

AN ABSTRACT OF THE THESIS OF

Ayat Abuqurayn for the degree of Master of Sciences in Environmental Sciences presented on  
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Title: Changing Eating Habits in Connection with Environmental Problems in the Eastern  
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The agricultural lands of Saudi Arabia cannot support feeding the population since they have been facing environmental problems including climate change and water scarcity (DeNicola et al. 2015). Food security is the issue, especially in desert countries which rely on natural water resources. Saudi Arabia is one of these desert countries which has been struggling to meet their domestic food demand. Currently Saudi Arabia has been focused on importing most food commodities to meet local food demands in order to mitigate stress on depleting water resources (FAO 2017). Little is understood about how an individual's food choices can play a significant role in achieving environmental sustainability as well as food security. Therefore, there is a need for more place-based studies that consider the human dimensions of environmental problems. Regarding human dimensions provides a better understanding of the links between dietary choices and environmental consequences. Food choices of individuals can be expected to differ based on the social and cultural context of specific communities. Therefore, the approach of dietary choices and environmental consequences is adopted in this research study which focuses

on women who are responsible for feeding their families in the Eastern Region of Saudi Arabia. The main aim is to understand how women choose to feed their families and how changes in consumption, over the years, affect the environment. The study focuses specifically on the frequency of meat consumption and the factors that affect what women choose to feed their families and to explore their perceptions of the connections between food choice and environmental problems. Major themes emerged from this qualitative analysis. Research interviews reflect that women maintain their families' cultural tradition in consuming meat and dairy products. Meanwhile, lifestyle changes over the years influence dietary habits in shifting towards western foods. The main drivers of food choices, among women, were health, cultural factors and accessibility of restaurants. There was awareness, among the women, about the impacts of dietary choices on their health. However, these women didn't recognize the impacts of their dietary choices on their environment. This study suggests creating awareness among women to promote environmental sustainability by shifting their diets, which will also promote healthy life styles as well as reducing environmental impacts.

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Changing Eating Habits in Connection with Environmental Problems in the Eastern Region of  
Saudi Arabia

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Ayat Abuqurayn

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I understand that my thesis will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my thesis to any reader upon request.

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Ayat Abuqurayn, Author

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Changing Eating Habits in Connection with Environmental  
Problems in the Eastern Region of Saudi Arabia.

## CHAPTER 1- INTRODUCTION

All around the world, food security issues are a global concern for policy makers. The Middle East, especially Saudi Arabia (KSA), is challenged to meet the population's food needs since their domestic production is inadequate. Saudi Arabia has been concerned with this issue as they have experienced a rapid increase of their population. Climate issues and water scarcity are major limiting factors in developing local agriculture (DeNicola et al. 2015). Therefore, the policymakers have been focused on importing most food commodities to meet local food demands in order to mitigate stress on depleting water resources (FAO 2017). The agricultural sector is one of the biggest contributors to exhausted water around the world. Saudi Arabia is one of these countries where the consumption practices in the agricultural sector uses more than 80% of total water demands (DeNicola et al. 2015). For example, wheat is an extremely important crop for Saudi Arabia, and it involves large amounts of water usage. Therefore, KSA incorporated a system of eliminating the high-water consumption steps in cultivation. Now, they have abandoned this once valuable export crop and they import wheat (Blas, 2015). However, some farmers have switched from wheat to forage crops (Alfalfa hay and corn silage) for dairy and livestock production, which consumes even more water than wheat. Hence, farmers of phased-out crops are encouraged to engage in alternative sustainable production activities such as greenhouse farming or production of fruits and vegetables (FAO 2018).

Little is understood about how humans' food choices play a significant role in achieving environmental sustainability as well as food security. Therefore, there is a need for more place-based studies considering the human dimensions of environmental problems. Human dimensions provide a better understanding of the links between dietary choices and environmental

consequences. Food choices of individuals can be expected to differ based on the social and cultural context of specific communities. Therefore, the approach of dietary choices and environmental consequences is adopted in this research study which focuses on women in the Eastern Region of Saudi Arabia who are responsible for feeding their families. Shifting dietary habits is one of the factors that aggravate environmental problems which influences achieving food security (Garnett 2013). Saudi Arabia is one of the countries witnessing rapid change of lifestyles, including eating habits. Dietary habits of Saudi people have changed drastically due to improved socioeconomic conditions and an increasingly urban lifestyle (Adam 2014). The change of food choices doesn't just affect the environmental consequences but also has a significant role in increasing non communicable diseases among populations. The main aim is to understand how women chose to feed their families and how that change, over the years, affected the environment. The study is centered specifically on the frequency of animal food sources and drivers which impact women's choices to feed their families and explore their perceptions of the connections between food choice and environmental problems. Major themes emerged from this qualitative analysis. Research interviews reflect that women maintain their families' cultural tradition in consuming meat and dairy products. Meanwhile, lifestyle changes over the years influence dietary habits in shifting towards western foods. The main drivers of food choices, among women, were health, cultural factors and accessibility of restaurants. There was awareness, among the women, about the impacts of dietary choices on their health. However, these women didn't recognize the impacts, of their dietary choices, on their environment. This study suggests creating awareness among women to promote environmental sustainability, by shifting their diets, which will also promote healthy life styles as well as reducing environmental impacts.

#### Problem Statement:

Western influenced socioeconomic development shifts have resulted in Saudi Arabian lifestyle change. Saudi populations have been shifting dietary habits that could be impacting the environment. Exploring shifting dietary habits among the population and their understanding of the environmental problems in their region is useful for providing insights for policy makers to develop communication that facilitates food security while protecting the environment. Current literature regarding the impacts of food choices on the environment in Saudi Arabia is not clear with respect to water scarcity and climate change. This limitation challenges our ability to understand the change of lifestyle-dietary habits which may impact aggravating environmental problems. Acquiring a greater understanding of how households choose their food may help policy makers better promote dietary practices that lead to sustainable environments.

#### Research Objective:

The purpose of this research is to conduct an ethnographic study exploring the relationship between the change of dietary habits over the years and the environmental problems in the Eastern region of Saudi Arabia. It focuses specifically on the frequency of meat consumption and the factors that affect what women choose to feed their families and to explore their perceptions of the connections between food choice and environmental problems.

#### Research Questions:

- 1- How do women choose to feed their families and how has that changed over the years in ways that that could affect the environment in the Eastern Region of Saudi Arabia?
- 2- What drives food choices and food habits?

3- What kinds of meat do they serve and what do they see as the qualities of different kinds of meat?

4- How aware are women of the environmental consequences of food choices they make?

## CHAPTER 2: LITURTURE REVIEW

The effects of shifting food choices on the environment have for a long time been cited as a factor that could bring restraint in meeting present and future food needs (Garnett, 2013). Nutrition and food policy experts have been concerned about the food security of the population. The impacts of human actions on the planet are significant. Dietary choices are one of the human actions that can affect the world's future potential for food security and environmental sustainability. The guarantee of having long-term food security relies on ensuring that there is a sustainable food supply today (Nelson et al. 2016). Different studies have proved that dietary choices of foods have implications on the environment and provide strong evidence that "a dietary pattern higher in plant-based foods (e.g., vegetables, fruits, legumes, seeds, nuts, whole grains) and lower in animal-based foods (especially red meat), as well as lower in total energy, is both healthier and associated with a lesser impact on the environment" (Naja, 2018). Poor dietary choices have brought about an increase in non-communicable diseases such as hypertension, obesity, and diabetes in both developing and developed nations. That alarming rise in lifestyle diseases affecting all social groups threatens the survival of humanity and the environment. This calls for society to reconsider their actions to save their planet.

The Food and Agriculture Organization (FAO) developed a model of sustainable diets that reinforces the relationship between diet and the environment and cultural (FAO, 2012). FAO's definition of sustainable diets, "are those diets with low environmental impacts which contribute to food and nutrition security and a healthy life for present and future generations. The sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy;

while optimizing natural and human resources." The relationship between diet choices, health, and environmental outcomes has for a long time been tackled in numerous studies with all of them reinforcing the theory of sustainable diets. Therefore, in order to reduce the increasing burden on the environment, we need to establish sustainable dietary patterns that incorporate the domains of culture, nutrition, society, and environment. The following literature review will focus on how the dietary transition presents challenges to the global food system, food security, health, and environmental problems.

### Global Food Systems

Food systems around the world have the ability to boost human health and environmental sustainability, however, both of them are currently threatened. It is noticeable that sustainable food systems have been challenged to provide healthy food with the increasing of the global population and changes of the environment. Willett et al (2019) defined a food system that is "All elements and activities that relate to production, processing, distribution, preparing, and consumption of food" (Willette et al.2019). All elements of food systems play a significant role in affecting human health and environmental sustainability. Many studies cite evidence that the current food systems are one of the elements that elevate the pressure on natural resources such as water depletion, soil degradation, and high levels of greenhouse gas emissions (GHGE) (Food Systems, n.d.). The food system emissions contribute 19-29 % of total greenhouse gas emissions and agriculture remains the highest contributor of non-CO<sub>2</sub> greenhouse gas emissions. Moreover, agriculture contributes to the exhaustion of the water supply as it consumes nearly 70% of the world's freshwater (Food Systems, n.d.). The strain on natural resources implies that future generations may fail to acquire a share if there is no proper management and conservation of land, energy, and water (Steffen et al. 2015)



The study of Willette et al. (2019) concentrates on two components of the global food system: consumption (healthy diets) and production (sustainable food production). Both of these components of the food system are connected to environmental problems around the world since the growing population increases demand on food which affects their health and the environment. Because food systems are a major driver of poor health and environmental degradation, Willette et al. reveal the importance of scientific targets for producing healthy food from sustainable food systems by transforming diets and food production. In this study, the Commission brings 19 Commissioners and 18 coauthors from 16 countries in various fields of human health, agriculture, political sciences, and environmental sustainability in order to improve global scientific targets which rely on the best evidence available for healthy diets and sustainable food production (Willette et al. 2019)

The scientific targets for healthy diets and sustainable food systems are incorporated together in one framework that forms win-win diets (healthy and environmentally sustainable). In contrast with win-win diets, people currently adopt lose-lose diets which are often high in calories, added sugars, saturated fats, processed foods, and red meats. In addition, environmental degradation from these lose-lose diets could aggravate poor health. The environmental impacts of unhealthy and non-environmentally sustainable diets include but are not limited to air pollution from agriculture, dynamic climate change, and nutrient deficiency in some crops, and increased levels of carbon dioxide present in the atmosphere (Willette et al. 2019). All of these environmental impacts also impact human health. Therefore, diets are a basic connection between human health and environmental sustainability, and it is difficult to separate these components from each other (Willette et al. 2019). Willette et al. (2019) suggest that this framework is global for all diet cultures and production systems around the world. This

framework indicates that food systems can provide healthy food for the global population of about 10 billion people by 2050. However, this framework indicates that even a small rise in specific kinds of food consumption such as red meat or dairy foods would make this goal hard to achieve because producing these foods increases greenhouse gases in the environment which impacts the atmosphere and global warming that then influences farmlands and food production. Therefore, a conversion of the global food system should include basically stakeholders, from individual consumers to policymakers working together towards the global goal of healthy and sustainable diets.

Willette et al. (2019) show five strategies supported by a strong evidence base for effectively achieving a Great Food Transformation. Some of these strategies are: shifting towards healthy diets which consist of increasing consumption of plant-based foods and substantially reducing consumption of animal source foods. Studies have shown evidence that this shift will reduce environmental impacts and improve health consequences. Another strategy is shifting from producing high quantities of nutritionally poor food to producing healthy, high-quality food. This change would increase the efficiency of fertilizer and water use, and mitigate climate change, including changes in crops and enhancing biodiversity within agricultural systems. The global food system needs to be shifted to reduce its impacts on human health and environmental sustainability. However, this shifting will not be achieved without the change of people and their engagement with food systems. This change in thinking should realize the complicated connections between human health and environmental sustainability and combine these issues into a common global framework to achieve healthy diets from sustainable food systems (Willette et al. 2019).

## Food Security Issues

The Food and Agricultural Organization of the United Nations World Health Organization declared that “Food security, at the individual, household, national, regional and global levels [is achieved] when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life” (Food and Agriculture Organization, 2003). In the Middle East, especially Saudi Arabia, food security is an area of interest for policymakers. The desert countries normally rely upon food commodities imported from other countries since their domestic production is inadequate to satisfy their domestic needs and Saudi Arabia is not an exception as it mostly imports red meat and cereals. The predicted trends in Saudi Arabia revealed that by 2050, the nation will entirely depend on imported food commodities in order to meet the overgrowing domestic needs (Fiaz, Noor, & Aldosri, 2018).

However, many agricultural programs were started at different times to ensure food security (Bailey & Willoughby, 2013). They include and are not limited to free land division, contemporary agricultural expertise, extension programs that are effective, loans with zero interest to farmers and access to projects related to irrigation. Their existence boosted the output rates of foods such as fruits, cereals, animal products, and vegetables. The effective programs not only enabled the Kingdom of Saudi Arabia (KSA) to fulfill domestic needs, but also made it possible to export the surplus (FAO, 2009; Fiaz et al., 2018).

One of the effective agricultural programs to increase food security is the increased production of wheat to fulfill the demand among Saudi people. The KSA came to be known as a primary producer of wheat that could cover the wheat needs of the population from 1980–1990 (DeNicola et al. 2015; Blas, 2015) . However, when it comes to the environment, this program

was not so successful. Saudi Arabia recognized that the cultivation of some crops, like wheat, involved large amounts of water that threatened the survival of aquifers whose recovery is a problem once depleted. Therefore, KSA incorporated a mechanism of eliminating the high-water consumption steps in the cultivation since there was no reasonable gain in the irresponsible overexploitation of the non-replenishable naturally existing resources (Al-Subaiee et al., 2005; Alzhrani, 2007). Following the adopted mechanism of sustainable food production, the number of wheat plantations vanished and KSA turned into relying on wheat purchased from other nations (Blas, 2015; DeNicola et al, 2015). A recent study by Fiaz et al., (2018) suggested that cereal crops like sorghum, wheat, barley, and millet can thrive in the hot and dry climatic conditions thereby contributing to achieving the objectives of food security. Given the severe climate in KSA, the government through the Ministry of Agriculture should consider introducing drought-resistant cereal crops that can thrive in such areas. That incentive will provide solutions in meeting the primary goals of food security of availability, stability, access, and utilization.

In the past few years, the KSA leadership has aggressively employed unsustainable new strategies to partner with major cereal crop-producing nations in the quest to satisfy the ever-growing food needs of its population. One of the vital investments has been the partnership with the Baltic States, Germany, and Canada to fill the wheat demands in the nation (Blas, 2015). Another significant investment is that of partnering with India to supply the kingdom with rice. By 2010 India had an approximated market share of 59% of the rice eaten in KSA. The rest of the rice was imported from other country (Adam, 2014). Additionally, the 2011 strategy of securing

the supply of food through investing in livestock from Brazil and Australia has yielded positive results seen by the increased availability of animal-related products and grains (DeNicola et al. 2015). Due to the vivid observation in the extensive importation of rice, meat and wheat, the staple foods of the KSA population, the trend is an area of concern that requires quick intervention measures to minimize the overreliance on imported food. However, it is only with trading and food importation that KSA has managed to fulfill the requirements of food security (DeNicola et al. 2015). There may be a possibility that the high rates of over-dependence on imported foods present economic constraints to the government. In addition, importing foods contributes to elevated greenhouse gas emissions which aggravate climate change and affect natural water sources (Wakeland et al,2012).

