study, women specified that a lack of transportations is the second major barrier in engaging in physical activities (32.4%). Alharbi and Jackson (2017) also found that a lack of transportation is a barrier to women being physically active; however, a larger percentage reported this (55.4%). A possible explanation is that most of the women in Saudi Arabia do not drive cars (around 99.3%) and do not ride bicycles, according to the director General of Traffic, Maj. Gen. Mohammed Al-Bassami. The general reported that approximately 70,000 women have been issued driving licenses since June 24, 2018. Therefore, only 0.6% of Saudi women are driving, making it difficult to get to sports places, which are usually far away from areas where families live (“70,000 women obtain Saudi driving licenses,” 2019).

A lack of facilities has been reported in the literature as a barrier to physical activity, and this study was no different regarding a lack of facilities or equipment, which are the third most common barrier reported by women in Mecca region. In this study, 57.7% of the women mentioned that lack of appropriate places for exercising is a barrier for them. Similarly, Awadalla et al. (2014) learned that 31.1% of their participants mentioned a lack of sport places as a barrier to physical activity. S. Alsahli (2016) likewise found that Kuwaiti females report a lack of facilities as one of the barriers to being physically active. The majority of sports places in Saudi Arabia for women are limited and usually a long distance from the living area.
Results in this study from the EBS indicated that 903 participants (31% strongly agree and 39.7% agree) that sports places are too far away, while 875 subjects (30.6% strongly agree and 37.9% agree) that there are only a few sport places to exercise. One explanation for these barriers is that the society in Saudi Arabia is conservative and male dominant. In some families, women need permission from male guardians to go outside the house and do the activity. Considering permission maybe needed and the sports places are few or far between, opportunities for women to be activity are difficult to come by (Samara et al., 2015). Additionally, culturally, it is not typical for women to walk alone outdoors, and it sometimes is not safe for women to walk alone (S. Alshahi, 2016).

The EBS also indicated that 23.5% participants agree that exercising takes time from their family responsibilities. Similarly, Alyaemni, Theobald, Faragher, Jehan, and Tolhurst, (2013) found that most women do not exercise because they have too many responsibilities in the family, confirming that lack of adequate time and gender roles are the major obstacles to their physical activity. According to Mobaraki and Soderfeldt (2010), women’s physical inactivity is attributed to social norms.

The examination of an association between physical activity level and demographic characteristics of women in Saudi Arabia in the Mecca region such as age, education level, living status, household income, and marital status, in this study resulted in the finding that there is a relationship between physical activity level and both living status and household income. There are positive correlations between physical activity level and participant living status ($r = 0.097; n = 1248; p = 0.001$). Similarly, a positive correlation exists between the physical activity level of the participants and total household income ($r = 0.059; n =1250; p = 0.036$). These results are
consistent with Kim and So (2014) who also reported a strong relationship between household income and physical activity among both males and females in Korea.

The results of this study confirm previous findings by Kari et al. (2015) who examined the relationship between income and physical activity among 753 adults in Finland (mean age 41.7 years; 64% women). The researchers discovered that higher income is associated with higher self-reported leisure-time physical activity for both women and men. One explanation maybe that individuals with high incomes are more likely to belong to gyms, workout with personal trainers, and own cars so they have transportation to sports facilities. The positive relationship between household income and physical activity, however, has not been consistent with other researchers results.

Albawardi, Jradi, and Al-Hazzaa, (2016) conducted a study on 420 Saudi women ages 18 to 58 and found that women with a monthly family income of 5000 SR or less have a mean physical activity level of 1420.5 MET-minimum per week. When the family income is over 20,000 SR, the mean physical activity is only 1028.4 MET-minimum per week. These researchers concluded that individuals who have more income or are financially stable are less physically active compared to those who are not. Also, Al-Zalabani et al. (2015) conducted a study on 4,758 participants in Saudi Arabia. They found that income is not significantly associated with physical activity.

**Limitations**

There are several limitations that may impact the validity, generalizability, and reliability of this study. First, the use of snowball sampling might have limited the study to participants who share the same ideas or answers to the questions as emphasized by Emerson (2015). There is a possibility that the participants who responded share experiences and have similar
perceptions of physical activity. As such, the data that contributed to the results of this study may have lacked an element of diversity.

