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Food Consumption and Waste in Kuwait: the Prospects for Demand-Side Approach to Food Security

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According to the UN Food and Agriculture Organization (FAO), the Arab countries, with population of around 367 Million, import about 50% of their food needs. These countries experience a rapid population growth rate of around 2.3% per year, and suffer from declining agricultural production due to urbanization, dwindling water supplies, and desertification. Many of these countries are predicted to face some serious food security challenges in the near future. The World Food Summit of 1996 defined food security as "when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life". While food security issues are often viewed as a supply-side problem, this preliminary study endeavors to shed light on the demand side of the problem, by exploring the potential for improving food security by reducing wastage, altering consumption patterns and food subsidy. A sample of about 1,300 families (Kuwaitis and other Arab nationalities living in Kuwait) was surveyed. The data was analyzed to examine food consumptions and wastage patterns across different demographic groups and the effect of existing food subsidy policies. The findings suggest the presence of food wastage patterns due to household food preparation and management practices, in addition to government food subsidy. The prospects to improve food security using demand-side strategies in Kuwait seem to be realistic. The results suggest that further research is needed on demand-side food security strategies.

1. Introduction

Food security is an increasingly universal concern and it is more of a pressing challenge for developing and poor countries around the globe. The World Food Summit of 1996 declared that food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (FAO 2006). The Food and Agriculture Organization (FAO) of the United Nations adds to the preceding definition "physical and economic access to nutritious food." According to the World Health Organization (WHO 2012), food security is built on three pillars "food availability on a consistent basis; food access with sufficient (economic) resources to obtain a nutritious diet; and appropriate use based on knowledge of basic nutrition and care, as well as adequate water and sanitation." WHO also states that "food security is a complex sustainable development issue, linked to health through malnutrition, but also to

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sustainable economic development, environment, and trade." It is estimated that 16,000 children in the world die every day because of malnutrition and the UN World Food Program reported that the number of hungry people worldwide grew to more than 1 billion in 2009. This comes as no surprise given the sharp increase in food prices in 2008 and the global economic recession in 2009. According to the Action Aid to End Poverty (ActionAid 2011), the world is facing an impending triple crisis of climate change, depleted natural resources and rising food prices, all of which could hinder our ability to feed a global population. The group just issued a report that looks at how countries are prepared for the "triple crisis" which shows that the 10 most vulnerable countries account for about a quarter of the world's population. Given this reality, the prospects to "cut in half the number of undernourished in the world by 2015", pledged by the representatives of 185 countries during the 1996 World Food Summit, seem far from being attainable, given the dismal outlook of food security today.

According to FAO, the world food production must double by 2050 in order to meet the food security challenge. While there is no shortage of arable land to accommodate the increase, scarcity of water is the most impending challenge to bring more land under production. Additional challenges include reduced land productivity and the increased environmental degradation, both of which are a result of existing intensive agricultural production practices.

The challenges to Kuwait and Arab countries are even direr. Kuwait is an affluent oil-based country on the northwest tip of the Arabian Gulf with a population of 3.2 million and one of the highest per capita incomes in the world. Its agricultural production is limited to 84 km2 in the border regions of Al-Abdali with Iraq and Al-Wafrah with Saudi Arabia, in addition to the central region of Slaibiyah relies heavily on food imports. Its food production includes vegetables, dairy products, chicken and red meat, all of which accounts for about 1% of the country's GDP. Like many of its Arab neighboring countries, it has higher-than-average fertility rates and is expected to be in a precarious situation when it comes to meeting its food security challenges. Although the 22 Arab countries occupy an area of 14 million km2, which constitute 10 percent of the world land area, they receive only 0.5 percent of the world annual fresh water supply. As a result, they depend heavily on food import, which averages 40 to 50 percent of their food needs, with the situation being more dramatic in cases of Iraq and Yemen, where food import is as high as 70 percent.