Recently, the efforts to shift from imported food products has yielded the emergence of locally produced commodities that satisfy the domestic demand in animal food sources in KSA. For instance, KSA is a global leader in integrated dairy farming. Additionally, it enjoys self-sustenance in producing poultry and eggs. That noticeable agricultural development has created a window for investors in the agricultural sector, especially in the animal feed, feed barley, and alfalfa sectors among others (Hisham, 2017). There is also a study that reveals that the KSA has transitioned its policy of developing agriculture from relying on crops that intensively consume water to those that require minimal amounts by diversifying their production through fishing, aquaculture, cultivation of vegetables and fruits in greenhouses that involve reduced water requirements in order to conserve groundwater (Alzhrani, 2007; DeNicola et al., 2015). There was cooperation between Saudi Arabia and the FAO for strengthening food security and sustainable agricultural and rural development. FAO and the Ministry of Environment, Water and Agriculture have united to energize the practice of aquaculture, perceived by the Saudi

Vision 2030 as a standout amongst the most encouraging areas for food production. Oil prices have decreased dramatically and thus there is an urgent national need to diversify KSA's economy and production. The agreement through concerted effort has resulted in a sustainable rise in marine fisheries and aquaculture productivity as well as an enhancement of food safety and nutrition security, hence boosting the sector's contribution to the national economy. According to Mohamed (2017) Saudi Arabia and FAO have designed a subprogram aimed at increasing the national consumption of fish and seafood.

Saudi Arabia is self-sufficient in 85% of vegetables and 66% of fruits (Adam, 2014). One of these staple fruits is the date which can be grown in sufficient quantities to meet the domestic demand of the kingdom's population. Dates fall into the category of the best crop from Saudi Arabia with more than 18 million date palms under cultivation yielding nearly 600 million pounds of dates annually (Adam, 2014). If people trend their dietary habits toward eating more dates, this transformation will lead towards food security as well as environmental sustainability.

There are some studies that evaluated the condition of food security in Saudi Arabia and gave practical recommendations to get to the solutions. Fiaz et al. (2018) examined the present situation of food security in regard to agricultural production and consumption and suggested the need to incorporate modern resource-efficient agricultural technologies in facing food security. Additionally, the study endorsed the appropriate application of available natural resources, productive agricultural extension and enlightening farmers on sustainable farming across the kingdom (Fiaz, et, 2018). Fiaz and Al-Hag disclosed that it is necessary to create awareness in the farming community in

KSA about sustainable food production and methods of conserving the environment such as proper use of non-replenishable natural resources. The extension department in the Kingdom needs to take the first initiative in examining the level of knowledge that farmers have about the transformation of agriculture and ways to adapt to environmentally sustainable production. (El-Hag, 2008; Fiaz et al., 2018; Al-Shavaa et al., 2012). There is a wide rift between the present supply of food from the local producers and the day to day demand in KSA because of the rampant growth in the population. That alarming trend calls for more efforts to supplement the gap. Saudi Arabia continues to face the challenges of climate change and declining water resources. The incorporated mitigation techniques by KSA have been cited by a recent study to be not sustainable and having elements of worsening the state of some areas (DeNicola et al. 2015). That implies that there is still much that the government and relevant stakeholders in agriculture need to do.

The government of KSA has since been on the lookout for partnerships with other nations and non-governmental organizations for assistance in improving the livelihood of their citizens. For instance, Mohamed (2017) noted that FAO under one of its regional initiative program “Building resilience of food security and nutrition for the near East and North Africa” selected Saudi Arabia to focus on empowering production, institution, and marketing systems institutions to counterattack risks and crises. One of its key objectives entailed building capacities of households, agro-ecosystems and communities in predicting, responding and recovering from the negative outcomes emerging from natural and artificial crises.

## Environmental Issues

Achieving food security entails linking significantly with the environment and its capability to produce sufficient food for future populations. The primary limiting factors causing restrictions in agricultural production are land, climate change and water availability (Steffen et al. 2015). The effects of climate change are expected to bring a rise in global temperatures due to the continued release of greenhouse gas emissions and the intensity of these changes will vary as per the regions. The availability of water depends on the implications of these changes since the water cycle is a factor of climate. These impacts and irresponsible human actions threaten water security in various parts of the world, especially in low latitude subtropical areas that they culminate in global warming, exhaustion of water resources and precipitation reduction (DeNicola et al. 2015).

Saudi Arabia forms the largest portion of the Arabian Peninsula covering nearly an area of 2,149,690 square kilometers and is considered one of the biggest arid nations that contains no permanent rivers and lakes (Fiaz, Noor, & Aldosri, 2016). The temperatures shoot to above 50°C (122°F) creating overwhelming hot and dry conditions. The average precipitation of KSA is 114mm annually. Despite being one of the wealthiest countries around the world because of the quick development of the economy derived from oil drilling, Saudi Arabia lags behind as one of the poorest nations in terms of naturally renewable water resources (DeNicola et al. 2015). The Middle East and North Africa experience insufficient water reservoirs and that implies that the inhabitants of these nations are at high vulnerability to the consequences of climate change (DeNicola et al., 2015). Saudi Arabia, as one of these regions, encounters the challenges



of a harsh climate (Alkolibi, 2002) and since 1990, the Kingdom has been on the list of nations suffering the threat of water scarcity (Al Zahrani, & Al Tayeb, 2007). One of the key factors causing the water shortage in the Arab region is rapid population growth such that by 2017 the total population of Saudi Arabia rose to 32,552,336 from 31,742,308 in 2016 according to the General Authority for Statistics, KSA. Other cited agents include rising water demands, unequal division of water facilities and effects of climate disturbances. The intense demand for freshwater in KSA to use in agriculture puts pressure on the few water sources, mainly aquifers, and that leads to the conclusion that lack of water will be a strong barrier in attaining environmental sustainability (UNDP, 2010)

Saudi Arabia has been taking some strategies of adaptation and mitigation in addressing the strain on conventional water resources including and not limited to desalination and outsourcing food products (DeNicola et al. 2015). Saudi Arabia has now become the leader around the world in the development and utilization of desalination technologies as alternatives to save natural groundwater. The process of desalination requires a large amount of energy, capital, and transportation to distribute the desalinated water to distant areas. The increasing production of desalinated water accelerates the effect of climate change by releasing greenhouse gases, hence aggravating the environmental problem such as climate change (DeNicola, et al. 2015).

#### Dietary Pattern

Policymakers are increasingly becoming aware of the need to address the concerns of the environment such as climate change due to greenhouse gas emissions. Simultaneously, they encounter the growing burden of food security and nutrition-related problems as well as ensuring that there are enough foods to meet the needs of the massive global population. The

bottom line, more people need to be fed with nutritious diets that have minimal or no impacts on the environment. One of the perspectives stipulated by Garnett (2013) on these issues and their association appears to be revolving around the challenge of food consumption that requires modifications in the dietary drivers that influence the production of food.

In recent decades, both the Middle East and North African areas have displayed notable shifts in the food choices. They have swapped from consuming the traditional diets that are comprised of diverse and rich fibers, vegetables and proteins at the cost of synthetically processed food products that contain elevated levels of sugars, proteins, and fats, especially from animal sources (Fahed et al., 2012). Also, they have reduced the intake of fruits and vegetables. The major cause of these dietary patterns is globalization and lifestyle shift due to the invasion of the fast foods from the West into other regions (Fahed et al, 2012). The KSA has undergone dramatic lifestyle changes over the past three decades that have greatly influenced the food choices for the entire population. Urbanization has been a key driver for these shifts such that about 86% of the populations are currently city dwellers while 14% live in the rural settings (Adam, 2014).

The rise in globalization has produced impacts that accelerate the formation of new lifestyle patterns and food choices. As the country develops, the transitions have affected the quality of food systems right from production, processing, distribution, and marketing. Data collected by FAO in KSA registers an increase in the food supply between 1961-2007, that consist of large amounts of animal fat, sugar, milk, and meats with a moderate trend in the supply of fruits, vegetables and grains (Moradi-Lakeh et al., 2017). The study further focused on assessing whether consumers in KSA

observe the recommended dietary guidelines in their diets. The findings indicated that these consumers have poor dietary habits that have detrimental impacts on their health as well as the environment.

One of the agents that attribute to the dietary alterations in the population is the swiftly growing food manufacturing and processing sector in KSA over the last decade. The government has played an influential role in supporting investors in this industry through the provision of subsidies like duty-free on imported raw materials, low prices in land leasing, and availing food-related equipment. According to Mousa (2017) the huge demand for packaged foods, expansion of food retail outlets, and food services have led to the continued growth in the food processing industries (Mousa, 2017).

Most inhabitants of KSA opt to buy the ultra-processed foods from American fast food outlets that continue to be prominent and easily accessible. The major sector that frequents these chains are youthful members of the population who are drawn to copy characteristics of the West. Due to the nature of KSA having a minimal number of social recreation avenues for the youth, these individuals from various age categories have found entertainment by frequently visiting the food joints that they view as hubs for leisure and pleasure. That shift in behavior has boosted consumption of the processed products dramatically and has created a change in the concept of food as not only fulfilling nutritional needs but as a source of enjoyment (DeNicola et al. 2015). Food was always source of nutrition and enjoyment at the same time but eating from restaurants is a newer phenomenon which youthful people enjoy. They often eat outside more than eating at home.

Bouznif et al. reported that there was an increase in numbers of Saudi women in the workplace in the last 15 years. (10.1% of Saudi women worked outside the home in 2016

according to the General Authority for Statistics.). The increase of working women has influenced eating from restaurants since preparing meals at home is more difficult for working women. Restaurants are an easy way to have their meals. From the working women's view, having meals from restaurants is more economical, less effort, and more efficient than cooking at home (Bouznif et al. 2018).

Even so, the population of Saudi Arabia is traditional, and they mostly prefer consuming traditional foods. Over the years the staple foods have been yogurt, wheat, dates, chicken, and rice across the population (Adam, 2014). According to Al-Nozha et al. (2007) wheat is a conspicuous cereal grain in KSA used in preparing dishes and bread, such as flatbread. Rice is also highly consumed since it forms a key component in the traditional dish known as *Kapsah* that Saudis often consume twice daily. The dish comprises rice, meat, spices, vegetable oil or animal fat, tomatoes and carrots. Mutton and beef are preferred as compared to other meat categories. Fish consumption is relatively low, mainly along the Red Sea coast (Adam, 2014; MAF, 2001). Another observation by Adam (2014) was that between the periods 1961-1970 and 1981-1990 the supply in fruits and vegetables marked an increase, before marking a temperate drop in 2001-2007 while meat consumption shot up around that period.

#### The Health Cost of Dietary Choices

The production of global food has kept increasing with the growth of population. However, this increase of the production has not met the population's food need that causes more than 820 million people to have insufficient food and many more to eat low-quality food that leads to micronutrient deficiencies, obesity, and non-communicable diseases such as heart disease and diabetes (Willette et al.2019). Willette et al. reveal that there is an urgent need for

global shifting of the food system in order to the environmental issues that are the cause of food safety problems (Willette et al. 2019). In this new study, they describe a global healthy reference diet to support a foundation for assessing the health and environmental impacts of adopting an alternative diet. The overconsumption of unhealthy foods is increasing globally which indicates that the global average consumption of healthy foods is basically lower than the reference diet consumption (Willette et al. 2019). The increase in consuming unhealthy diets could increase environmental problems, such as water scarcity, which in turn affects food security. Nelson et al. (2016) argued that the health of the population is one of the primary pillars contained in the concept of food security and environmental sustainability. Ideally, health is a critical aspect that once compromised has the power to wipe out humankind and anything that depends on them. The activities in attaining the requirements of the new food systems have impacted the health of end consumers and others facilitating the chain. The current food systems have led to harmful environmental effects while searching for solutions to acquire more food availability and a healthier population, at the same time boosting the livelihoods and security of marginal groups (Nelson et al. 2016).

The nations in the Middle East and North Africa suffer from high rates of non-communicable diseases that account for 47% of the total burden of diseases, and this percentage is predicted to rise by 2020 (Sibai, 2010). That pronounced prevalence of non-communicable diseases, obesity, and overweight might be a result of the shift in diets towards diets from the west particularly those of animal origin and artificially processed (Paredes, Sherwood, & Arce, 2017). The instances of obesity drivers in the Arab Gulf are due to changes directed to bring higher gross domestic product. They include but are not limited to transitions in nutrition, demographics and health status (DeNicola et al. 2015). Exacerbating this issue, the Arab region

is known to have the lowest rates of physical activities worldwide and the greatest adoption of “westernized” food culture with ultra-processed food as basic components in the diets (DeNicola et al. 2015).

The swift transformation in living standards due to the recent influence of Westernization, the KSA is one of the leading nations in cases of overweight and obese children and in other age groups as well. The Arab region has a high percentage of overweight and obese people (66%–75% of adults and 25%–40% of children) but KSA has the highest prevalence rates for overweight and obesity. More than 70% of the Saudi population now lives more sedentary lifestyles due to living in major cities where they rely on unhealthy foods such as fast food. The past three decades of economic growth brought a major shift in the food culture in the KSA. Now, most Saudis tend to prefer American fast food chain restaurants that contain ultra- processed foods, and the availability of fast food chain restaurants has exploded in Saudi Arabia. The combination of the persistence of conservative traditional Saudi customs, the importation of global convenience foods, and economic growth produces an obesogenic environment that leads to weight gain, unhealthy eating and sedentary lifestyles (DeNicola et al. 2015). A study conducted by the World Food Programme proposed that among third world nations, the Arab region has insignificant numbers of people suffering undernourishment. Nevertheless, after the 1990s, the Arab countries have manifested a proliferating number of people living with undernourishment in the global margins. Surprisingly, rich countries like Saudi Arabia, UAE, and Kuwait contain a segment of undernourished inhabitants. The outgrowing prevalence of obesity in KSA is a result of the excessive consumption of foods with high amounts of sugar and fats. Moreover, there is a

probability that the poorly nutritious and readily available processed cause health-related complications (Adam, 2014).

Hypertension is another lifestyle disease under cardiovascular diseases (CVD) being experienced by the population of KSA that has persistently grown over the years (Al-Nozha et al, 2007). The study associated lifestyle transitions such as urbanization, changes in eating habits and obesity with the rise of hypertension. The findings from the study indicated that not less than a quarter of the KSA population suffers from hypertension (Al-Nozha et al. 2007). Hypertension is a key factor in cardiovascular, neurological and renal disorders. Its asymptomatic nature makes it fatal since it only gets recognized after damaging the target organ. There has been no complete cure for hypertension, but there are strategies to manage it at minimal levels. Pharmacological therapy and observing the recommended dietary habits are some of the mitigation methods for hypertension. Healthcare providers working closely with the people of KSA must implement dietary guidelines such as low salt intake as well as engaging in physical activity to avoid obesity and going for regular checkups to keep hypertension at bay.

A study by El Bcheraoui et al. (2014) determined that 13.4 % Saudis aged 15 years or older have diabetes. This study revealed the high rate of diabetes among young people in KSA and called on the Ministry of Health to impose awareness about diabetes among the population. More importantly, these authors called on the participation of other ministries in order to offer a comprehensive socio-cultural approach to combat this disease.