Second, the data was collected online, which may have limited the participation of older adults because many lack computer knowledge and skills. Kendall (2014) noted that one of the demerits of an online interview is the inability to get valid responses from the elderly population due to their limited knowledge and skills of operating the equipment to answer the questions. Moreover, elderly participants lack the proper understanding of the questions and may receive help from other people to access and provide responses to the questions. Thomas and Magilvy (2011) reported that the validity of a qualitative research can be compromised if the participants do not understand the questions. Therefore, the findings may not be generalized among all the Saudi women in the Mecca area because the data collected from the older generation may have been distorted.

Conclusions

The objectives of this study were to assess physical activity levels among Saudi women aged 18 and older in the Mecca region, define the barriers that reduce their physical activity, and to determine whether knowledge correlates with physical activity levels. According to the results in this study, Saudi women in the Mecca region have different levels of physical activity depending on the social and economic status with those of lower economic status having lower levels of physical activity. The results show that the major barriers for the Saudi women in this study to meet the physical activities recommendations and guidelines are due to insufficient time, unavailability of transportation, and lack of equipment or facilities for exercising. The results of this study imply that Saudi women in the Mecca region are interested in being physically active
and are aware of the health benefits; however, exercise is limited due to the social-economic barriers.

**Recommendations**

Physical activity is important for the health of all Saudi women. The women in this study understand the importance of physical activity, but there are numerous barriers preventing them from being physically active. To improve the ability of Saudi women to maintain optimum health, it would be beneficial if future research investigated appropriate strategies and interventions to the Saudi culture that would reduce these barriers. To address ways to overcome cultural barriers, it would be helpful for researchers to investigate the views of Saudi males on women being physically active. Do males believe that it is important and or appropriate for females to be physically active and if so, what are appropriate venues and types of activities? Additionally, what are Saudi males’ thoughts about teaching sports in female schools? Furthermore, research investigating the levels of physical activity among married Saudi women compared to those who are single or divorced would provide more insight into additional barriers to physical activity. This focus may help gain further understanding of how socio-cultural factor and gender roles impede Saudi women from being physically active.
References


Appendix A: Institutional Review Board Approval

December 19, 2017

Ibtihal Ali Barnawi  Food & Nutrition  University of Wisconsin-Stout

RE: Physical Activity Knowledge, Attitude, and the Barriers to be Active Among Adult Saudi Women in Mecca Region, in Kingdom of Saudi Arabia

Dear Ibtihal,

In accordance with Federal Regulations, your project, “Physical Activity Knowledge, Attitude and the Barriers to be Active Among Adult Saudi Women in Mecca Region, in Kingdom of Saudi Arabia” was reviewed on December 19, 2017, by a member of the Institutional Review Board and was approved under Expedited Review through December 18, 2018. If a renewal is needed, it is to be submitted at least 10 working days prior to the approvals end date.

If you are conducting an online survey/interview, please copy and paste the following message to the top of the form: “This research has been approved by the UW-Stout IRB as required by the Code of Federal regulations Title 45 Part 46.”

Responsibilities for Principal Investigators of IRB-approved research:

1. No subjects may be involved in any study procedure prior to the IRB approval date or after the expiration date. (Principal Investigators and Sponsors are responsible for initiating Continuing Review proceedings.)

2. All unanticipated or serious adverse events must be reported to the IRB.
3. All protocol modifications must be IRB approved prior to implementation, unless they are intended to reduce risk.

4. All protocol deviations must be reported to the IRB.

5. All recruitment materials and methods must be approved by the IRB prior to being used.

6. Federal regulations require IRB review of ongoing projects on an annual basis.

Thank you for your cooperation with the IRB and best wishes with your project. Should you have any questions regarding this letter or need further assistance, please contact the IRB office at 715-232-1126 or email buchanane@uwstout.edu. Sincerely,

Elizabeth Buchanan  Interim Director of Office of Research and Sponsored Programs and Human Protections Administrator, UW-Stout Institutional Review Board for the Protection of Human Subjects in Research (IRB)

CC: Karen Ostenso

*NOTE: This is the only notice you will receive – no paper copy will be sent.*
Appendix B: Informed Consent