Food security has always been the subject of intense debate and attracted attention of policy makers and scholars. Food security has traditionally been viewed supply-side phenomena and this is evident in the literature. Our endeavor in this paper is to draw attention to the demand side of food security, using Kuwait as a case study for the Arab countries. New research on dietary energy restrictions (DER) shows promises for better health and effective management for some of health conditions humans are grappling with. We assert that food security could be the major beneficiary of DER practices, given that it is centuries-old and time tested human experience. The literature shows that little research has been done in this area. The remaining section of the paper is structured as follows: literature review, methodology, results, discussion and conclusion.

2. Literature Review

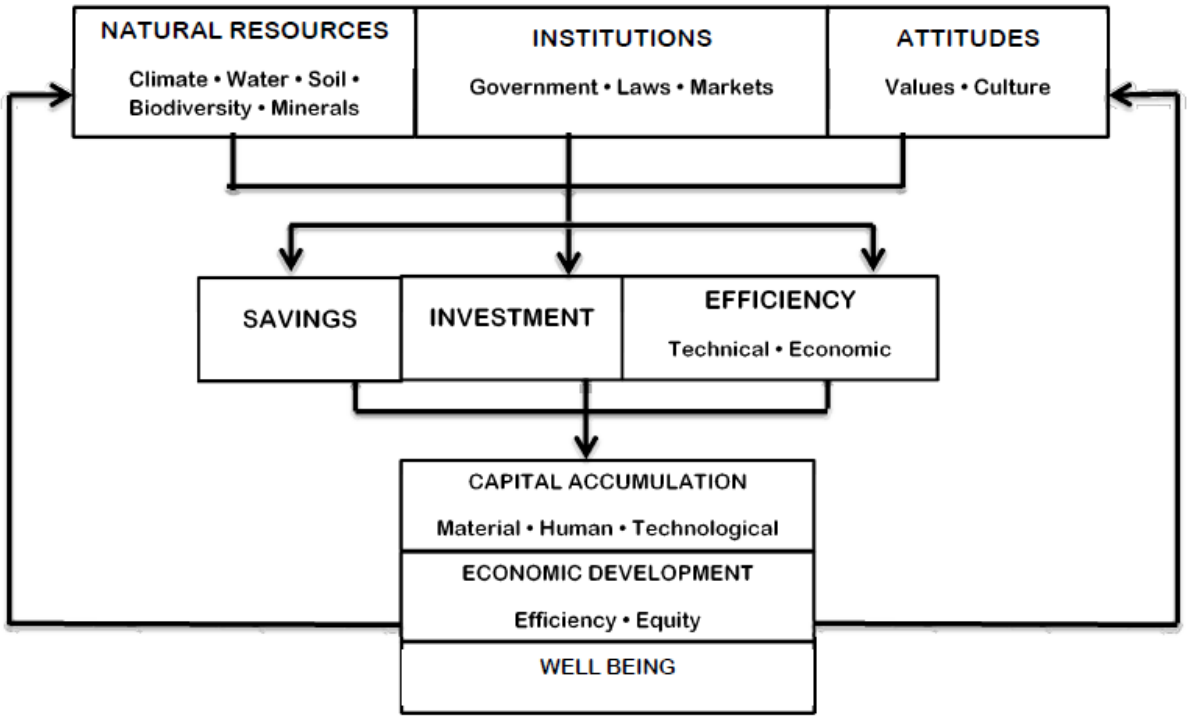
Food security can be achieved by a sustainable food supply which could keep up with the pace of population growth. It can, however, be reached by substantially reducing, if not altogether eliminating, food wastage and excessive food consumption. One way to achieve this is by a regimented dietary intake that can limit food consumption to the minimum level necessary to maintain good health, while avoiding excessive and unnecessary food consumption. Recent research has confirmed what we have known for centuries about the low-calorie diet and its benefits of healthy and longer life. Researchers at the National Institute of Aging found that “rats and mice reared on restricted amounts of food increase their lifespan by up to 40% and a similar effect has been noted in humans (Mattson 2012). Their experiments on human have demonstrated that dietary energy restriction, particularly when administered in intermittent sessions of major caloric restriction (e.g. alternate day fasting), has considerable potential for a range of health improvements in asthma patients and women at risk for breast cancer, among others.