The undesirable outcomes of health on the inhabitants of KSA are mainly due to the cultural shifts, such that the bodies of these individuals are incompatible with the new diets. The Saudis' daily diets comprise high levels of fats in culturally significant foods (DeNicola et al.

2015). The cultural custom of displaying generosity to others contains the features of having these individuals overconsuming the food. Additionally, frequent social occasions among the Saudis encourage the participants to eat unnecessarily without considering the choices of diet that might later compromise their health (DeNicola et al. 2015). Through such factors, those individuals develop unhealthy eating habits that cause weight gain and obesity.

### The Environmental Cost of Dietary Choices

Modifications of the type of food we eat have the potential to impact land use and water use as well as human health. Food production for meeting human needs requires large pieces of land as well as a large volume of water. As a result, these heavy demands have brought massive negative impacts on the environment. Also, the activities cause elevated greenhouse gas emissions (GHGE) released from the animal manure and burning fossil fuels to run the food machinery. Willette et al. (2019), in their new study reveal the Commission's objective to support scientific targets to reduce environmental degradation caused by all levels of food production. There is strong evidence indicating that food production is one of the largest factors of global environmental change. That it causes climate change, biodiversity loss, freshwater use, global nitrogen, and land-system change. Food production has a significant role to regulate a steady earth system that supports sustainable food production globally (Willette et al. 2019)

Naja et al. (2018) evaluated and compared the footprints related to the environment through the trends of food consumption in a group of Lebanese adults. That came after the release of sustainable development goals that require the population to observe sustainable consumption and production. Furthermore, the goals call for "sustainable diets" that are under analysis to determine their impacts on the environment



as well as their health implications. The healthy dietary patterns will reduce the environmental impacts by controlling land use, water use, energy use, and greenhouse gas emissions. The findings of this study indicated that among Lebanese adults, there were high environmental footprints of the Western and the high-protein dietary patterns, whereas the Lebanese-Mediterranean dietary patterns comprised of plant food ( olives, vegetables, fruits, cereal, and legumes) had minimal GHG emissions and water use (Naja et al. 2018). Joining the past results of the beneficial impacts of Lebanese-Mediterranean patterns on health, the findings of this study lend the facts that whatever human beings terms as healthy to them apply to the ecosystems as well.

Nelson et al. (2016) updated the systematic review (SR) of comparing various different patterns to improve the understanding of the foods and eating habits that have minimal environmental impacts while fulfilling the nutritional requirements and promoting health. The US Dietary Guidelines Advisory Committee conducted an earlier SR in 2015 after being appointed by the federal government to give information on dietary guidance. The recent SR concurred with the strengths and conclusion of that previous one that suggested that adhering to the well-formulated dietary patterns that include vegetarian diets, Mediterranean-style diets, and dietary guidelines-related diets, among others assist in achieving improved health and less negative outcomes on the environment. The study further proposed that the multiple benefits achieved from dietary shifts come through elevating the consumption of vegetables, cereals, and fruits while lowering the intakes of processed foods and animal-related products that cause the undesirable environmental results. For the sake of saving the present and future generations, there is a need to comprehend the interaction between sustainable diets and the health of the population.

The study conducted in Sweden involves analyzing, presenting and discussing the results using the amount of greenhouse gases and energy consumed in the lifecycle of some animal-based sources and plant-based sources. Carbon dioxide, methane, and nitrous oxides under the Greenhouse gas emissions (GHGE) produced during human activities such as food production are known to absorb infrared radiation thus leading to climate change on the planet. The results from the lifecycle analysis presented indicated that plant-based sources such as carrots, dry peas and potatoes had the least amount of emissions. The study further compares the amount of greenhouse gas emissions and the energy derived from the crops. The outcome is that whenever the evaluation only involves the factor of energy, there is the possibility of having under-evaluation of the most essential stages in the life-cycle. This is because by expressing the GHGE in energy basis modifies the categories of foods, with the difference between the plant-based origin and those from animals reducing significantly. Consequently, the goal of controlling the pollution from the greenhouse gases may be sub-optimized as seen when transporting the crops to the consumer which is part of the life cycle analysis. Additionally, the functional unit of a food is a key element in the lifecycle analysis as this refers to the unit of product for expressing the environmental impact indicator, that need to have a link to the function of the food product (Carlsson,1998).

The concept behind the observation is that the former had an animal-based product while the latter had only plant-based sources. Hence, products from animal origin are energy intensive and emit higher GHGE amounts than plant-based products. Therefore, for the sake of controlling the environmental impact caused by food consumption, the recommended choice for a sustainable diet should entail reducing the amount of meat intake and raising the consumption of fruits, starchy foods, and vegetables. By taking the consumption patterns of the selected foods in

this study to determine the values for the greenhouse gases emissions, the results are compared with the existing standards on the sustainable levels of GHGE (Carlsson,1998).

The study concludes that the contemporary patterns of food consumption in developed nations surpass the sustainable limits of GHGE to the environment by an approximate factor of 4. The trends are alarming and pose a threat to the realization of sustainability in the patterns of the consumed food to ameliorate climate change while meeting the dramatic increase in food demand for the growing population as targeted by 2050. The vegetarian meal gives the least amount of emissions and highest nutritional levels. A sustainable diet must meet the requirements of having an affordable price, low environmental impact and high nutrient quality to maintain consumers' health among other goals. Consumers have that capability to influence a change in having sustainable food production systems and the dietary choices they take (Carlsson,1998).

Another study also established the connection of greenhouse gases emissions (GHGE) from the lifecycle analysis of products. This is along the food production and long-distance distribution to the last consumer, also known as “food miles.” The distribution and production phases have been cited as key sources of GHGE in addition to other emissions altering the nature of the environment, and by addressing the steps concerned consumers get a chance to minimize the “carbon footprint”. The authors recommend that making a dietary shift is one of the most efficient strategies of reducing the mean food-related climate footprint of the household (Weber & Matthews, 2008).

Nutritional professionals and policymakers need to work on creating awareness among the people about dietary choices which impact the environment. They need to boost the local sustainable food production to achieve food security and promote a sustainable environment.

While the adaptive and mitigation strategies to face food security amidst the harsh environmental conditions have been extensively documented, the impact of human actions, specifically the change of dietary habits on the environmental challenges in Saudi Arabia, remain unexplored. That presents gaps in empirical research calling for the need to determine the actual connection between the dietary shifts and environmental problem in the KSA. Consequently, If the land of Saudi Arabia cannot meet the domestic need of the population due to the harsh environmental conditions, the previous strategies may not be sustainable especially with the solution of the importation of food that accelerated environmental problems and food security. One of the effective and sustainable solutions could be shifting eating habits toward sustainable diets that support the health of both humans and the environment.

## CHAPTER 3: METHODOLOGY

The Data for this project was collected in 2018 during the months of June, July, and August. This ethnographic study was conducted through observation and interview to gather qualitative data from Saudi women over the age of 40 who are in charge of feeding their families. For this project, because qualitative analysis offers a more comprehensive approach, unstructured and semi-structured interviews were used to elicit perceptions of the connections between food choices and environmental problems, specifically what factors affect what women choose to feed their families.

Ethnographic research has many options for data collection that includes quantitative measurements, participant observation, unstructured and semi-structured interviews. The use of these instruments depends on the research question. The researcher in this study chose qualitative research since this method aims to understand human behavior and the reasons for this behavior, values, experience, and knowledge. Through this approach, qualitative research allows the researcher to gain perspective on the topic while maintaining analytical flexibility to pursue interesting leads. These approaches translate descriptive data into rich cultural understanding (Bernard, 2017). However, the method is time-consuming.

### Sampling Methods:

A total of 15 interviews were conducted with women of varying educational levels. Ten women were interviewed face to face and five were interviewed by phone. Three of the women interviewed face to face were also observed in their homes. Informants were identified through purposive and indirect, snowball sampling, also known as chain referral methods for studying hard to find or hard to study populations. Therefore, this method is suitable because the

researcher was able to target elderly participants. In addition, this method was convenient since the nature of the study aims to get a specific perspective on a cultural phenomenon (Bernard 2017).

All the participants for this research have been informed about the intention of the project and they agreed to take part in this work for their own interests. Information about the study was distributed through hanging posters at public events and through social media, especially WhatsApp Groups which is a common App in Saudi Arabia used by many women currently. Women who were interested in participating then contacted the researcher for more information about the study and to schedule an interview. In addition, participants were informed of the purpose and requirements of the study at the beginning of the interview and were given a written “Verbal Consent Document”. They were also informed that participation was voluntary and that they could withdraw at any time. Participants passed on the information to other eligible individuals, who then contacted the researcher. This approach helped to target women who were knowledgeable about the change of dietary habits and the environmental conditions over the year in the Eastern region of Saudi Arabia and who were interested to participate in this study.

The interview guide was designed to explore the following: How do women choose to feed their families and how has that changed over the years in ways that could affect the environment in the Eastern Region of Saudi Arabia? What drives food choices and food habits? What kinds of meat do they serve? What is their perception of meat consumption and their perception of the environmental consequences of food choices they make? Questions were developed assuming that food choices and eating decisions are formulated within social and cultural environmental contexts.

### Data Collection:

The participants were offered the chance to participate in a one-on-one interview with the present researcher to help her further explore questions about drivers of food choices and perceptions of environmental impacts over the years. The design of the study was meant to qualitatively assess how Saudi women talk about food through unstructured and semi-structured interviews. All interviews and observation with the participants were conducted in the Arabic language since the researcher is a native speaker and grew up in Saudi Arabia. This made women feel more comfortable and afforded the researcher the opportunity to meet and observe women. These interviews were transcribed and later translated into English. Since the interviews were performed in Arabic and the quotes have been translated by the researcher, this has affected some expressions which could not be directly translated into English. Oregon State University's Institutional Review Board approved the study protocol and methods of this research. All participants were informed about verbal consent and they were given a business card with the research title and the researcher's contact information, along with the contact information of the advising professor and the IRB.

Interviews with these women lasted between 30 minutes to 90 minutes. The interviews were arranged at a location that the interviewee preferred and felt most comfortable. Three interviews were conducted at a cafe and the rest were conducted at the informant's house. They invited the researcher to come to their houses when they scheduled the meeting. These interviews were recorded and transcribed. The researcher asked the participants' permission to be recorded and just took notes if they preferred. Most of them didn't agree to being recorded. After doing these interviews, the researcher recognized the importance of recording in order to capture more details. Therefore, in December 2019, the researcher asked permission from IRB to

do phone interviews with additional women in Saudi Arabia. The researcher asked her friends to explain to their mothers the importance of recording the interview and gave them confidence that no one would use this recording except the researcher. They were informed that these records would be destroyed after transcription. The researcher did five phone interviews and then deleted the older five interviews in which the researcher was only able to take notes.

Three of these interviewees were selected for participant observation who were more interested in the topic and accepted to be observed after interviewing. Participant observation lasted 3 days for each woman while the researcher was taking fieldnotes to describe these observations. Participant observation was mainly in the kitchens of these participants and the researcher accompanied the participants when they purchased food from supermarkets. The researcher observed these women's food choices and the sources of their food. This information proved crucial to uncovering emic perceptions during the observation and interview process. It also enabled observations of these women's food choices, validating the information elicited during interviewing.



### Data Analysis:

All interviews and field notes were transcribed and coded using Dedoose, a qualitative analysis software program. Dedoose coding was used to analyze and pull themes from the texts which addressed my research questions. In addition, Dedoose frequency of mention elicited factors that were most prominent. The difference of dietary habits, between the past and now, was extracted to illustrate traditional foods that were eaten in the past and still persist today. The common foods from the past and contemporary dietary habits were compared and added in charts, to note the change of eating habits over the years. The drivers of food choices were extracted including economic and health factors. In addition, cultural beliefs, accessibility of fast food restaurants and peer pressure factors among children were extracted, through the Dedoose frequency mention. The importance of serving red meat was extracted and coded in order to explain the cultural and health beliefs about eating red meat among woman. There was comparison between meat consumption over the years to establish the change. The perception of climate change and its impacts on the environment over the years was extracted and coded to establish the transition. The prominent perception of healthy food was analyzed in order to illustrate how women's health perceptions have influenced how healthy food choices work together alongside with environmental substantiality.

## CHAPTER 4- RESULTS

### Interview participants:

A total of 15 women participated in interviews, lasting an average of 60 minutes each. Interviews were usually conducted at interviewees' homes and some of them at coffee shops they chose. Most of them live in cities and three of them live in villages of the Eastern Region of Saudi Arabia. However, most of the participants grew up in villages.

According to my interviews, all the participants are grandmothers and they have some of their children still living at home. So, they are feeding both their husbands, their children and some of them feed their grandchildren as well. Three of them are teachers and home after 2 o'clock and the others do not work outside of the home. The majority of these women have a low level of education and while four of them are educated including the teachers.

It was revealed that the family finances of participants were varied. The majority of the participants are middle class status, five of them are high class status and just one woman is from the lower class.

The table below provides demographic information including whether they live in an urban or rural setting, the level of education, work and family finance. All names have been changed to protect the identity of the participants.

Table 4.1: Overview of Interview participants:

Name	Urban and Rural Background	Education Level	Family Finance	Work
Aysha	Urban	Educated	High	Working
Dalal	Rural	Educated	High	Not Working
Shaikah	Urban	Educated	High	Working
Hind	Urban	Educated	Middle	Working
Fatimah	Urban	Low Educated	Middle	Not Working
Asma	Urban	Low Educated	High	Not Working
Marim	Urban	Low Educated	Middle	Not Working
Saliha	Rural	Low Educated	low	Not Working
Abla	Rural	Low Educated	Middle	Not Working
Basimah	Urban	Low Educated	Middle	Not Working
Amal	Urban	Low Educated	Middle	Not Working
Fayza	Urban	Low Educated	Middle	Not Working
Aminah	Urban	Low Educated	Middle	Not Working
Noal	Urban	Low Educated	High	Not Working
Jamilah	Urban	Low Educated	Middle	Not Working

### Interview Themes:

From the interviews, the themes that emerged were all related to the complex process of dietary shift related to environmental problems. The following sections present an overview of the themes from the interviews, along with supporting quotes. Each theme has its own sub-themes and reflects changing eating habits experienced by these mothers. They include dietary habits of the past, shifting to western diets and persistence of traditional food, the drivers of food choices, the perception of red meat consumption and the perception of environmental consequences.

### Background Questions:

The interview conversations started off with questions about traditional diets that the women ate in the past, which provided me as a researcher with basic information about the participants' diets from the past and how that has changed over the years. In this section, it was revealed that the participants' food in the past was locally grown in their yard and their farms. The majority of the women grew up in a small town close to their food sources and they made their own meals for their families by themselves. For example, women usually had milk from their own cows and made yogurt, butter and *Laban*<sup>1</sup>. The women mentioned that they got their meat from animals they raised and some of them purchased meat from farmers in their neighborhood or from the local butchers.

Table 2 shows the most common foods that the participants were eating in the past: meat (lamb, beef, chicken) and eggs, milk and dairy (yogurt and cheese) and starchy food (rice, bread,

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<sup>1</sup> Laban is buttermilk that is other fermented dairy beverages used in Arab countries.

pasta). All the participants emphasized that rice with meat is the basic meal at lunch and they eat it every day. Bread was served mostly at breakfast with milk or eggs and at dinner with meat soup or yogurt. Some of the women mentioned they were eating *harees*<sup>2</sup> for dinner and sometimes they ate rice without meat. Dates<sup>3</sup> were important throughout the day. They would eat them with *Laban* for breakfast, lunch, and dinner.

