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KAHRAMANMARAŞ SÜTÇÜ İMAM UNIVERSITY
GRADUAT SCHOOL OF NATURAL AND APPLIED SCIENCE

**HOUSEHOLD FOOD CONSUMPTION
IN ERBIL - IRAQ**

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MASTER THESIS
DEPARTMENT OF BIOENGINEERING AND SCIENCES

KAHRAMANMARAŞ, TURKEY 2015

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**Thesis submitted in candidature for
the degree of Master in
Department of Bioengineering and Sciences**

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I hereby declare that all information in the thesis has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

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ÖZET

Bu çalışmanın amacı Erbil'de hanehalkının gıda tüketim yapısını araştırmaktır. Bu amaçla Irak'ın Erbil bölgesinde 2014 yılı Aralık ayında 305 hanehalkından 30 günlük gıda tüketim kayıtlarından elde edilen veriler ve Working-Lesser modeli kullanılarak araştırma alanında on üç gıda grubu için gıda harcama talebi parametreleri sistem denklemi kullanılarak tahmin edilmiştir. Araştırma sonuçlarına göre, hanehalkının gıda tüketim harcamalarının toplam harcamalar içerisindeki oranı yaklaşık %34.9'dur. Et ve et ürünleri, tahıl ve ekmek grubu ürünler ve sebze grubu ürünler gıda harcamaları içerisinde en büyük payları alırken, yumurta en düşük payı almıştır. Tahmin edilen gıda gruplarından yumurta, patates, meyve ve ev dışı gıda tüketimlerinde sıfır gözlemlere rastlanmıştır.

Araştırmada, tüm gıda gruplarının harcama esneklikleri pozitif olarak saptanmıştır. Patates en düşük harcama esnekliklerine sahip iken, ev dışı gıda tüketimi harcamalarının en yüksek esnekliğe sahip olduğu tespit edilmiştir. Sonuç olarak, tüm gelir esneklikleri pozitif ve birden küçük olup incelenen gıda gruplarının tamamı normal ve zorunlu mallar kategorisine girmektedir.

Anahtar Kelimeler: Gıda tüketimi, Talep sistemi, Working-Lesser Modeli, Erbil, Irak

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HOUSEHOLD FOOD CONSUMPTION IN ERBIL-IRAQ

(M.Sc. THESIS)

MOHAMMAD JAMIL MOHAMMAD

ABSTRACT

This study investigated household food consumption in urban Erbil, using data obtained from 305 households by a 30-days dietary food record survey, carried out by researchers in the Erbil province of Iraq in November 2014. The Working-Leser model was used to estimate the food consumption demand system parameters for thirteen main food groups in the sample area. It was found that on average households spent about 34.9% of their monthly income on food consumption during a month. Meat, cereals, bread, and vegetables accounted for a large share of expenditure and eggs had minimum share of expenditure. The result suggested some zero consumption for fruit, eggs, potatoes and food eaten away from home groups.

The results indicated that the expenditure elasticities for all food groups were positive, and the potatoes and food away from home groups had the minimum and maximum expenditure elasticity, respectively. Moreover, all income elasticities were positive and less than one. This indicated that all food groups were normal and necessary goods.

Key words: Food consumption, demand system, Working-Leser Model, Erbil, Iraq

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LIST OF SYMBOLS AND ABBREVIATIONS

AIDS	: Almost Ideal Demand System
CAPMAS	: Central Agency for Public Mobilisation and Statistics
EMOP	: Emergency Operation
FAO	: Food and Agriculture Organization of the United Nations
FOODEX	: Canada by using the Food Expenditure Survey
GOI	: Government of Iraq
HBS	: Household Budget Surveys
HIEs	: Integrated Economic Survey
IBM	: International Business Machines Company
IFHS	: Iraq Family Health Survey
IQD	: Iraqi Dinar
Kcal	: Kilocalorie(s)
Kg	: Kilogram(s)
Km	: Kilometer(s)
KRG	: Kurdistan Regional Government
KRSO	: Kurdistan Region Statistical Office
LA/AIDS	: Linear Approximate Almost Ideal Demand System
LPG	: Liquefied Petroleum Gas
MT	: Million Ton
PSLM	: Pakistan Social and Living Standard Measurement Survey
UN	: United Nation
UNCHR	: United Nations High Commissioner for Refugees
USD	: United States Dollar
WFP	: World Food Programme

1. INTRODUCTION

Food is any raw or cooked substance consumed to provide nutritional support and necessary energy for motility and viability of the human body or any other living creature. It is often of animal or plant origin and contains essential nutrients, such as fats, proteins, vitamins or minerals. These substances assimilate and are converted into energy by the organism's cells to supply the necessary power for growth, motility and viability (Singh, 2014).