If low-calorie diet can be widely adopted, it can open the door for a major and drastic improvement in food security. It can, moreover, substantially reduce the environmental degradation caused by intensive agriculture intended to increase production. Excessive consumption and wastage of food are complex phenomena’s and their patterns differ across age groups, seasons, cultures and countries. It is estimated that at least half of food grown is discarded before and after it reaches consumers, and about one third to half of landfill waste comes from the food sector, which releases greenhouse gases and degrade soil and water quality (Lin et al. 2009). A study in Jordan found that one eighth of the food purchased by students at a university restaurant was wasted (Al-Domi et al. 2011). In the UK, the binned food and drink increase by 80 percent over the Christmas period, with the amount estimated at to be 230,000 tons valued at £275 million (Pool, 2012). Another UK study found that the largest contribution to food waste is from homes, where 8.3 million tons per year, costing consumers £12 billion, and generating 3 percent of the UK’s greenhouse gas emissions (Quested et al. 2011).

Food wastage is rampant in developing countries and even among the recipients of food aid. Food shipments to poor countries, which are intended to alleviate hunger and malnutrition, often lead to over-consumption and waste, and thereby, hinder the recipient countries potential’s to improve food security, according to Tweeten (1999). The study found that although food aids provide an immediate relief in the short-term, they could have detrimental effect on domestic markets if they distort incentives for agricultural producers in recipient countries. The study concludes that food aid shipments that constitute less than 10 percent of domestic production appear to be benign, while shipments above this level show signs of being disruptive to local agricultural and food markets. Another study argued that the classical definition of food security “as access to food” does not recognize two other important dimensions, availability and utilization (Tweeten and Brinkman 1976, p. 60). While availability refers to supply by production or importation, utilization refers to the actual benefit or metabolization of food. They argued that food insecurity can still persist, even when food is available and accessible, due to multiple reasons such as inadequate education

about food nutrition and preparation, bad habits, eating disorders or poor health. The authors presented a three-dimensional food security paradigm beginning with the underlying culture (social and psychological), institutional (government and economics) and natural resources, see Figure 1.

Figure 1: Elements of economic progress and food security.



Source: Tweeten and Brinkman (Iowa State University Press, 1976)

While the natural resources dimension, in Figure 1, represents the supply side of food security, the cultural and the institutional dimensions capture the demand side of it. These elements constitute what Tweeten and Brinkman call social capital, social institutions, culture, customs, goals, beliefs, and values of society. The social capital is defined, according to Schiff (1992, p.160), as the "set of elements of the social structure that affects relations among people and are inputs or arguments of the production and/or utility function". These social structures and values are engrained in religious teaching and some cultural norms, which emphasize moderation in food consumption and shun extravagant and wasteful behaviors (Quran 7:31). If food wastage can be minimized, or even eliminated altogether, the earth, under the right conditions, has the potential to provide sufficient food for the world population for decades to come. Some of these conditions include reducing dietary intake and food wastage (Foley et al., 2011).

Although this is not enough or sufficient literature on supply side, hardly any study have been focused on achieving food security through demand side practices. This paper attempts to shed some light on an important gap in the literature.

3. The Methodology

The objective of this research is to explore the potential for demand-side strategies to improve food security in Kuwait and other Arab countries. Food wastage can potentially be reduced by one or more of the followings: shifting diet from high to low calories; lessening of dietary energy, which can be achieved by moderate and sensible dietary intake; and improved home food management practices. These practices include reducing the amount of food that find its way to waste bins, reduce the more-than-needed food purchases, larger than necessary food serving portions, and leftover food that is unnecessarily discarded. In this preliminary study, we assert that there is a widespread pattern of food wastage due to excess consumption and poor management practices among inhabitants of Kuwait. We endeavor in this study to shed light on problem which worsens food security problems for Kuwait and many Arab countries. A 25-question survey was designed to assess wastage of meat and basic foodstuff among households in Kuwait (mostly Kuwaiti and some Arab expatriates). It also includes questions on key demographic variables, food purchasing habits, daily food preparation and management, dining out and ordering of precooked food behavior, food prices and food security concerns. One thousand three hundred surveys were administered in person the January of 2010. One thousand two hundred twenty two surveys were validated and used in the study. The SPSS statistical software was used to perform the frequencies and cross tabulation analysis.