Table 4.2: Common foods from the past.

	<i>Breakfast</i>	<i>Lunch</i>	<i>Dinner</i>
<b><i>Meat, Fish and Eggs</i></b>	**Eggs	**Chicken	**Chicken
	Been	**Lamb	*Lamb
	Lamb or beef liver	**Beef	Beef
		Dried Fish	
		Eggs	
<b><i>Milk and dairy</i></b>	**Milk	**Laban	*Yogurt
	*Cheese		*Cheese
<b><i>Starchy Food</i></b>	**Bread	**Rice	**bread
	*Pasta	**Potatoes	**Pasta
	Rice	**Zucchini	*Potatoes
	Lentil	**Carrots	Lentil

<sup>2</sup> (a traditional Arabic dish consisting of wheat and meat (chicken or lamb))

<sup>3</sup> A product of the date palm and is considered kind of dried fruit.

\*Lentil

\*Rice

\*Common    \*\* Extremely common

According to the results of my interviews, meat was prevalent in the meals of the past. It was obvious from the interviews that historically red meat in meals, depended on the social class of people. Several women mentioned that they didn't eat a lot of red meat and if they had red meat, they ate a small amount of it. One of the women explained:

We didn't eat much red meat; we usually were eating it on holidays or once every one or two months. Lamb or beef was important to provide when we had guests in our house. People didn't think it was enough to give chicken to guests. Some of them slaughtered sheep on the same day when they invited people to their houses.

However, several women from the high and middle class mentioned that they were eating red meat in the past more than today. They preferred to feed their families lamb or beef more than chicken or fish. One of the interviewed women confessed:

I remember we were eating red meat more than chicken, but these days people around us always alarm us about eating a lot of meat, they usually said that red meat bring diseases. Anyone with heart disease or kidney disease, they say it's because he eats a lot of red meat.

Other women emphasized,

In the past, it was important to cook dinner, women took the leftover meat from lunch and then made it for the dinner.... Not chicken I remember they ate red

meat more. They made a soup that included red meat, zucchini, and some vegetable and then served with bread at night

Table 4.3 shows the most common foods that the interviewed participants are eating today. These mothers confessed that they are responsible for preparing meals at home and sometimes their daughters help them in the kitchen. It is important to note that these participants mentioned that their children often eat outside the home or have meals delivered from restaurants. In this chart, we can see some meals that did not appear in the past such as cereals, waffles and crepes at breakfast and western food, such as pizza, hamburger, beef kabab, grilled chicken or beef, pastries and French fries in addition to chicken or lamb *Chawarma* at dinnertime.

Table 4.3: Contemporary dietary habits:

	<i>Breakfast</i>	<i>Lunch</i>	<i>Dinner</i>
<i>Meat, fish, shrimp and eggs</i>	***Eggs	***Chicken	***Chicken
		***Lamb	***Lamb
		***Beef	**Beef
		*Camel meat	***chicken or lamb
		***Fish	<i>Chawarma</i>
		***Shrimp	***beef Kabab
<i>Dairy</i>	***Cheese	*Cheese	***Cheese
	***Milk	*Sour cream	**Yogurt

		*yogurt	
<i>Starch</i>	**Toast	***Rice	***Pasta
	***Cereal	**Potatoes	*Lentil
	***Bread	**Carrots	***Bread
	**Sandwich	**Bread	*Rice
	*Bean	**Pasta	
		*Flour	
<i>Western food</i>	*Waffle	*Hamburger	***Pizza
	*Crepe		***Hamburger
			***grilled chicken or beef
			***pastries
			**French fries

\*less common      \*\*Very Common      \*\*\*Extremely common

Shifting to western diets:

The second theme encompasses some of the changes the interviewees talked about in regard to the shifting to western diets. These changes in their eating habits are connected to the recent transition of their lifestyle. The rapid development of the prevalence of western restaurants and fast food chains plays a significant role in the shifting of their lifestyle and their dietary habits. The women explained how their kids now have changed their eating habits and rely on unhealthy western foods both at home and at restaurants. One of these women compared her older children to her younger children and recognizes the changes in the foods the younger ones eat now compared to when their older siblings were young, “My kids, before they got



married, they didn't eat fast food meals, but these days, they eat a lot more of these harmful meals than before and my younger son eats much more fast food than his older brothers did at his age"

The majority of the participants compared their diets in the past and now. They mentioned how they were eating healthy food in the past and that their meals didn't include processed foods with so much sugar and oil. Now most of their children's foods include harmful ingredients. One of these mothers said.

I see how my kids prefer sweet foods that contain a lot of processed food that we didn't eat in the past. Instead, we were eating dates. We ate dates in the lunch meal and in the morning but now my kids don't prefer eating dates a lot. They like to eat cakes and chocolates. They also prefer to add different kinds of cream on the cake that include a lot of sugar and oil that affect their bodies

Most of the participants explained how their kids like to eat outside from restaurants these days even though they still like their mom's cooking. Many of the participants expressed their regret that their kids have been influenced by their peers when they hang out with them.

My kids prefer homemade food but sometimes they want to eat something quickly or sometimes they go out with their friend and gather with their friends or with their cousin and want to eat like them. They order from restaurants more during vacations and holidays

Most of the participants mentioned that they don't cook dinner these days. Saudi people usually eat their lunch at 2 pm but now with people working outside the home, people sometimes eat their lunch late, depending mostly on the father's work schedule. The mother below explained the reasons for no longer cooking dinner.

When I want to talk personally, in recent times I have been canceling the dinner these days. So, my idea is to let each one of my kids do his dinner by himself because they're grown up now and have become adults that they can be responsible for themselves. Also, because their dad usually comes late from his job and we usually like to share at least one meal a day together. So, I just make one basic meal a day that we usually have at 5 pm. Another reason also of no longer cooking dinner is because my kids like to eat from the restaurant.... Each one has a responsibility to do his dinner. If they want me to do their meal, I can do it for them, but they usually don't ask me.

Most of the women described how peer influences affect meal choices of their kids now. If their friends eat from restaurants, their kids eat from restaurants too. The mothers confessed that they don't want to be tough and prevent their sons from hanging out with their friends and eating outside. Daughters are more likely to order food to be delivered. Some of these mothers stated that they don't allow their daughters to hang out with their friends outside frequently. If their daughters want to gather with their friends, they usually invite them over to their house and then they can order from restaurants.

However, none of the women mentioned truly enjoying trying the foods from restaurants. Some tried the foods because their children were excited about the foods and encouraged them to taste the foods. One of the participants explained:

My husband and I never eat from restaurants. Through the school days, we eat maybe once a month from restaurants because my kids encourage us, but my kids usually when they feel hungry at night, they have food delivered from restaurants.

Most of the mothers confessed that they are starting to prepare western foods at home now because their kids required them to do so because they like American, Indian and Italian food. Some of them mentioned that they are preparing western food at home to pull out their kids from restaurants, “Unfortunately If we don’t do the western food at home, our young sons go to have their meals from fast food restaurants”. Another woman stated that she has been trying to prepare Japanese food at home now:

Western foods enter our meals now, so I try sometimes to prepare food like the restaurant food just because my kids like them and I don’t want my kids to eat a lot from restaurants such as the Japanese food (*Sushi*) that my kids like and I try to do it even I don’t like it.

Most of the participants mentioned that now they cook western foods at home. They mentioned that they have been preparing hamburger, beef, lamb or vegetable pizza and pasta at home.

Yesterday, I made hamburgers and put it in the freezer but that was not enough for all my kids. So, I told my son to buy a plate of meat from the butcher to fry at home. I thought they would prefer the hamburger from the store, but they preferred the hamburger that I made.

Other opportunities for the kids to try western food included going out to eat at restaurants and fast food locations. The majority of these women stated that their kids eat from restaurants approximately 2 to 3 times a week. The foods that were mentioned were pizzas, hamburgers, Indian food, Italian pasta, Shawarma, grilled beef or chicken which their kids usually eat from restaurants during dinner. The impact of women working can be seen in the frequency with which their children ate in restaurants. One of the working women mentioned that their kids eat

from restaurants every day, while an unemployed woman stated that hers never eat from restaurants at all since, she cooks a variety of western food at home.

Overall, all the mothers felt that, while some western foods were considered tasty, they also seemed to be unhealthier than homemade meals. The mothers were trying to understand the concept of healthy and unhealthy food related to diseases that affect their physical health. The educated women considered western food as processed food which causes an increase of chronic diseases (non-communicable diseases) for their kids. One of them stated that western food is usually imported, and it is not a healthy choice since these foods have high amounts of oil and sugar. While the health of individuals came up frequently when the women spoke of western food, the first time the environment came up in association with food was when one of the educated women connected eating in restaurants to the increase in air pollution that affects their health. She stated that the environment of restaurants causes the spread of microbes due to poor hygiene and then this is dispersed in the air.

Quotes below illustrate how three educated women perceive the connection between health and the chemicals, preservatives, and microbes in imported food:

when it comes to pasta, it has a lot of fat and white sauces, such as American and Italian sauces which have preservatives and chemicals components. All these sauces are considered processed food that harms our bodies and increases chronic diseases among our kids

ingredients of western food, like cheese and American or Indian sauces, come from other importing countries, and most of them are processed food and contain a lot of oil and sugar that harm people and increase diabetes and obesity

I see that these restaurants are not clean and eating there has been increasing diseases among people. It also increases microbes that spread contaminants in the air. As a consequence, human health is affected.

#### Drivers of Food Choices:

The interviewed mothers described their roles of feeding their kids and the many ways that their food choices are affected. The most common responses among all women is that they always try to choose and feed their families healthy food, however, they cannot control them sometimes. Some of the educated women revealed that they try to reduce the amount of oil and sugar in their meals, as these components increase cholesterol and diseases. They, instead, use olive oil as a healthy choice. One of the less educated women was more careful to provide fruit every day as a snack instead of cakes and chocolate. The educated women didn't reveal anything about fruit in their meals. Some of these mothers stated that they tried to read nutrition facts on the products to know about the components to see if these products are a healthy choice for their kids.

#### One of the women revealed:

I am really concerned about what my kids eat every day. I try to choose food that contains less fat and sugar... I usually read nutrition facts on labels of food products when I buy anything from supermarkets and ask about the components of any food I choose to make sure my kids eat healthy food.

#### Another woman revealed:

I always try to choose healthy food. I don't buy anything if I don't know about its components... even though I don't know exactly if these components are

healthy, but if I go to shop with my daughters, they tell me which kind of foods have healthy components... Sometimes people say we have been eating this kind of food for a long time and we are fine and don't suffer from diseases. I don't take this into consideration because I see how much foodborne illnesses have increased these days

The majority of the participants have noticed how they became more aware of the impacts of what they eat on their body health. One of the women confessed that the social media played a significant role in their life.

People now have recognized the relationship between what they eat and the effects on their body health. They start to see how some of the food brings diseases like cholesterol and heart diseases. A lot of information became easy to get and to learn. The social media has played a significant role in educating people and alarming them about unhealthy food on their bodies

Another mother confessed that the busy lifestyle doesn't let them change their unhealthy eating habits:

Nowadays, we have all things to change our lifestyle, but we don't try to control ourselves. We don't try to choose healthy food that protects our bodies from non-communicable diseases (heart diseases, blood pressure, diabetes, etc.). All of these are increased now. We have the choice to change our life style, but this is hard with the increase of the processed food, comfort food, and restaurants. Because we think our life is always busy, it is more convenient to eat outside instead of spending hours to prepare.

Many of the participants revealed their concern with feeding their kids unhealthy food. They expressed their regret of it being difficult to control their kids with the attractiveness of food choices from outside. Some of the women have been aware of diets because of the cost of healthcare and this makes them think differently about their children's diets. One of the less educated mothers mentioned how she started being concerned about their kids eating because she has been suffering from diabetes.

I am really careful about feeding my kids healthy food because I suffer from diabetes. So, I am afraid my kids will have this disease like me, but kids like sugar and sweet food even though you alert them many times. They first listen to you and obey, but then they don't care much. We have to advise them a lot, especially the teenagers. However, I see later that my older daughter reduces the amount of sugar when she drinks tea or prepares sweet food, as I always warn them about consuming sugar.

Another woman expressed her regret about not being able to control their children, "I try to choose and cook healthy food to feed my family. I don't let them eat from a restaurant but sometimes I cannot control what my kids eat if they are outside with their friends and they are influenced by what their friends eat."

Most participants revealed that the available and accessible restaurants affect their food choices. Of all the family members, the children seemed the most likely to eat from restaurants, especially fast food restaurants. Several women who live in the village stated that their sons eat more from restaurants than their daughters, as they usually hang out with their friends at night.

Hanging out with their friends, as well as the variety and prevalence of restaurants, influence children to eat from restaurants and choose what they like to eat. Women who live both

in the city and the village made common comments about how the prevalence of restaurants and fast food restaurant chains have influenced their food choices.

One woman who lives in the city said

What helps our kids eat outside is that there are a lot of restaurants around us. In every street, you find a restaurant. All my kids like to eat from restaurants, and one of my kids doesn't like rice so she always wants to order from a restaurant. Also, if she gathers with her friends, they like to order from fast food restaurants

One woman who lives in the village said,

My kids go by themselves and buy this food. These restaurants are behind our house, so that makes it easy for them to buy their meals. These restaurants are everywhere now, and that facilitates people to eat outside or order their meals at home.

Several of the women confessed they don't prepare dinner these days since there are a lot of restaurants around them and their kids like to eat outside. One of these mothers explained that "Today I don't cook dinner because most of my kids go outside to eat since it is easy to get their meal from any close restaurants. Also, my husband and I don't prefer to eat dinner at night."

Furthermore, another common response to the drivers of food choices is familiarity with food. The women explained that they chose and cooked what they were familiar with, usually what they learned from their mothers and have been cooking for many years. One of these women said, "I choose this food because I am familiar with it and I know the ingredients I need for these meals since both my sister and I have used them for many years." One of the women from the middle class mentioned that they buy what they are familiar with, no matter the price.



I don't take anything if I am not familiar with the components of the food. I buy from specific supermarkets ...even when there is a discount, I don't take anything because I have not tried it before. I don't care about the price. I take what my kids like and we always eat this in our meals.

The women focused on a preference for fresh ingredients, especially with the traditional diets as they know about the taste. Most of the women who either live in the city or the village professed that they always buy fruits and vegetables from local outdoor markets, not only because of economic or environmental reasons, but because they know the market vendors and they have purchased from them for many years. If necessary, they purchase the ingredients from supermarkets to save time, as the supermarkets are located close to their houses, but, in general, they prefer to buy from outdoor markets.

Most interviewed mothers confessed that the cost of the food doesn't affect their choices, so they purchased what they like and need, whether it is cheap or expensive. Middle- and high-class mothers explained how they can afford what they want and like to eat. One of them said, "I purchase from specific companies even though there is a discount from another one that is similar to what I want... I don't care about the price. I take what we and my kids like". Another woman from the middle class emphasized that "We don't think about how much we spend on food even though we are considered middle status. We can afford the cost of healthy food even though it is much more expensive."

Many of the participants commented that their kids now usually carry money with them which makes it possible for them to buy from restaurants anytime they want. One of these women mentioned,

My kids usually go to play in the park and they usually have money, so these facilities make buying fast food easier... Also, they want to eat like their friends who eat usually fast food. ... They walk together and buy their meals from restaurants. So, these factors encourage them to eat from restaurants.