Consent to Participate In UW-Stout Approved Research

Title: Physical Activity Knowledge, Attitude and the Barriers to be Active Among Adult Saudi Women in Mecca Region, in Kingdom of Saudi Arabia

Investigator: Ibtihal Barnawi
Graduate student
Phone: 859-420-3460
Email: barnawii5566@my.uwstout.edu

Research Sponsor: Karen Ostenso
PhD, RD, CD Food and Nutrition
Office: 225 Heritage Hall
Phone: 715/232-2394
Email: ostensok@uwstout.edu

Description:
This study will be conducted for Saudi female aged between 18 and older in Mecca region. The purpose of this cross-sectional study is to assess physical activity levels among Saudi women. Also, to defined the barriers that reduce their physically activity, and to find whether knowledge correlates with physical activity levels. The data will be collected via online survey, which will be distributed by social media.

Risks and Benefits:
There could be a risk of discomfort that may occur as a result of participation. The collected information would be beneficial for both the Saudi women and healthcare professionals who could aim for developing preventative measures to promote healthy lifestyle, and to improve quality of life.

Time Commitment:
10 to 15 minutes to fill the questionnaire.

Confidentiality:
Your name will not be included on any documents. We do not believe that you can be identified from any of this information.

Right to Withdraw:
Your participation in this study is entirely voluntary. You may choose not to participate without any adverse consequences to you. You have the right to stop the survey at any time. Please don’t skip over a question and leave it blank. If you are participating in an anonymous online survey, once you submit your response, the data cannot be linked to you and cannot be withdrawn.

IRB Approval:
This study has been reviewed and approved by The University of Wisconsin-Stout's Institutional Review Board (IRB). The IRB has determined that this study meets the ethical obligations required by federal law and University policies. If you have questions or concerns regarding this study, please contact the Investigator or Advisor. If you have any questions, concerns, or reports regarding your rights as a research subject, please contact the IRB Administrator.

**Investigator:**
Ibtihal Barnawi  
Graduate student  
Phone: 859-420-3460  
Email: barnawii5566@my.uwstout.edu

**Advisor:**
Karen Ostenso  
PhD, RD, CD Food and Nutrition  
Office: 225 Heritage Hall  
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**IRB Administrator**
Elizabeth Buchanan  
Office of Research and Sponsored Programs  
152 Vocational Rehabilitation Bldg.  
UW-Stout  
Menomonie, WI 54751  
715.232.2477  
Buchanane@uwstout.edu

By clicking on the START SURVEY link you are indicating your willingness to participate in this survey of this project, *(Physical Activity Level, Knowledge, and the Barriers to Be Active Among Adult Saudi Women in Mecca Region, in Kingdom of Saudi Arabia.)*
Appendix C: Survey Instrument

Physical Activity Level, Knowledge, and the Barriers to Be Active Among Adult Saudi Women in Mecca Region, In Kingdom of Saudi Arabia.

DEMOGRAPHIC INFORMATION:

Please answer the following about yourself:

1- What is your age?
   1) 18-20
   2) 21-30
   3) 31-40
   4) 41-50
   5) 51 or over

2- What is your current weight in kilograms?----------kg

3- What is your height in centimeters?----------cm

4- Which of the following best describe your current relationship status?
   1) Married
   2) Widowed
   3) Divorced
   4) Single

5- Education level:
   1) High school degree or equivalent
   2) Bachelor degree
   3) Master's degree
   4) PhD degree
5) Non-graduate

6- Do you live:

1) Alone
2) with your husband
3) with your family
4) other, specify…………..

7- In which city do you live?----------------------

8- Occupation:

1) Don’t work
2) Student
3) Teacher
4) Doctor
5) Nurse
6) Office Job
7) Other, specify…………..

9- What is your total household income?

1) Less than 5000 Saudi Riyal
2) 5000- 10,000 Saudi Riyal
3) More than 10,000 Saudi Riyal
PHYSICAL ACTIVITY AND HEALTH HISTORY

10- Do you have any of the following diseases? check all that apply

1) Diabetes
2) Hypertension
3) Osteoporosis
4) Heart disease
5) Obesity

11-Do you have a family history of? check all that apply

1) Diabetes
2) Hypertension
3) Osteoporosis
4) Heart disease
5) Obesity

12- Are you currently a member of sports clubs

1) yes
2) No

13- Do you smoke cigarettes?