4. The Findings

The average size of Kuwaiti household is relatively large when compared to western standards. About 62 percent of respondents live in 4-7 members household, 18 percent live in a household of 5 people, while 16 percent are part of 6 members' households, see table 1. Only 0.5 percent of the respondents live alone.

Table 1: Frequencies household size (values in %)

State the number of people in your household, including yourself										
1	2	3	4	5	6	7	8	9	= > 10	Missing
0.5	5.5	7.8	13.1	17.6	15.4	13.2	8.6	4.7	9.4	4.2

Eighty three percent of respondents are Kuwaitis and the remaining belongs to six Arab nationalities, with highest percentage being Egyptians, followed by Syrians and Lebanese. Two-thirds of respondents are males and 71 percent of them are married, see Table 2.

Table 2: Frequencies: nationality, gender & marital status (values in %)

Nationality			Marital Status			Gender	
Kuwaiti	82.8		Married	70.7		Male	32.9
None-Kuwaiti	16.5		Not Married	27.8		Female	64.7
Missing	0.7		Missing	1.5		Missing	2.4
	100			100			100

Thirty nine percent are in their 20's, 25 percent are in their 30's, while 31 percent are in their 40's or older. Education wise, 45 percent are college graduates, while 34 percent have a minimum of high school diploma. About 26 percent of respondents belong to households with monthly income of 701-1,200 Kuwaiti dinar (KD) ($2,500-4,300), 20 percent have income of 3,000 KD ($10,800), and another 20 percent are part of households with monthly income of 1,201-2,000 KD ($4,300-7,200), see Table 3.

Table 3: Frequencies: age, education and income (values in %)

Age			Educational Background			Family Monthly Income	
< 20 Yrs	4.3		< High School	9.6		< $1,080	2.7
20-30 Yrs	38.7		High School	33.5		$1,081-2,520	14.1
31-40 Yrs	24.9		College Degree	44.0		$2,521-4,300	24.1
> 40 Yrs	30.4		Grad/Professional	11.1		$4,301-7,200	18.4
Missing	1.5		Missing	1.9		$7,201-10,800	16.3
						> $10,801	18.8
						Missing	5.6
	100			100			100

More than half of respondents (52 percent) stated that they buy more food than they need, while 60 percent said that they more-than-needed food at home, see Table 4. Regarding food prices, 41 percent felt that prices are reasonable while over 50 percent regarded them as expensive to very expensive, see Table 4.

Table 4: Frequencies: opinion on food-buying patterns and prices (values in %)

In your opinion, are food prices (in general)			Do you feel that your family buys food more than they need?			On the average, do you keep at home more food than you need?	
Very low	2.9		Yes	51.9		Yes	60.1
Low	3.6		No	47.6		No	39.0
Reasonable	41.2		Missing	0.5		Missing	0.9
Expensive	38.4						
Very expensive	14.0						
	100			100			100

About one in four respondents regarded eating as a form of entertainment activity, as opposed to being a necessity, which suggests the potential for excessive consumption and waste of food, see Table 5. Seventy six percent of respondents said they are concerned about food security. However, when it came to addressing the problem of food security and avoiding food wastage, the overwhelming majority (94 percent) regarded education and awareness (moral suasion) as the best approach. Only 6 percent thought market approach via higher prices is good tool to address food security, see table 5.