However, there are several women who confessed that the cost of food affects their food choices as healthier foods are more expensive. The woman from the low class stated that they cannot afford the expensive food.

It depends on our income if we can afford these foods or not. Some rich families have high income, so they can decide which food they want to eat. They can choose the healthier food that has good quality even though is more expensive. In comparison, other people cannot afford the cost of healthy food, so they don't have a choice in deciding. They take the cheaper one whether this healthier or not

Another woman from the middle class emphasized that eating outside wastes their money and she cares about saving money. She said,

People who cook and eat at home can save money more than those eating out. I always tell my kids to not eat out and let us save money. If we eat homemade food, we will save money, but my kids always say that, if I am tired, they don't want me to cook, so we buy food from a restaurant instead.

One of the middle-class women stated that people who eat more meat are from a higher class.

This depends on the income of the family. For example, if the income is high, they will eat more meat, but if the income is low, they will alternate meat with another source of food... Eating meat is more expensive than eating a plant-based diet

One of the middle-high class women stated that eating outside the home is expensive but kids want to eat quickly instead of waiting for their moms to prepare their meals.

The food from outside is not cheap, to be honest, I don't see it as cheap, I see it quick and comfortable food and ready to eat. They say, instead of waiting for the meal to be ready and spending hours to prepare it, we can bring it from a restaurant, so it's easier than cooking.

Persistence of traditional food:

The third theme from the interviews focused on maintaining traditional foods. The mothers emphasized that their favorite foods were those that were traditional to their culture. Although several interviewed women felt that their children sometimes like to eat from restaurants, many explained they always prepared the same foods that they had prepared many years ago and their kids like traditional meals too. When asked about the family's daily meals, the most common responses were about traditional homemade meals such as rice, with vegetable and meat, or soup. All participants ensured that traditional food especially white rice with meat (lamb, beef and chicken) is the common traditional diet which they maintain eating every day because it is easy to prepare and their family members like it. Some of the mothers explained that for something to be considered a "meal" it must include meat, bread, and rice.

To preserve traditions and maintain family cohesion, families spend the time to share traditional meals one time a day during lunch or dinner depending usually on the father's work schedule. These mothers are the main food-preparers in the home, and they felt it is important to expose their children to the same foods that they themselves had grown up with. Some of the participants emphasized that,

even though our lifestyle has changed, these days, rice and meat are still important in our meals. Rice still is the main dish like in the past, even though the lifestyle has changed, we still like it. The only thing that we could say has changed about rice is the way of cooking it. This has changed a little bit, but not too much, and we are beginning to increase the amount of meat in our meals

Most participants described the importance of eating meat in their meals since it is considered to be a traditional habit. One of the participants stated, “Eating meat during lunch and dinner is a traditional habit that still exists in some families.” One of these women emphasized the importance of meat “even though one of my daughters doesn’t like to eat meat with rice, she does grill lamb or chicken served with bread”

Some of the participants mentioned that they sometimes feed their families other kinds of traditional meals with meat for example, they cook *hareese* or pasta instead of cooking rice. The participants described that these traditional foods, were provided at dinner in the past but now most of them do it during lunch and through the holy month (Ramadan).

On a daily basis, the most common foods mentioned included dairy products such as cow’s milk, yogurt, and cheese. Mothers feel that eating less food at night is healthier for their bodies, so they don’t cook dinner. They instead rely on dairy products like eating yogurt or cheese with bread at night. Many of the mothers mentioned that they no longer produce their dairy products at home, like in the past. Instead, they get them from supermarkets. Some of the less educated women explained how they changed their eating habits at dinner and don’t eat meat at night in order to keep their body healthy. They eat dairy products instead. One woman said, - “It is not healthy to eat meat or a big meal before sleep. It would be much healthier if we just ate a small meal like bread and cheese.” Another one said:

Today dinner is not important, and it is not considered the basic meal. At dinner, some of my kids want to eat cheese with bread and some of them want to eat French fries. This depends on what they like to eat.

In addition, the majority of the participants revealed that milk is still important for breakfast like in the past, even though the form of it might have changed. One woman said “Our food has changed compared to the past. Now, we always eat cheese with bread, and our kids always eat cereal with milk nowadays”. Some of these women who lived in the village still maintain the traditional habit of eating dates with milk in the morning and sometimes even for dinner. “We sometimes don’t eat rice and meat at dinner like in the past, instead we eat cheese and yogurt with olives. Also, we sometimes just eat dates and drink *laban* (fermented cold milk)”

Most participants associated good health with traditional foods. They believed that the natural and fresh ingredients of their traditional foods have better nutritional elements. The majority of these women described traditional meals as food that doesn’t contain processed ingredients or much fat and sugar. One of the mothers said, “Most of what I cook at home is healthy, because I usually cook traditional food that consists of vegetables and whole grains to make sure we get the necessary nutritional elements”. Another one stated that “traditional food is healthier because it contains natural ingredients like vegetables and fruits without any processed foods”

Another woman explained that traditional food is healthy since it has less fat.

Most of our meals depend on the products of western food, but I still make traditional food at lunch because I think these kinds of foods are healthier for my

children. Rice and *harees* with lamb, beef, or chicken and oat soup are healthy because they don't contain much fat.

However, one of the participants didn't consider traditional meals as healthy and emphasized that women cook it because they are familiar with this kind of food and it is just a habit.

In the past, some women fed their families healthy food and sometimes unhealthy food just because they were familiar with these kinds of foods and it was a habit to cook like this. I don't think that all traditional food is healthy, but we can make it healthier if we reduced the oil and fat when we cook instead of doing it in the traditional way

Perception of red meat consumption:

Most of the participants believed that meat consumption is important for their body's health especially lamb and beef. They believed that red meat is the basic element of protein based on what they have heard throughout their lives. The majority of educated and less educated women commented that they eat red meat just in moderate portions, so it doesn't affect their health negatively. The level of education did not make a difference in the consumption of meat in my sample. Most of the participants stated they eat lamb or beef twice to three times a week. All of the participants revealed that the source of lamb and beef is local, and they never eat imported lamb or beef in order to guarantee that the meat is Halal<sup>4</sup>. Some interviewed women stated that they sometimes don't like to eat from restaurants because they don't know about the source of

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<sup>4</sup> Halal is the method of slaughtering an animal in the Islamic way to make sure an animal is killed in one swift cut to its throat. The word Halal means permitted meat.

the meat in these restaurants. They fear that imported meat is not halal, even if it is listed as halal.

The importance of red meat as necessary to body health was voiced by the interviewed women. One of the women said that red meat is healthier as she heard from people “Red meat has many benefits and it has a higher quality than chicken. We feel that red meat is healthier than Another woman said, “There are alternatives to meat, but for me, I don’t think it is a good thing to stay one week without eating beef or lamb.”

Some of the participants described how red meat is important in their traditional habits and they should eat it several days a week. The participants described the importance of providing meals containing red meat for guests who come to visit their family. Another common response mentioned is that it is standard to eat red meat at social gatherings, such as holidays:

During holidays, we always make beef when we gather with our family as a kind of fancy meal. Also, when inviting people to our house, we make sure to prepare beef. This is one of our old customs that our parents also followed in the past. Nothing has changed now with regards to the importance of providing red meat on holidays or when inviting people.

However, some of them revealed that red meat causes diseases, so they try to not eat much of it. The interviewed women agree that eating too much meat brings diseases. One of these women mentioned that “We don’t eat red meat a lot. We just eat it two days a week because it is not healthy in excess and it can cause kidney disease.”

Another woman emphasized that people became more aware of eating meat and increasing disease:

They eat lamb more than chicken, but these days they said that red meat brings diseases. For example, more people have heart disease, and they believe this is due to eating a lot of red meat. They also have kidney disease and high blood pressure, too. Anyone who feels pain in their legs, it is said that it's because of eating red meat. That's why they have been reducing eating red meat these days.

One of the educated women stated that kids need protein, but there are protein alternatives to red meat. "It is important to eat one kind of protein source a day, but there are alternatives to meat, like eggs, lentils, and legumes. If you reduce the protein from animal-sourced food, you can replace it with plant-sourced food".

Perception of environmental consequences:

The last theme from the interviews described the perception of the environmental consequences of food choices. The theme described the change of environment over the years and what the participants have noticed. The participants were asked if they take into consideration environmental issues when they choose their food and about the connection between their meat intake and increasing environmental problems in their region. The most common answer to this question among all women (whether more educated or less educated) was that they don't have any idea about the connection between food choices and environmental issues. Many of them after talking with me were wondering if their eating and the change of their dietary habits has aggravated environmental problems, such as the change of climate and water scarcity.

When I asked them, what were the causes of climate change, the common response concerned the increase of factories and transportation that release gases in the air. This answer was mostly among educated women. One of them mentioned that "factories and transportation



are the biggest factors that increase climate change's effects, which increases the temperatures and pollution around us." Another woman stated that pollution causes climate change, claiming that "pollution that comes from transportation and industries."

Speaking of the effects of climate change, the participants listed what changes they have noticed in their environment over the years. Several mothers listed rising temperatures and increased air pollution. One of these women explained, "We have noticed the increase of temperature, decrease of the rain period and, as a result, our environment has become drier." Another woman who lives in the city said that there is an increase of contaminants in the air. "The climate has changed our environment by increasing high temperatures, reducing the rain, and increasing draughts. There are a lot of contaminants in our air that have the effect of increasing diseases such as asthma."

Some of the participants described the effects of the environmental changes on farmlands that have been destroyed.

There is no interest in planting crops as in the past when farms were considered as the source of living. Now, most farmlands are destroyed to build houses instead of planting on this land. Farmers are not able to plant many kinds of crops like in the past because of the weather, so the government has to import crops from outside.

Another woman emphasized that, "My brother has a farm and he tried to plant some crops, but the plants died because the weather is so hot and dry, unlike in the past." Another uneducated woman noticed the decreasing food production now. "In the past, we had farmland close to our house and we grew food on this land. We planted tomatoes, cantaloupe, mango, and everything, but now there is nothing... maybe just lemons."

Water scarcity, a significant issue in Saudi Arabia, was mentioned by just one of the educated participants who lives in a small village that is considered farmland. She explained that even though water scarcity is a big issue in Saudi Arabia, people in her village have several ground water springs and many farms. She explained that most of this farmland is not owned by the people in her village who only work the land. The farms are owned by people who live in the cities who don't really care about the land and often construct housing developments on it. She said that now people in her village are starting to care about this farmland. She mentioned how the government ignores good farmland with springs and instead establishes farms in the desert. She stated:

“There are several springs that are buried now because there is no more water. We always remember how when we were little, we ate from the crops that were produced on the land. All our food came from these farms.... ... My husband and some men are working on this project, and their aim is to save the springs and the heritage of our farmland.... My husband works to make the project official and save our heritage. People who have the ability and can afford the cost of the land are starting to buy farmland and to become owners and care more about the farms”

## CHAPTER 5- DISCUSSION

The research objective of this study was to explore the relationship between the change of dietary habits over the years and the environmental problems in the Eastern region of Saudi Arabia. The research questions were:

- 1- How do women choose to feed their families and how has that changed over the years that could affect the environment in the Eastern Region of Saudi Arabia?
- 2- What drives food choices and food habits?
- 3- What kinds of meat do they serve and what qualities do they perceive in different kinds of meat?
- 4- How aware are women of the environmental consequences of food choices they make?

The following sections attempt to answer the research questions using the themes from and the topics discussed during the interviews in addition to insight from the literature.

### Maintaining Traditional Diets and Shifting Dietary Habits over the Years:

The role that women play in influencing food decisions is essential in comprehending the change of families' dietary habits and it has not been widely studied. The mothers in Saudi Arabia are one of the decision makers in food choices in the family unit as they have been charged with feeding their families since ancient times. Therefore, choosing mothers with older children in this study was effective because they could elaborately explain how the dietary habits have been shifting from generation to generation from the past to the present time. These mothers went through the change of dietary habits from their childhood to that of their children. Therefore, they are the perfect respondents to assist in comparing and contrasting feeding patterns of the past and today. The data from these mothers inspired this research in attempting

to connect the change of dietary habits and environmental consequences over the years which will be discussed in the last section of this chapter.

The first research question in this study of how women choose to feed their families and how that has changed over the years was inspired by previous research which described nutrition and food consumption patterns in the Kingdom of Saudi Arabia (KSA). The answer to that question demonstrates similar results to the previous research by (Adam, Osama & Muhammad, 2014). The interviewed women mentioned that they still choose to feed their families with traditional food while at the same time they have shifted to Western food because of lifestyle changes over the years. The Saudi women revealed that traditional foods (rice and meat) are still important in their meals that they prepare once in a day for lunch or dinner in addition to the consumption of traditional dairy products (milk, Laban and yogurt). However, they have shifted their eating habits to Western diets including hamburgers, beef, lamb, vegetable pizza and pasta that most of their children eat in the fast food restaurants at dinner as noted by DeNicola et al (2015).

Dietary habits of Saudi people have changed drastically due to improved socioeconomic conditions and an increasing urban lifestyle which led to the rising demand for red meat (Selvanathan, Albalawi, & Hossain, 2015). Meat consumption among Saudi people increased between 1990 and 2007 from 26 to 139g/ per capita/day marking a rise of 435% (Adam, Osama & Muhammad, 2014). The interviewed mothers in this study confessed that meat is one of the most fundamental traditional components of their meals both in the past and today. However, they did not eat high quantities of beef, lamb and fish in the past because their consumption rates for these meats were widely spaced across several days of the month. Fish which is a white meat and one of the recommended alternatives for red meat was a scarce commodity. These women

further stated that the consumption of lamb, beef and fish have increased these days such that they eat either lamb or beef twice or thrice in a week. Findings by Selvanathan et al. (2015) indicated that Saudis have traditionally relied on lamb, goat, and camel meat for their sustenance. However, the socioeconomic changes over the last 50 years have impacted meat consumption habits, where beef, chicken and fish now constitute the main Arab diets. Selvanathan continued to note that beef and fish are considered necessities and mutton and chicken are luxuries (Selvanathan, Albalawi & Hossain, 2015). In the present study lamb, beef and chicken are most commonly consumed these days.

The mothers emphasized that their favorite foods were those from their traditional culture that are based on meat, bread, pasta and rice. Some of them explained that for something to be considered a “meal” it must include one kind of meat and one of these starches (bread, pasta or rice). The most popular cookbook in the Middle East shows that main meals include meat and either rice, bread or pasta, just as the women mentioned in this study. This cookbook "*Matbakh Manal Al-Alem*"<sup>5</sup> in Arabic "مطبخ منال العالم" is considered the standard cookbook which covers a wide variety of recipes that fit the tastes among people in Middle East. Furthermore, this book is considered unique because it includes the traditional cuisines presented in different ways. Some of the women that I interviewed stated that they still cook traditional meals, but sometimes they do it in different ways today. I found one of the popular dishes in this book which most of the participants mentioned in this study, macaroni pasta with *Pechamel* which they called it in Arabic "بشاميل". This dish includes these ingredients: Vegetable oil, garlic, black and green pepper, onion, mincemeat, a variety of spices, salt, cumin, flour, butter, milk, pasta and Mozzarella cheese. This dish has common ingredients that the interviewed women mentioned in

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<sup>5</sup> There is official website for the cookbook with recipes in English. <http://www.manalalalemrecipes.com>

this study. Look to the contemporary dietary habits chart 3. The interviewed women also prepared the same dish but in different ways than in the past, but without adding flour, milk and cheese, instead they add tomatoes with the other ingredients. These women stated that they sometimes make it the traditional way and sometimes use contemporary recipes as their kids prefer.