1) Yes
2) No

14-Did you receive any physical education or health education class?

1) Yes
2) No
15- How often do you exercise?
   1) I do not rather exercise
   2) 1-3 days/week
   3) 4-6 days/week
   4) daily

16- what motivates you to be physically active?
   1) For medical reasons
   2) To improve your physical appearance
   3) To be healthy
   4) To mimic your friends
   5) Because it is a trend in social media
   6) For fun and enjoyment
   7) For your mental health/stress relief
   8) To control your weight
   9) Other (please specify)...................

17- What do you most often do for exercise?
   1) Lift weights
   2) Walk
   3) Run
   4) Swim
   5) Dance
   6) Aerobics
   7) Pilates
8) Other (please specify) ..................

18- What are the obstacles that prevent you from being active?

1) Lack of social availability
2) Lack of motivation
3) Lack of awareness/knowledge
4) Lack of facility/equipment
5) It’s boring to exercise
6) Harsh weather
7) Family prevent you from doing exercise outside the home
8) Lack of transportation
9) Other (please specify) ..................

19- How many minutes do you spend doing physical activities on a typical day?

_______________ minutes.

20- How many hours do you usually spend sitting or reclining on a typical day?

_______________ hours.

21- Would you say that you are physically more active, less active, or about as active as other persons your age?

1) More
2) Less
3) Same
23- How do you do most of your regular exercise?

1) Alone
2) In a pair
3) As a group
4) Other (please specify) ..................

24- Do you think men are more physically active than women?

1) Yes
2) No

25- Is it easier for men to be more physically active than women

1) Yes
2) No

26- Do you support the new legislation of providing physical activity class in females’ school?

1) Yes
2) No
## KNOWLEDGE ABOUT PHYSICAL ACTIVITY

27- What do you think about the following statements

<table>
<thead>
<tr>
<th>Items</th>
<th>True</th>
<th>False</th>
<th>Not sure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Physical activity can reduce the risk of cardiovascular disease</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2) Physical activity can be an effective treatment for depression, decrease feeling of stress and tension</td>
<td></td>
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<tr>
<td>3) Physical activity can help manage type 2 diabetes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4) Regular physical activity decrease energy levels</td>
<td></td>
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<tr>
<td>5) Adults who are physically active have a lower risk of developing certain types of cancer</td>
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<tr>
<td>6) The only health benefit physical activity has is in assisting weight loss</td>
<td></td>
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<tr>
<td>7) physical activity can help improve health</td>
<td></td>
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<tr>
<td>8) high blood pressure can be reduced by physical activity</td>
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<tr>
<td>9) Regular physical activity is a key to sleeping better</td>
<td></td>
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<tr>
<td>10) physical activity convert fat to muscles</td>
<td></td>
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</tr>
<tr>
<td>11) Adults aged 18–64 should do at least 150 minutes of moderate-intensity aerobic physical activity throughout the week.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- True
- False
- Not sure

- Physical activity can reduce the risk of cardiovascular disease
- Physical activity can be an effective treatment for depression, decrease feeling of stress and tension
- Physical activity can help manage type 2 diabetes
- Regular physical activity decrease energy levels
- Adults who are physically active have a lower risk of developing certain types of cancer
- The only health benefit physical activity has is in assisting weight loss
- Physical activity can help improve health
- High blood pressure can be reduced by physical activity
- Regular physical activity is a key to sleeping better
- Physical activity convert fat to muscles
- Adults aged 18–64 should do at least 150 minutes of moderate-intensity aerobic physical activity throughout the week.
Appendix D: Research Flyer

You are invited to participate in an online survey for a research study!

The goal of this cross-sectional study is to collect information about Saudi women physical activity levels, knowledge and barriers to be active in Mecca Region.

If you are a Saudi woman, aged 18 years or older, and living in Mecca region in Saudi Arabia, feel free to answer the following survey.

If you have questions at any time about the study or the procedures, you may contact me:

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Barnawii5566@my.uwstout.edu