Table 5: Frequencies: opinions on food security and consumption (values in %)

Is food security an issue of concern to you and your family?			In your opinion, what is the best method to avoid food waste?			Eating in your family is	
Yes	76.2		Make food more expensive	6.4		Fun activity	25.8
No	23.2		Education and awareness	93.6		A necessity to survive	74.2
Missing	0.6						
	100			100			100

Only 15 percent of respondents indicated that they end up with no leftover food, see Table 6. Regarding the staple content of the daily diet, rice came first at about 31 percent, followed by bread with 17 percent. In the meat content, chicken came first with 54 percent, followed by lamb with 19 percent, fish with 14 percent, and finally beef being the least popular with only 13 percent, see Table 6.

Table 6: Frequencies: Essential part of diet & estimated leftover (values in %)

Which of these is an essential part of your daily diet?			Your family consumes more			On average, the leftover food could potentially feed	
Bread	16.9		Beef	13.0		1 person	21.1
Rice	30.6		Lamb	19.1		2 persons	35.4
Both	46.7		Chicken	53.7		3 persons	19.5
None	6.7		Fish	14.2		4 or more persons	8.0
						No leftover food	15.4
	100			100			100

About 80 percent of respondents indicated that they eat-out or order ready to eat meals one to three times per week, see Table 7. Most of the food wastage happens with home-prepared food according to 48 percent of respondents. About 18 percent indicated that wastage happens more often while dining- or eating-out and 14 percent of respondents thought home-delivery is wasted more often, see Table 7. Moreover, a little over 20 percent of respondents indicated that they do not waste food, which is similar to the result about no leftover food in the Table above. As to the subsidies and prices of food, 64 percent of the respondents indicated that they regularly receive government-subsidized or free foodstuff, a privilege which is strictly for Kuwaiti. This is not surprising given that 83 percent of respondents are Kuwaitis.

Table 7: Frequencies: food subsidy, food wastage and eating out (values in %)

Does your family receive government food discount?			How many times per week does your family eats out or order food delivery?			Which of the following in your opinion is wasted more often?	
Yes	64.1		One	28.5		Home prepared food	47.9
No	35.9		Twice	27.4		Ordered food	14.2
			3 times	23.5		While eating out	17.5
			Four Times	11.7		We do not waste food	20.4
			Five or more	8.9			
	100			100			100

Fifty eight percent of respondents indicated they prepare more food than needed, see Table 8. The leftover food is enough to feed anywhere from one to four or more people, see Table 6. Fifty five percent of respondents indicated that their families eat leftover food while 45 percent indicated that they do not, see Table 8. About 23 percent indicated they dispose the leftover, while about 26 percent indicated they donate the leftover, see Table 9. Higher incidents of food wastage happen during lunch[i] according to about 51 percent, followed by breakfast according to 36 percent with the dinner being least associated with food wastage, see Table 8.

Table 8. Frequencies: leftover food incidence and status (values in %)

On the average, do you prepare more food than needed?			Does your family eat leftover food you cooked?			Meal at which food is wasted more often	
Yes	58.2		Yes	55.1		Dinner	13.4
No	39.0		No	44.9		Breakfast	35.9
Missing	2.8					Lunch	50.7
	100			100			100

The single most wasted food item is rice, according to about 36 percent of respondents, followed by bread 16 percent, vegetables 14 percent and meat at 13 percent, see Table 9. Children tend to waste more food according to 39 percent of respondents, followed by females, 20 percent, with the males being the least at a little over 15 percent, see Table 9.