### The Drivers of Food Choices

One of the objectives of this qualitative study was an attempt to understand how decisions relating to food purchasing, preparing and consumption are made by Saudis women. There are some factors that influence food choices among Saudis women today which include health, economics, availability and accessibility of restaurants and peer pressure among the young generation. Following the current growing awareness and consciousness about health matters due to the high prevalence of non- communicable diseases that are cited to be from poor food choices, health is the central driving force in the choices of food made by mothers today. The word of health which is a single word in Arabic has the common name (الصحة) “alsahuh” or less commonly (العافية) “aleafih”, both of them mean in English, health. There are many different concepts of the word of health (الصحة) among the interviewed women health means healthy food (nutrients) which relates to bodily health and diseases. In addition, the word of (الصحة) in this study refers to spiritual health related to food which these interviewed women mentioned. Food is intertwined with their religious faith, values, and beliefs, especially concerning meat which I will discuss later. In the present study, when I asked these women in Arabic “هل خياراتك الغذائية تعتمد على خيارات الغذاء الصحي؟” which means in English “Are your choices based on healthy food choices?”, most women used these words in Arabic related to healthy food “الغذاء الصحي”, “الاكل” or “” الصحي” or “الطعام الصحي” which means healthy foods or healthy eating. They mentioned that

traditional foods are healthier since these foods have natural components which are grown in farms and gardens and made at home. They don't contain artificial ingredients or preservatives. and don't have. They connected processed western foods, such as fast foods from multinational chains with excess sugar and oils that increase the risk of diabetes, blood pressure, and high cholesterol.

In this study, it appears that the level of education does not make a big difference among the participants where both educated and less educated mothers in the Eastern region were trying to understand the concept of healthy and unhealthy food related to diseases that affect their body health. The difference between these two groups appears when talking about obesity and non-communicable diseases (NCDs). The educated Saudi women used these words in Arabic "السمنة" which means in English obesity and they used "الامراض غير المعدية" which means in English non-communicable diseases or chronic diseases. These women have recognized that Western processed foods yield increased rates of obesity and non-communicable diseases. However, the less educated women mentioned non-communicable diseases without reported exactly the name of "الامراض غير المعدية". For instance, they reported that preparing meals with a lot of oil increases the risk of blood pressure and high cholesterol, and that sugar increased diabetes. In the recent years, Saudi Arabia is encountering an increased burden on healthcare services greatly as a result of the shifting patterns of disease from communicable to non-communicable diseases in order to the change of the lifestyle. Frightening increase in "cardiovascular diseases, diabetes, cancer and chronic respiratory diseases", which the treatment of these diseases is expensive, represents 78% of all mortality (Hazazi & Chandramohan,2017). According to a survey by the Kingdom of Saudi Arabia and the Institute for Health Metrics and Evaluation, diabetes, obesity, high

cholesterol and high blood pressure are among the leading conditions that affect a growing number of people in Saudi Arabia (Mokdad, 2014).

A 2017 survey by the General Authority Statistics of KSA indicated that in the population, 1,327,646 individuals were suffering from high blood pressure, 1,450,296 from diabetes, 226080 from cardiovascular disease, and 33881 from cancer. DeNicola et al. (2015) revealed that the Eastern KSA has seen especially dramatic growth in the spread of overweight people and obesity over only the past few years because the Eastern region is an oil-producing province and has the longest history among KSA regions of shifting to westernized habits.

The participants reported that the two basic components in their meals that have the potential to impact their health and lead to diseases are sugar and oil. These women revealed that they were aware of the consumption of cooking oil being attributed to increasing cholesterol levels and risk of suffering from cardiovascular diseases. Therefore, they were trying to reduce the amounts of these ingredients during the cooking process to prevent the feared health risks. Willett et al. (2019) in their study cited that exceeding sugar intakes leaves one susceptible to being overweight, type 2 diabetes and other conditions. The WHO recommends that the daily intake of sugar should not exceed 10% of calories and that decreasing the amount to 5% may yield more positive impacts (Willett et al. 2019). According to my research participants, they have heard that most types of oils are unhealthy and hold the potential to negatively alter their health, leading to chronic diseases. It appears that they did not recognize that “edible oils are always a combination of saturated, mono- unsaturated, and polyunsaturated fatty acids, depending on the source and processing” (Willett et al. 2019). They might not know that oils which contain unsaturated fatty acids are healthier than those of saturated fatty acids and those



high in polyunsaturated fats that include omega-3 and omega-6 fatty acids reduced risk of cardiovascular disease (Willett et al. 2019). Additionally, there is evidence supporting that some oils depending on their composition profile have the capacity to promote the health status of individuals such as the unsaturated vegetable oils, especially those high in polyunsaturated fats containing omega-6 and omega-3 fatty acids. These can reduce risk of cardiovascular disease (Willett et al. 2019).

Palm oil is the commonly used plant oil by women in the kitchen, with less attention being paid to soybean oil. A study comparing the chemical profile of palm and soybean oils acknowledged that consuming artificially processed palm oil increases the LDL cholesterol unlike the other saturated oils of plant origin which “palm oil is low in polyunsaturated fat (9% vs 60%) and high in saturated fat (52% vs 16%)” (Willett et al. 2019). Therefore, it seems that there is inadequate knowledge among the women on the kinds of oil which promote their health, and this makes them believe that most oils bring diseases and they have to reduce consuming them. Furthermore, oil palm is one of the world's most rapidly increasing crops which are considered disastrous environmentally. Increase production of oil palm contribute to tropical deforestation and impact biodiversity. This kind of oil has replaced large areas of forest in Southeast Asia. Further to impacts which cause increase pollution which including greenhouse gas emissions (Fitzherbert et al.2008). According to statistics in KSA, the consumption of domestic palm oil has increased rapidly from 2009 to 2018 which amounted to approximately 520 thousand metric tons in 2018 (Statista, 2018). Therefore, the excessive consumption of this oil impact the both the health of body and environment.

The results of this study suggested that these women have a growing concern about the choice of plant oil they use and currently go for olive oil in the daily preparation of meals since they believe it is healthy and comes with numerous health benefits. This finding is in line with that of a previous study which stated that a Mediterranean diet prepared with extra virgin olive oil has the capability to reduce the chances of cardiovascular disease and offers notable cognitive performance advantages (Willett et al. 2019). The participants did not mention any other kind of healthy oil such as rapeseed oil (canola oil) which appears to be uncommon in the region. It contains essential amounts of omega-3 fatty acids and it is high in monounsaturated fats (Willett et al. 2019). Willett et al.'s study further pointed out that continued consumption of dairy products with saturated fatty acids elevates the risks of suffering coronary heart diseases (Willett et al. 2019). Nevertheless, the women in my study traditionally consume dairy products with the belief of deriving health benefits. They do not realize that full fat dairy products contain fatty acids that may be harmful to their health.

The women I interviewed have developed concerns about their kids eating at fast food restaurants given the vivid negative health impacts today. They noticed that their kids frequently ate at these restaurants, exposing themselves to unwanted conditions such as obesity and diabetes. One is more likely to find most of the young generation going to these restaurants and changing their diets than their older counterparts. Many of the interviewed mothers mentioned that they rarely eat from restaurants and fast food chains. Instead, they prefer to eat traditional food. Furthermore, they prefer to feed their children traditional meals as they believe that those meals are healthier than processed food. The Saudi Health agency conducted a survey (SHIS) in 2016 of 12,000 households finding that the older individuals eat healthier food than the younger

ones, and the consumption of processed meat was higher among adolescents in comparison with the older people (Moradi-Lakeh, 2017). It is evident that in the present study the participants' children eat frequently from fast food restaurants choosing foods (burger, pizza and French fries) that are unhealthy. The women felt that despite the Western foods being tasty to their children, they are unhealthier than homemade meals. It is crucial to note that these women might have regarded the fast foods as unhealthy because they were aware that these restaurants provide processed meat and fried foods which have noticeable saturated oils. Naeem (2012) confirmed that the increase in junk foods in the KSA which have a high amount of saturated fats resulted in high vulnerability of non-communicable diseases. The results of a study by Gadiraju et al. (2015) too support that the intake levels of fried foods exceeding the required have close association with non-communicable diseases. From a practical standpoint, it implies that these women might have heard that the increased frequency of eating fried foods is unhealthy. They didn't understand that there are some cooking oils which can be healthy, like unsaturated fat, instead of all cooking oil being unhealthy.

From this qualitative study, I can report that these women got food, nutrition and health information from what they have heard through their life experiences and some of them mentioned that they acquired the information from social media today. Also, some of them stated that their children are more knowledgeable about the impacts of food on the health condition of the body as they get the information from their school work and recognize the consequences of unhealthy foods. Furthermore, it is clear that the mothers were aware of diet choices, especially when they worry about the health consequence that make them think differently about their children's diets. When the women had a dietary related disease, they were more aware of what food was healthy and were more concerned about their children's diets. One of the less educated

mothers mentioned how she is concerned about her kids' eating habits since she has been suffering from diabetes and she would not want to see her kids have a similar experience. Another study found that older people enjoy long life by adhering to healthy diets because they have more contact with care providers compared with the young individuals, and their continual commitment to dietary guidelines for recognizing and addressing the risk of diseases in time (Moradi-Lakeh, 2017). That trend threatens the future survival of the young generation who should be sensitized to the need of observing healthy eating habits.

Women participating in this study held the view that Saudi women today cook less than their mothers did. The presence of plenty varieties of restaurants and fast food chains was cited as a major reason why fewer Saudi women cook today, especially for dinner. A study by Bouznif et al. (2018) reported that the role of women in Saudi Arabia has a significant impact on food choices as they hold the current perspective that ordering meals from restaurants saves time, money and energy rather than preparing the meals at home. As a result, the trend has made many restaurants and fast food joints to shoot up dramatically in recent times. In the present study, employment among the women had little or no impact on food choices. Both the working and non-working women revealed that the availability and accessibility of restaurants have impacted their food choices and especially that of their kids. The women stated that these restaurants have become ubiquitous in their region. Most of them expressed their regret because they felt it was difficult to control their kids around these attractively packaged harmful foods. The kids preferred eating from the restaurants where food is already prepared instead of waiting for their mothers to prepare the meals. The habit of having meals outside the home with easy access affects the kids' choices. That finding in my study was consistent and similar with the results of other research. The previous research by DeNicola et al. (2015) mentioned that American fast

food chains have increased and erupted in KSA due to the rapid demand from the young generation and most inhabitants of KSA opt to purchase the ultra-processed foods from these outlets that continue to be prominent and easily accessible. Additionally, the rampant growth of the KSA food service market is because of the Saudis' demand for varied cuisines and new dining concepts.

Today food activists speak of food environments called food swamps and food deserts. These terms are not yet used in the KSA, but they are useful ways of depicting different contemporary food environments. An abundance of unhealthy food choices in a region is known as food swamps where ubiquitous food joints exist with the promise to nip hunger at any time of the day outnumber healthy food options and these are commonly found in neighborhoods with high income inequality and where dwellers are less mobile (Curley, 2018). Food deserts are communities where there is a limitation in accessing affordable and nutritious foods such as fruits and vegetables since there are no grocery stores at all that sell healthy alternatives. Even though Saudi Arabia lies in a desert, it is not a food desert. Saudi Arabia has many options of healthy foods across the country, such as grocery stores in each neighborhood which have fresh fruits and vegetables. A study by Rudd Center for Food Policy and Obesity exposed that there is a higher rate of acquiring obesity living within a food swamp compared to living in a food desert (Cooksey-Stowers, Schwartz & Brownell, 2017). In the present study, the participants stated that their children eat from fast food restaurants frequently instead of eating at home because there are many restaurants around them, and they can access them anytime they want. One of the interviewed women revealed that when her children feel hungry at night, they don't want to wait for their mothers to prepare foods as these take time. They prefer to get their meals from fast food restaurants close to them. Overall, the types of food sold in these junk food outlets include

sweet drinks and ultra-processed foods that are not healthy for the body. In addition, fast food and junk food joints aggressively advertise poor habits that influence the population, especially the youth, to remain over dependent. As a result, the high demand for these retail environments have made these stores spread across the country like wildfire (DeNicola et al. 2015). They include MacDonalds, Burger King and Pizza Hut that have opened several stores in most urban centers.

One of the mothers explained that their kids usually go to these restaurants as sources of entertainment not just for the ‘tasty’ food. When children hang out with their friends, they go to restaurants as entertainment hubs. Due to the nature of KSA having limited number of social recreation avenues such as cinemas, concerts and carnivals for the youth, these individuals from various age categories have found entertainment by frequently visiting the food joints that they now view as hubs for leisure and pleasure (DeNicola et al. 2015) (Bouznif, et al. 2018). Only a few studies exist on the effect of availability and accessibility of fast food restaurants and their impact as drivers of entertainment and young adults’ food choices (DeNicola et al. 2015). The effects of peer pressure on kids’ food choices have been minimally studied. The role that peer pressure plays in influencing food choices is important in understanding children’s dietary habits. In this study the shifting of their diets is not only be the result of their mother’s choices, but also the children’s desires as well. The kids would change what they usually eat and try Western food even though they enjoy their mothers’ cooking. These kids still like eating traditional foods served during lunch meals. However, most of the participants expressed their regret that their kids have been influenced by their peers’ eating style when they hang out with them and choose to eat from restaurants and fast food joints. The mothers stated that as a way of driving their kids away from these restaurants, they begin adopting Western foods in their

cooking to have the kids eat the home-prepared food instead of that from the restaurants that poses a threat to their health. That observation makes one insinuate that these children want to be more involved with the global culture by eating the foreign foods and not the traditional meals. They may want to be modern and not remain as traditionalists given the shift in feeding behaviors of their peers by eating western meals. Moreover, the children start eating East Asian cuisines which one of the mothers stated that she had begun preparing Japanese cuisine at home because her kids like Japanese foods and though she does not like the food she does it to keep her children from eating outside. The mothers agreed that their children learn about their peers' lifestyle through the modern technology platforms of social media such as Snapchat and Instagram where they share images of the Western dishes and consequently that has an influence on the Saudi kids shifting their feeding habits.

Based on gender differences from this study, the participants noted that their sons hang out late at night more frequently than their daughters and it is there that they interact with the unhealthy diets from the fast food joints. These mothers disclosed that they do not wish to be tough on their children by restricting them from hanging out with their friends and eating from these restaurants. However, given the traditions among the Saudis, the parents feel more comfortable having their daughters at home than being out at night. The girls are expected to remain within the compound to assist their mothers in cooking among other home chores while the boys are freely interacting outside. During my observations at the different homes of the respondents, I noted that the mothers would keep requesting the girls and not the boys to assist in the house preparing them for motherly roles once they are of age especially in feeding their families accordingly. In contrast, from the observation, the observed women were asking their

husband and their sons to purchase what they need from the supermarkets. It might be because the girls are more likely to be at home and another thing because the boys can drive and buy what the family needs outside. Since ancient times, families used to live under one roof where all the extended members of the family lived (The grandparents, their siblings, their siblings' spouses, and their grandkids). The normal routine was having one of the females taking charge in cooking for the entire family. The interviewed women confessed that they milked a cow with their own hands in the past, in addition to making *Laban* and yogurt at home. Diets have changed, but women continue to have a crucial role in choosing the type of food to prepare for their families. It could be more effective if the policymakers in KSA take into consideration the role of women in dietary shifting toward sustainable healthy diets and work to increase awareness about the effects that food choices and consuming specific kinds of meals have on environmental problems such as climate change and water scarcity as well as their impact on body health.