Table 9. Frequencies: leftover food composition and wastage (values in %)

What do you do with the leftover food you cooked?			Which kind of food is usually most wasted? Select as many as needed.			In your opinion, who waste more food?	
Eat at later day	51.8		Meat	13.0		Males	15.3
Dispose	22.7		Bread	16.0		Females	20.1
Donate	25.6		Rice	36.3		Children	39.1
			Fruits	11.2		Not sure	25.4
			Vegetables	13.8			
			Desserts	9.7			
	100			100			100

5. Discussions

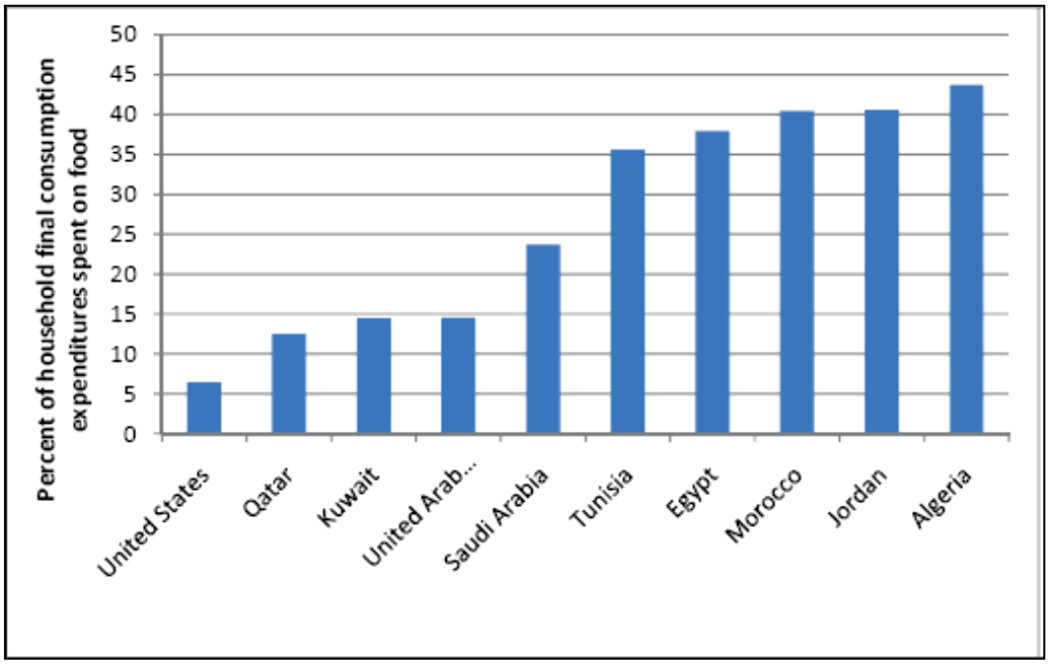
Projections of population growth and demand for food indicate that agricultural output must be expanded from 70-100% of the current levels by 2050 in order to maintain a global food security, according to FAO (2006) and the USDA Economic Research Service (Shapouri et al. 2011). Given the growing consciousness about the global warming and the environmental degradation associated with intensive agriculture, achieving such an ambitious goal is questionable. Such growth would not only increase stress and volatility associated with climate change, but also add to economic and political pressure associated with uncertainty and vulnerability (Muir, 2011). Therefore, improving food security, particularly in developing countries, should be focused more on self-sufficiency and sustainability of food and should depend less on cash crops (Tadesse, 2009). To improve the prospects for self-sufficiency, Kuwait and Arab countries should emphasize demand-side policies rather than continue to concentrate on the traditional supply augmentation approach. As only 15 to 20 percent of respondents indicated that they do not waste food, the potential is great to reduce food import and improve food security by reducing food wastage and thereby reducing demand for food. This can be achieved by implementing demand-side strategies to alter food consumption behavior associated with excessive consumption and wastage.

Kuwait and many Arab countries provide subsidies to farmers to supplement their income and influence the price of their products. Government also set price ceilings on certain food items such as bread[ii]. Moreover, Kuwaiti government provides, although periodically, Kuwaiti citizens free monthly foodstuff and rations of rice, sugar, cooking oil, chicken and powder milk[iii]. It is not surprising; therefore, that 64 percent of respondents take advantage of free or heavily-subsidized foodstuff handed by government. The irony is that price control (support to farmers or subsidy to consumers) of food lead to excessive consumption, and therefore, they could be responsible for worsening the food wastage problem in Kuwait. The fact that most of food wastage happens at home, where subsidized food is prepared and the majority of respondents prepare more food than needed, support our assertion that low prices, together with heavy subsidies of food, promote wastage. It is evident that the regularly market-priced (not subsidized) food which is home-delivered or eaten out, are wasted far less (17 percent) than the subsidized home-prepared food (48 percent). More importantly, Kuwaitis, with higher income than their expatriate counterparts, the majority of which receive free or subsidized foodstuff, are more likely to prepare more food than needed at home. As a result, they end up with more wastage, since they are less likely to eat the leftover food and more likely to dispose the leftover.

With 54 percent of respondents indicating that chicken is their first choice of meat, it seems like there is a shift in the Kuwait lifestyle, where fish is no longer the preferred source of protein. In the pre-oil era, Kuwait economy was based on pearl hunting and fishing, where a variety of fish used to be a major part of the Kuwaiti menu. The results of our survey shows signs of a probable shift in consumption pattern and eating habits, where fish is now secondary to chicken and red meat in the Kuwaiti diet. Nowadays, chicken[iv] and red meat are more popular and this may be due, at least in part, to subsidies Kuwaiti farmers receive to influence prices of meat.

The different food subsidy programs (targeted at consumers or farmers) are mostly to blame for food wastage in Kuwait, since they produce market distortions and keep price artificially low. Such low prices and their substitution effect not only promote excessive purchases of food but also lead to waste. The Kuwaiti food subsidy programs are not only unwarranted but also misguided since Kuwaiti households spend, on average, less than 15 percent of their income on food, see Figure 2. In fact, this is one of the lowest share of household income spent on food in the region and in the world, if compared, for instance, to Egyptians, Algerians and Moroccan who dedicate around 40 percent of household income to food expenditure (USDA, 2011).

Figure 2: Percentage of household final consumption expenditures spent on food in select Arab countries



Sources: USDA

6. Conclusion

Our survey indicates the presence of food wastage pattern that can be attributable to factors such as low food prices, free foodstuff, customs and cultural norms, among others. These factors were highlighted in the three-dimensional food security paradigms of Tweeten and Brinkman (1976), which shows that food security is a complex phenomenon and cannot be simply reduced to a simple supply problem. The finding of this preliminary study suggest that bringing demand in line with limited supply is possible if demand-side policies are integrated into existing food security strategies. Such policies, which substantially reduce, if not eliminate altogether, excessive consumption, and thereby, food wastage, would help Kuwait and Arab countries achieve food security objectives at lower cost and less environmental degradation. These policies require the reshaping of what Tweeten and Brinkman called “social institutions, cultures, customs, goals, beliefs, and values of society” to make them

conducive to achieving sustainable food security. Some of these values are religiously-mandated and time-tested means such as fasting.

Although, fasting is common across many cultures and religions, its practices, however, are different from one religion to another. Under the Islamic doctrine, for instance, it is recommended that adherents maintain a regular voluntary fasting[v] in addition to the mandatory fasting of the month of Ramadan. Fasting is typically based on regimented restriction of dietary intake, which if observed properly, it can eliminate excess food consumption and substantially reduce food wastage. Moreover, fasting on regular basis produces wide spectrum of health benefits (Mattson, 2012). This approach is more than likely to succeed in Kuwait and Arab countries, given that the overwhelming majority of the population is Muslim and that 94 percent of respondents indicated that they are receptive to education and awareness as means of addressing food security challenges. Eliminating food wastage yields substantial positive external benefits in terms of healthy population, less expenditure on obesity-related health care, healthy ecosystem and less environmental degradation, among many others. Therefore, demand-side policies should be incorporated into food security strategies in Kuwait and other Arab countries. We recommend that more research is conducted to identify and empirically test such policies to improve the prospect for sustainable food security in these countries and beyond.

Endnotes

[i] Lunch is the main meal in Kuwait and it usually takes place in the mid-afternoon.