From the findings of this qualitative study, the cost of food does not affect the women's choices, since they purchase what they like and need, regardless of it being cheap or expensive. Some other researchers argued that the consumption of red meat was higher among individuals with higher household incomes (Moradi-Lakeh, 2017). That finding was not in line with my findings, the mothers mentioned that in the past the higher household incomes used to consume more red meat than others but today most families can afford the cost of red meat because it is readily available. Among all the participants, only the woman from the low class stated that she cannot afford the expensive foods which are relatively known to be nutritious. It appears that the economic factor has not influenced the food choices of most families in Saudi Arabia except the



few lower income families among the population. Nevertheless, the high and middle-class mothers stated that they can afford the expensive foods from supermarkets and they confessed that eating from restaurants is a waste of their money and they try to limit their kids from eating outside frequently. They stated that they cannot control their kids now that the kids usually carry some cash with them and go eating in the restaurants anytime they want. From a practical standpoint, it appears that the women take into consideration the cost of foods when it comes to eating from restaurants because they know these foods negatively affect the health of their family members. They also disclosed that they try to choose healthy foods even though they are aware that these foods may be expensive. Furthermore, these mothers do not care about the cost involved in purchasing familiar foods since they know about the attached taste and benefits as well as being the favorites of their family members. It is important to note that the mothers believed that traditional foods are healthy, so that does not affect their food choices even with the income levels but if these foods are now termed as unhealthy, they would then consider saving their money and not buying them. One of the most important traditional habits among the participants is the preference to purchase local meat, even though it is more expensive than imported meat because they trust that local meat is *Halal* and they will not concern about the source of imported meat. This buttresses the idea that considerations of healthfulness and religious belief outweigh concerns about cost.

#### The Perception of Consuming Red Meat

There is a strong belief among the interviewed women that consuming red meat is associated with improved health status. They believed that red meat which called in Arabic "اللحم الحمراء" is the basic origin of protein based on what they have heard throughout their lives. However, the majority of these women commented that they eat red meat just in moderate portions twice to

three times a week, so that it does not affect their health negatively. They believed that eating more meat than this brings several kinds of diseases such as an increased incidence of heart disease. This finding is supported by recent study that revealed the association of consuming high amounts of red meat as sources of proteins with increased susceptibility to cardiovascular related ailments and other outcomes such as diabetes, and some cancers (Willet, 2019). The consumption of meat is part of the culture derived from the Islamic religion. The religion has a significant role in forming Muslims' beliefs about the consumption of meat with the holy Quran as the guiding tool with ordained requirements in this faith. The Quran teaches Muslims the manner in which to carry out their everyday lives and specifically on what to eat and not to eat. They are allowed to eat meat from cow, goats and sheep but they are prohibited from eating pork meat. Hence, pork is close to non-existent in the Muslim world (Agriculture and Rural Development, 2017).

(إِنَّمَا حَرَّمَ عَلَيْكُمُ الْمَيْتَةَ وَالدَّمَ وَلَحْمَ الْخَنزِيرِ وَمَا أُهْلَ بِهِ لِغَيْرِ اللَّهِ فَمَنْ اضْطُرَّ غَيْرَ بَاغٍ وَلَا عَادٍ فَلَا إِثْمَ عَلَيْهِ إِنَّ اللَّهَ غَفُورٌ رَحِيمٌ  
سورة البقرة: ١٧٣

According to the interpretation of the Noble Qur'an, this passage states, "he has forbidden you only the *Maytata* (dead animals), and blood, and the flesh of swine, and that which is slaughtered as a sacrifice for other than Allah (or has been slaughtered for idols, etc., on which Allah's name has not been mentioned while slaughtering). But if one is forced by necessity without willful disobedience or transgressing due limits, then there is no sin on him, truly, Allah is Oft-Forgiven, Most Merciful" (Al-Hilâli & Khân, 1993, p. 39-40). That verse vividly indicates that it is not permissible for Muslims to eat meat that was slaughtered for anyone or anything other than Allah and that they can only eat that which Allah was mentioned in the slaughtering by adhering to the *shar'i* practice. Therefore, Muslims have a lot of concern about

the manner in which the meat they purchase was obtained and handled, hence they can only consume it once they are sure about its origin in complete compliance with Allah's commands.

That stringent observation significantly controls their choices of meat.

According to Fadzlillah et al. (2011) out of the major cited reasons for Allah prohibiting the consumption of swine is to protect his followers from evil and it is only He alone who has the clear motive and wisdom. Muslims firmly believe in everything mentioned in this book because it is the speech of God who knows the benefits and risks of all his creations. Therefore, Muslims eat these permissible meats because Allah has not prohibited them in the Quran. One of the women justified the importance of eating red meat as a requirement of the traditional culture that is inspired by the Quran. In accordance with the result of this study, I found some passages of the *Quran* which talked about consuming meat and their benefits:

سورة النحل: ﴿وَالْأَنْعَامَ خَلَقَهَا لَكُمْ فِيهَا دِفْءٌ وَمَنَافِعُ وَمِنْهَا تَأْكُلُونَ﴾

Surah Al-Nahl (The Bee) 16:5 “And the cattle, He has created them for you; in them there is warmth (warm clothing), and numerous benefits, and of them you eat” (Al-Hilâli & Khân, 1993, p.403). The implication of the passage to the Muslims is that Allah has permitted the consumption of cattle owing to its value in terms of health. It follows that one might face strong resistance from Muslims, especially the older generation in the attempt to convince them that that they should start reducing eating red meat. However, by offering informed nutrient education and offering about the impacts of the environment to these folks on the current risks of red meat to their body health, it might change their staunch beliefs.

From a study by Agriculture and Rural Development (2017) it is in the interest of the KSA to have meat sold as halal as per the Islamic teachings and currently there is high alertness about imported meats coming from non-Islamic nations even with the Halal labels on the packaging

material. That demonstrates the KSA dwellers do not want to violate their faith with the type of meat they consume. All the participants revealed that the source of lamb and beef is the local Halal meat and they never eat imported lamb or beef whether from Muslim countries or non-Muslim countries in order to guarantee that these meats meet the Islamic way of slaughtering animals. This study showed that the interviewed women declared that they trust specific stores in their neighborhood that sell local Halal meat and they stated it is impossible to have them selling imported lamb or beef. It is crucial to note that the Islamic law does not prohibit eating imported Halal meat from other countries if these countries guarantee strict adherence of the Islamic laws during the slaughtering processes of animals. From a practical view, the hesitation to eat fast food may not only be as a result of the health factor and risk of diseases, but also from the possible fear of the unknown source of red meat as mentioned by one of the participants. The parents do not trust that these restaurants provide Halal meat or not as the older people strictly follow instructions from the Quran. These fast food restaurants may say that they use halal meat, but they may not. So, parents are keen in searching for the origin of the meat and serving it at home. The huge challenge lies in that the kids still go ahead and eat from the restaurants where these parents fear the sources of the foods.

Another perception of red meat that emerged in this study came with the traditional cultural practices of generous hospitality in which meat is symbolically the center of hospitality. Lakeh, (2017) reported that the cultural tradition of generous hospitality in Saudi Arabia often means providing and consuming large quantities of foods. Social gatherings are frequent, and family members and guests are often encouraged by peers and family members to eat at events even when they do not want to. This previous study didn't report about the importance of red meat

along the hospitality values. The finding from this present study showed the importance of providing meals containing red meat that is considered good hospitality for guests who come to visit their family. There was a common response that mentioned eating red meat is prevalent at social gatherings during the holidays and wedding parties. In these ceremonies, red meat from lamb and beef are in plentiful quantities and the people present consume large chunks of meat.

### The Environmental Consequences of Food Choices

There is an increasing food demand globally that has brought elevations in income levels and standards of living in many developing nations over the recent decades. Consumers are increasingly showing concern in acquiring substantial food amounts and of good quality as well as new changes in the dietary tastes and preferences, particularly toward a Westernized meal that has begun influencing agricultural trends. Additionally, there is the anticipation that the pronounced climate change of increasing temperature, water scarcity, and extreme weather conditions will keep presenting new and dynamic problems in food production. Saudi Arabia has been a victim of the climate change that has drastically reduced the local crop yields and consequently led to an overreliance on imported foods. The growing food demand for *Halal* and traditional food products across all sectors is increasing and consumer who show higher selection and demand put pressure on outlets to produce more (Hisham, 2017). So, dietary choices of the population and the population growth encouraged food policy in Saudi Arabia to consider importing food as one effective solution to food security. There was no effort to include education and awareness among the population about the impacts of food choices on the environmental problems.

In this present study, when it comes to the last research question (How are women aware of the environmental consequences of food choices they make?) The results showed that none of the interviewed women stated that there is a connection between their food choices and environmental problems. Instead they connected food with body health. For instance, my findings in this study demonstrated that the interviewed women were aware of physical health issues. They were aware about the risk of eating red meat twice to thrice in a week and the risk of fast foods, but they didn't recognize the effects of these foods on the environment. However, when I asked them about the effects of climate change which Saudi Arabia has faced over the years (DeNicola et al. 2015), they started talking about these impacts. Their responses were that climate change which is called in Arabic "التغير المناخي" "altaghyur almunakhii" has increased temperature, drought, and air pollution and has reduced food production. There are some differences in what "climate change" is called among the participants as التغير المناخي is considered a scientific term in Saudi Arabia. The educated women used the term "التغير المناخي" but among less educated women, they called the change of weather "التغير في الجو" "altaghyur fi aljaw". There are three words for weather in Arabic "الجو" "aljaw", "الطقس" "altaqas" and "الهواء" "alhawa". Furthermore, when I asked about the environments using the word "البيئة" "albiya", the educated women talked about climate and the less educated women always referred to the weather. Even though there are different terms used for climate change and environment among these participants, it does not change their responses about the impacts of environmental consequences of food choices. The level of education among these women does not change their responses about the impacts of environmental consequences of food choices. Their responses were that the climate has changed in increasing temperature, drought, reducing food production and increasing air pollution. None of them realized that animal source-based foods increase the

impacts of climate change and that was a surprising lesson to them. In addition, surprisingly, none of the interviewed mothers mentioned water scarcity which is considered to be a significant environmental issue in Saudi Arabia. The participants noticed that the lack of local food production contributed to the change of climate and the raising temperature over the years. Most of the participants compared the sources of their foods in the past and now. They stated that they got their foods in the past from their fathers' farms and their houses as farming was thriving in the past. However, they noticed that their fathers have not produced foods like the past in order to increase temperature.

Most of the interviewed women stated that they didn't know that eating animal-based food sources, such as red meat, influences the environment negatively. One of these women revealed that they were never taught that eating red meat increases their carbon footprint and therefore influences climate change and exhausts natural water sources. She stated that we were taught that increasing consumption of red meat influences our health negatively, with high cholesterol and heart diseases, but didn't know that it also impacts our environment. From a practical standpoint, there are some reasons that should take into consideration beyond the absence of knowledge about these relationships between dietary choices and environmental impacts. One of these reasons is an education system in Saudi Arabia that is missing such topics in the Science Curriculum. It is important to connect science knowledge with daily life such as including human impacts related to environmental issues which allow students to connect their studying of sciences with contemporary issues in their country. Saudi Arabia believes that it is important to prepare good and productive citizens who can meet the need of the present and the future. To this end, the government considers investment in education and human resources to be

a basic element in the comprehensive development of the country and the advancement of its policies and programs (Alsobeiy,2016).

Saudi Arabia is committed to implementing 17 Sustainable Development Goals (SDGs) and assigns the highest priority to achieve this agenda. The Saudi Vision 2030 aligns with the goals of Sustainable Development and both work hand in hand to achieve this endeavor. One of the 17 SDGs is quality education in which they emphasize education curriculum development and advancement of higher education. In 2018, Saudi Arabia was part of the Voluntary National Review of the High-Level Political Forum on sustainable development which highlights the dramatic rise in the living standards of its population, improving food and water security, enhancing health services and improving education. (Towards Saudi Arabia's, 2018). However, In 1431- 1432 H (2009 – 2010), Saudi Arabia started to include developed science curriculum in elementary and middle schools which this modern curriculum endeavors to achieve 19 goals of vision 2030 in KSA (Al-Qarni ,2019). However, there is no lesson connecting the production of animal-based foods and its impact on the environment. For instance, in the fourth year of primary education (Grade 4), the science curriculum incorporates the following topics: Environmental systems, Earth and Water but there is no connection between the impacts of human's food choices on the environment, earth and water (TIMSS & PIRLS,2016). The education system in KSA was also re-developed in recent years to incorporate environmental science material in high schools which started in 1430H (2008). This curriculum teaches the general concepts of environmental science and ecological systems but still, there is a gap to include the environmental issues related to food (The Ministry of Education, 2008). It is important to note that most of the participant women in this study have a low education level and they didn't receive any knowledge about contemporary environmental issues related to human



impacts through their studying at schools. The education system in Saudi Arabia has addressed these issues in some departments at colleges such as the environmental science colleges and the college of agriculture and food science. The department of agriculture and food science has a program called Environment and Natural Resources of Agriculture which focuses on teaching sciences related to natural environmental systems in Saudi Arabia. The purpose of this section is to provide the student with the basic concepts related to the conservation of the environment and its components such as the various agricultural natural resources (soil, water and plant) in KSA from degradation and pollution in order to maintain its productive capacity of agriculture and to improve efficiency. (KFU,2016).

The Ministry of Environment, Water and Agriculture in Saudi Arabia (MEWA) is also one of the institutions responsible for addressing issues of food and environmental problems. This ministry has some objectives which are “preserve the environment and natural resources, and sustainably develop them, achieve water security and contribute to achieving sustainable food security”. In addition, MEWA seeks to take on a strategy which focuses on managing water demand instead of satisfaction of demand. This approach focuses on reducing water demand in the sectors which consume a lot of water, such as agriculture which used 84 % of the water demand in 2015. Therefore, One of the 17 SDGs which aligns with KSA’s Vision 2030 is ensuring availability and sustainable management of water resources (Towards Saudi Arabia’s, 2018). Even though this goal works toward achieving food and water security, there is still a gap among its objectives. What is missing is the role of the citizens. The population could help to achieve part of this goal if they understood the relationship between their eating habits and its impacts on natural water sources. The education system could play a significant role in achieving this goal by incorporating the impacts on water sources of dietary choices. As a result, the

population could understand how they participate in achieving part of the sustainable development goal (SDGs).

There is a study that also reported the importance of establishing public health policy in the kingdom of Saudi Arabia. It is noticeable that health plans and expenditure in the health system are focusing on the medicinal aspects and there is a significant shortcoming in public health administrations. Also, most occupations are allocated for medicinal care and there is lack of job titles related to public health in the health structure. Establishing a ministry of public health will work to ensure that all issues related to the health of the public in every part of daily life in the kingdom are within the basic interest of all policy makers (Milaat,2014). Saudi Arabia, later in 2017, approved adopting public health as a policy which takes into consideration the impacts on the health of draft regulations for better wellbeing of society (Salman,2017). The health public policy is one of the most important sectors in achieving the role in educating the population to reduce their carbon footprint and in the same time keep their bodies healthy if they choose to eat less animal-based food.