[ii] The late Sheikh Jaber Al-Ahmad Al-Sabah issued an Amiri Decree (Executive Order) in 1977 establishing a 50 fils price ceiling per bag of bread (375 grams of white pita bread) and 100 fils on falafel sandwich (Kuwait Times, May 1, 2012 http://news.kuwaittimes.net/2012/05/01/are-subsidies-causing-inflation/). If such rates were to be adjusted at the annual rate of inflation, the rates would have been increased by at least 10 folds.

[iii] In January 2011, the government pledged cash handouts of $3,500 per citizen in addition to free food stuff for 14 month. On May 1, 2012, the Minister of Commerce and Industry announced a proposal to extend the free food stuff to citizens until August 2014 (Kuwait Times, May 1, 2012).

[iv] In fact, there is a thriving poultry industry in Kuwait which has not been able to keep up with the growing demand for chicken.

[v] This amounts to about 10 days each month, given the Prophetic tradition of fasting Monday and Thursday of each week, beside the 13th, 14th, and 15th days of each month in Lunar Calendar.

References

ActionAid (2011), A quarter of the world's population on brink of triple crisis, viewed 31 March 2012, <http://www.actionaid.org/bangladesh/news/quarter-worlds-population-brink-triple-crisis-warns-actionaid>

Al-Domi, H, Al-Rawajfeh, H, Aboyousif, F, Yaghi, S, Mashal, R & Fakhoury, J 2011, 'Determining and Addressing Food Plate Waste in a Group of Students at the University of Jordan' *Pakistan Journal of Nutrition*, vol. 10, no. 9, pp. 871-878.

FAO Agriculture and Development Economics Division 2006, *Food Security,* Policy Brief Issue 2, Food and Agriculture Organization, Rome.

Holy Quran, 7:31

Lin, A, Huang S, & Wahlqvist, M L 2009, 'Waste management to improve food safety and security for health advancement' *Asia Pacific Journal of Clinical Nutrition,* vol. 18, no. 4, pp. 538-545.

Mattson, M 2012, '*Caloric Restriction and the Aging Brain and Body*', paper presented to the Annual Meeting of the American Association for the Advancement of Science, Vancouver 12-20 February.

Muir, JF 2012, 'Perspectives from the UK foresight global food and farming futures programme' Improving Agricultural Knowledge and Innovation Systems: OECD Conference Proceedings by OECD Organisation for Economic Co-operation and Development, OECD Publishing, pp. 107-109.

Pool, R 2012, 'The nightmare after christmas', *Engineering & Technology*. vol. 6, no. 12, pp. 38-41.

Quested, TE, Parry, AD, Easteal, S & Swannell, R 2011, 'Food and drink waste from households in the UK', *Nutrition Bulletin*, vol. 36, no. 4, pp. 460-467.

Schiff, M, 1992, 'Social Capital, Labour Mobility, and Welfare: The Impact of Uniting States' *Rationality and Society*, vol. 4 no. 2, pp. 157-175.

Tadesse, G & Shively, G2009, 'Food aid, Food Prices, and Producer Disincentives in Ethiopia', *American Journal of Agricultural Economics*, vol. 91, no. 4, pp. 942-955.

Tweenten, L 1999, 'The Economics of Global Food Security' *Review of Agriculture Economics,* vol. 21, no. 2, pp. 473-488.

Tweeten, L & Brinkman, G 1976, *Micropolitan Development: Theory and Practice of Greater-Rural Economic Development*, Iowa State University Press, Ames.

Shapouri, S, Rosen, S, Tandon, S, Gale, F, Mancino, L. & Bai, J, 2011, *International Food Security Assessment, 2011-21*, Outlook No. GFA-22, USDA Economic Research Service, Washington, DC, viewed 14 March 2012 <http://www.ers.usda.gov/publications/gfa-food-security-assessment-situation-and-outlook/gfa22.aspx>

WHO World Health Organization, 2012, *Food security*, viewed 23 March 2012, http://www.who.int/trade/glossary/story028/en/