The policy makers of KSA, were aware of environmental problems such as water scarcity and they have taken some proposed strategies for saving water in agriculture. However, these strategies might not be sufficient if they do not involve the consumers who are the local population in reducing the volume of water use in agriculture. Multsch et al. (2016) stated that KSA reduced cropland to save water but there is still the exhaustion of water in growing fodder crops necessary in feeding animals that are sources of food for the people. In their recommendation, they mentioned that in the bid to increase water use efficiency, vegetables and not fodder crops should be cultivated. While the high demand for the consumption of red meat exists, the government could view it as an opportunity to increase its production to ensure food

sovereignty, but the decision is not friendly to the environment as it increases the already existing environmental problems.

There are numerous studies that reported that the intense demand for fresh water in KSA for use in agriculture, puts pressure on the few remaining water sources, mainly the aquifers. This leads to the conclusion that there might be strong barriers to attaining environmental sustainability in Saudi Arabia. The findings of this study showed that the main shifting diets are towards Western food and increasing demand for red meat and dairy products. The ongoing dietary shift would lead to intensification in environmental problems and affect the available natural resources in the region as these diets exhaust water. According to the results from the study by Willett et al. (2019) efficiency in water usage can be attained by shifting to diets that involve minimal animal-based products, proper strategies of managing water as well as embracing up to date technology. For example, Mekonnen et al. (2010) stated that in the order of water footprints, cattle's meat is the leading one followed by sheep, pigs, goat, and chicken.

Another common food choice that significantly impacts water scarcity is the huge consumption of dairy products. In the results of this study, the mothers mentioned that the most common foods included dairy products such as cow milk, yogurt, and cheese and fermented dairy beverages (*Laban*) that are traditionally consumed in large quantities on daily basis. This finding is similar with other studies that showed that whole dairy products had the highest percentage contribution to water use, Mediterranean patterns which rely on the large number of dairy products contributed over 40% of the total water use and 22% of its GHGs (Naja et al. 2018). The water footprint of cow milk is 1000 m<sup>3</sup> /ton (Mekonnen et al,2010). In the discussion of world's water scarcity and food security issues, water footprints are developing to be essential sustainability indicators in the food sector and agriculture. Well thought insights can

assist the dairy sector in minimizing its overreliance on freshwater systems from consumptive water usage.

It is important to note that the participants mentioned both, impacts of climate change and the change of the dietary habits over the years which are based on the increase of consuming animal food sources (red meat, poultry and dairy products) and western diets that are ultra-processed foods. Producing significant numbers of these animal food sources increases the impacts of climate changes. However, some previous studies reported that Saudi Arabia imports most of the red meat to meet local demand instead of producing it locally (Fiaz, Noor & Aldosri, 2018). Yet, they are still raising significant numbers of livestock in KSA in order to achieve food security for their population. According to General Authority for Statistics of KSA reported that cattle slaughtering inside the kingdom dates back from the period of 1434-1438 A.H<sup>6</sup> with the total local cattle slaughtering growing from 407869 to 7173776 from 2013 to 2017. It appears that the local animal products in KSA have increased these years to meet the food needs of the population. As of 2017 the total number of local cattle in Saudi Arabia was higher than that imported (General Authority for Statistics, 2017). In accordance with the previous statistics, this present study reported that the interviewed women consume only local red meat and they never feed their families imported red meat. It is important to note that food choices contribute to 25 percent of all the climate change impacts which is greater than cars (Sanjayan,2012). The process to produce food creates greenhouse gases that contribute to global warming which vary in different diets. A single serving of beef contributes to 330 grams of carbon compared to 14 grams for vegetables. Livestock contributes over 14 percent of global greenhouse gas emissions

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<sup>6</sup> It is the reference used in the Islamic calendar (Hijri calendar). 1434 A.H meet 2013 A.D and 1438 A.H meet 2017 A.D.

which is equal to transportation (Sanjayan,2012). These animals, like cows and sheep, put more pressure on the environment since they produce methane that is 25 times stronger than carbon dioxide's impact on the climate. In addition, there is a need to produce about a billion tons of grain to feed all of those animals (Sanjayan,2012). These products of fodder crops exhaust water that aggravate the problem of water scarcity in Saudi Arabia (Multsch et al,2016). Even though the previous studies show evidence of the impacts of food choices on the environment, for this study it appears that meat is basic in their meals in addition to the frequency of eating meat from fast food restaurants. It is not necessary to switch to vegan or vegetarian diets to reduce the impacts on the environment. According to Sanjayan, Mediterranean diets could reduce 15 percent of global warming pollution by 2050 (Sanjayan,2012). According to Naja et al. (2018) studies showed the impacts of meat consumption and Western food among Lebanese adults on the environment. They showed that Western food and (meat and poultry) had the higher estimate for water and GHGs footprints comparing to Lebanese-Mediterranean diets that include higher consumption of plant-based foods and limited intake of animal food. The previous study reported that meat, was the highest contributor to all the three environmental footprints (water use: 69.30%, energy use: 50.87% and GHG: 73.08%).

Naja et al. (2018) was making connection between food consumption and the environmental impacts, but this source does not target the decision makers of food choices. The present study focuses on the women at home who make primary decisions regarding what to feed their families that could play a significant role in reducing the impacts of environmental problems by shifting their dietary habits and cutting down their meat intake for the entire family. However, when it comes to the promotion of achieving food security and saving the region from the impacts of climate change, it be would be vital to elevate awareness among decision makers

with the potential to minimize the food sources that cause deteriorative climate changes. Willett et al. (2019) in their new study reported that increasing the consumption of plant source-based food is one of the significant factors in reducing the effects of climate change. They estimate that having modified the food production strategies by 2050 there can be a reduction of GHGE by 10% while raising the intake of diets prepared from plant sources can decrease the same up to 80%.

Furthermore, the consumption of meat has been dramatically rising not only in the meals prepared at home by the mothers but also among young adults who prefer eating from restaurants and fast food joints whose most meals are comprised of processed red meat. The interviewed women reported that there is remarkable proof that their kids' diets differ from their own diets in the past which they used to mostly rely on starchy food during dinner meals. (Compare Table #2 in the Results chapter with Table #3 and you can see the increased consumption of foods from restaurants and fast food joints where the majority of the participants stated that their children have been eating approximately three times a week.) Eating from these restaurants puts more pressure on the environment as they consume more meat. One of the educated women connected eating from restaurants to the increase of air pollution that affects their health due to the use of imported, processed industrial foods that emit pollutants.

As a result, by creating consumer awareness about the risks associated with the choices of food they eat around the planet and the manner in which they occur naturally and producing them until they get to consume them would assist in addressing climate changes, water scarcity and leading healthy lives among other crucial domains. By working in collaborative efforts, the policy makers and the consumers would ultimately bring ease of food security and saving the environment from the pollutants released along the food systems. Members of the population,

specifically the women who serve the influential role in feeding their families, are significant assets to consider incorporating in the campaigns of dietary habits. These are the key players to ensure that the reduction of animal related products and increased consumption of plant-based foods would save the available fresh water sources and land as well as the overall objective of maintaining a healthy population among the Saudis. Essentially, addressing the issue of red meat in the KSA starts right at the household level before proceeding to the government through the public health institutions which can advise restaurants to reconsider the composition of the diets they sell. Furthermore, institutions and other stakeholders need to be on the frontline to educate the older generation as well as the youths who are the most affected by adopting Westernized diets. The future may be bright once the young generation adopts the dietary changes and going around the nation positively impacting others to embrace them for a sound health and sustainable environment.

#### The Diets with Environmental Sustainability

There was growing concern among the mothers in this study about their diets shifting with risks to their health, but there is less concern about the environmental impacts that have been changed in their region. From that point, this study found that even though there is little awareness about the environmental problems arising from food choices among Saudi women, they could significantly assist in restoring and protecting their environment by improving dietary changes towards healthy diets that are associated with less environmental effects on climate change and water scarcity. The shifting in dietary habits through embracing healthy diets for the sake of having a healthy population, works in a similar way to reduce the existing negative effects on the environment. Food consumption, food production and the health of the body work

together in promoting the food system and ultimately achieving environmental sustainability. According to a recent study that aimed at improving human health and environmental sustainability, they identified a universal healthy reference diet as one that comprises “vegetables, fruits, whole grains, legumes, nuts, and unsaturated oils, includes a low to moderate amount of seafood and poultry, and includes no or a low quantity of red meat, processed meat, added sugar, refined grains, and starchy vegetables” (Willett et al. 2019). The definition of the healthy reference diet based on improving human health is a safe plan for six environmental processes that include climate change and freshwater use (Willett et al. 2019). The most popular foods in my findings appear not to be complying with the concept of a healthy reference diet that could support the reduction of environmental impacts in Saudi Arabia. The consumption of vegetables, fruits, whole grains, legumes, nuts, and unsaturated oils did not appear frequently among the participants in this study meaning that they may or may not include them when choosing their foods. The amounts of seafood and starchy vegetables consumed were moderate but that of poultry, red meat and processed meat were high among the Saudi women. From this study one can identify that the basic factors influencing the consumption of unhealthy food are cultural beliefs and lifestyle changes that play an essential role in elevating unhealthy eating habits through the home meals or through the outside meals from restaurants that end up affecting human health negatively, as well as reducing environmental sustainability.



## CHAPTER 6 - CONCLUSION

This study aimed to explore the connection between the change of dietary habits over the years and the environmental problems in the Eastern region of Saudi Arabia. This thesis was organized to answer the four research questions related to the change of diets and environment over the years from Saudi women who are responsible for feeding their families. The first set of responses encompasses the differences between diets in the past and now which showed the combination of the persistence of maintaining traditional food with the adoption of western food these days. The first part of the research discussion addresses the first research question; How do women choose to feed their families and how has that changed over the years that could affect the environment in the Eastern Region of Saudi Arabia? The second set looks at the factors that affect food choices which is based on health issues, economic, availability and accessibility of western restaurants and cultural factors. The third part of responses includes the perception of red meat consumption which related to health and cultural beliefs. The last discussion addresses the last research questions: How aware are women of the environmental consequences of food choices they make? The last question looks at the perception of environmental impacts connecting to food choices.

The result showed that even though women have shifted their eating habits to western food with increasing consumption of meat and processed meat, they persist maintaining traditional foods to feed their families based on rice, meat, and dairy products. The participants believed that traditional foods are healthy, and they were aware about the health risks of frequently eating from fast food restaurants, processed food and red meat which bring several diseases. These women blamed the availability and accessibility of restaurants especially fast food restaurants which is

impacting kids' food choices. Moreover, the finding from the study showed that the cost of the food doesn't affect women's choices. They try to choose healthy food despite knowing that these foods might be expensive. In addition, the findings showed that the women believe that consuming red meat is associated with better health status and well as religious and cultural beliefs.

A significant finding in this study is that none of the women connected their food choices with environmental problems. Even though they realized the impacts of climate change over the years, instead they connected food with human health. The water scarcity is a significant environmental issue in Saudi Arabia, but the women did not mention this issue in the present study. This finding highlights the need for nutrition recommendations to take into consideration the environmental problems including water usage, in addition to health.

All the research questions are framed around the perception of shifting dietary habits related to the increase of environmental impacts, in order to examine the responses as strategies aimed at reducing the consequences of environmental problems especially the issue of water scarcity and climate change. Understanding eating habits and how diets are adapted can lead to the future direction for a sustainable dietary approach which reinforces both healthy diets with a sustainable environment. Shifting toward reducing of consuming animal food sources with high consumption of the plant food sources thus saving the available fresh water sources and reducing the impacts of climate change as well as the overall objective of maintain a healthy population among the Saudis.

In contrast to previous adaptations of environmental problems in Saudi Arabia, which focused on banning water consuming crops, importing foods and using new technologies, this study has given attention to one of the stakeholders, women, who are responsible for choosing food inside the family and could have the significant influence in this issue. Upholding unsustainable eating lifestyles is aggravating the environmental problems including climate

change and water scarcity. The dietary habits which include increasing consumption of red meat, processed meat and dairy products aggravate these issues.

#### Limitations:

The interviews and participants observations for this study took place in late June, July, and August of 2018. This period coincided with the summer vacation and the holidays in Saudi Arabia, thus it was not possible to observe the families' eating habits through the normal days of the years. Being there during the school year would have undoubtedly provided further insights into eating practices reported by the women.

Second, the key limitation of the present study is that Saudi Arabia has a lot of different regions. The Eastern region is the biggest region in Saudi Arabia and the desert covers most of its area. In addition, the Eastern region is an oil-producing province. Therefore, the Eastern region is not representative of all of Saudi Arabia. The participants may have a different lifestyle than other regions in KSA. The participants' viewpoints on life, food, nutrition, and environment may not reflect the cultural group as a whole.

Although being a Saudi woman from the same region is more of a strength than a limitation, there were times when participants did not elaborate on subjects, saying that I should know already, making assumptions about our shared cultural background.

#### Recommendations for future studies:

Topics for future research have been identified:

- The findings from the study support that the change of food system should involve all stakeholders from individuals (customer) to policymakers to promote environmental sustainability and then achieve food security by adopting healthy and sustainable diets.

- The importance of personal knowledge and preferences as potential targets to modify food policies toward reducing the impacts on the environment could be effective. The finding from this study highlights the need to address culturally-appropriate dietary habits related to a sustainable environment.
- It would be useful to establish perceptions of environmental problems including climate change and water scarcity among the Saudi population especially the women as they are essential stakeholders in making decisions about food choices inside the family. A comparison between perceptions of policymakers in achieving food security and the perception of women on how to choose to feed their families might reveal areas of consensus.
- The Ministry of Environment, Water and Agriculture; the Ministry of Education and the public health policy are responsible for educating people about human impacts, especially food choices that influence environmental problems. The SDGs which work hand in hand with Saudi Arabia's Vision 2030 highlights to improve food and water security while improving the education curriculum to connect food production and consumption with their the environmental impacts. This would help achieve part of the SDGs as well as Vision 2030.
- This study suggests reducing the consumption of red meat and fast food that have processed red meat. This will help to reduce the impacts of climate change and water issues which are associated with producing animal-based foods.

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## APPENDENCS

### Interview Guide

# How do women choose to feed their families and how has that changed over the years that could affect the environment in the Eastern Region of Saudi Arabia?

- What did women feed their families in the past? Where did they obtain their food?
- What are you eating today and where are you buying it?
- How many times a week, do members of your family eat fast food?
  - o What fast food do they eat?
  - o Why do they eat it? (time, expense, desire, easy)
  - o Do you think this has any environmental effects?
- Have you perceived a change in food preferences over the years?
- How do you differentiate between traditional food and western food today?
- How frequently are traditional foods being consumed in your house? How frequently are nontraditional foods being consumed?
- Are your choices driven by concern for the environment?

# What drives food choices and food habits?

- Are economic factors driving your choices?
- Are your choices based on healthy food choices?
- Do you consider what you choose healthy to feed your family?

#What kinds of meat do they serve and what qualities do they perceive in different kinds of meat?

How many times do you feed your family meat each week?

Do you consider it important as a nutritional element in their meals?

Do you try to find alternatives to feed your family instead of consuming meat?

Where do you buy meat?

#How aware are women of the environmental consequences of food choices they make?

What do you know about climate change and its effects?

Do you think that consuming a lot of meat increases climate change and temperature?

Do you think that people can help protect the environment by changing what they choose to eat?