Throughout the history of mankind, the minds of people have been pre-occupied with how to provide the necessary food. In the past, people secured food through hunting, gathering and agriculture, while today most energy for the ever growing population of the world is produced by the food industry (Anonym, 2015). It is clear that people can only eat what they can access and afford (Healy, 2012). On the other hand, access to adequate food is the main axis of health and community development (FAO, 1996). Everywhere and at any time, there are two fundamental conditions for achieving adequate and safe food; these are physical access and economic access (Frongillo, 1999). Throughout history those with high incomes and political power always had access to more plentiful and better quality food than workers and others in the lower classes (Healy, 2012). Nutrition has always played a role in health, and increased the productivity and performance of human learning. Its relationship to economic development all over the world, especially in the last twenty years, has been proven by scientific and empirical evidence (Hamelin et al., 1999).

Food consumption is one of the inevitable behaviors in the daily life of human beings and it is noted that in modern societies, especially in urban communities, that more food needs to be purchased. Hence, maybe it can be said that the most important economic human behavior is food consumption (Li, 2006). According to Adam Smith "consumption is the sole purpose of all production". Production increases when consumption is increased. It is food's consumption that makes its production inevitable (Chand, 2015). Production and consumption are economic operations and a boom in food production that follows prosperity and economic development depends on the amount of food consumed by people. However, food has become an extremely political issue (Moomaw et al., 2012). Overall, food consumption anywhere in the world depends on the economic and social structure of the country, as well as the environment, climate, resources, trade policy and ideology, religion, culture, and lifestyle of the people (Akbay et al., 2007 and 2008). Food

security at the national level is the foundation for successful policies and better outcomes of community development (FAO, 2015a), but it is unfortunate that in many communities, especially in developing countries, food production and consumption is still one of the big issues. As Engel's Law states, "the more developed a country is, the less it will spend on food proportionally speaking". This means that people in developing countries pay a large proportion of their budget for food, and also that development and progress reduce the share of food consumption in the budget (Vega and Gracia, 2000).

Food consumption and recognizable food consumption patterns are highly important economically if the food consumption-based production model is consistent with the development of society. But, if there is no consistent food production pattern, imports are normally counted and these act as an anti-development. In developed countries, food consumption is formed on the pattern of production over time. If such a society is encouraged to consume more, this can contribute to economic growth, because more food consumption will create more and more demand for domestically manufactured foods. This encourages production and increases employment, resulting in an economic boom. One of the characteristics of developing countries is that their food consumption is incompatible with the production pattern. In other words, they do not produce all of the foods that are consumed. Such a situation fuels the culture of food consumption, increases imports of foods and causes the withdrawal of accumulated wealth, and prevents investment (Mousaaei, 2009). Aligning the optimal pattern of food consumption with domestic production in developing countries, including Iraq, is not a short-term or annual policy, but is a strategic policy. Food consumption is not only an economic issue, but is also a social and cultural phenomenon and this doubles the complexity of the problem. Sufficient attention should be given to social and cultural aspects.

Consumption is highly important economically if the consumption pattern based on the production model is consistent with the development of society. In developed countries, consumption patterns are always based on the patterns of production. In this kind of society, people are encouraged to consume more. This can contribute to economic growth because more consumption will create more demand for domestically manufactured goods, which encourages production and increases employment. The result is an economic boom. In the developing countries the consumption pattern is incompatible with the production pattern. In other words, they cannot produce all the consumer goods required and this situation fuels the consumption culture. The importation of goods will

increase and this will cause the withdrawal of accumulated wealth and prevent investment (Mousaaei, 2009).

Nutrition and food consumption is important in household budget planning, and its high share of the urban household budget increases the importance of estimating the household food demand. An analysis of the allocation of household income on goods and services has been attractive for economists and politicians, and estimates of the demand for goods and services is important in order to detect preferences and future needs. Estimating the demand model and calculating the price and income elasticities for food groups demand is considered to be one of the most important tools to study the consumer's behavior for macro-economic policies and economic planning. The income elasticity determines the sensitivity of different food groups compared to specified income and goods types, in terms of the essential, inferior or luxury goods. Price elasticity measures the consumer's reaction toward price changes of goods and the price of other goods (Bahmani and Asghari, 2009).

The main objective of this study is to estimate the models for food group demand in Erbil, Iraq and also to answer the following questions:

- What is the coefficient of sensitivity of Erbil urban households in their consumption of each of the different food groups?
- Which of each of the different food groups are inferior, essential or luxury goods?
- What is the coefficient of sensitivity of Erbil urban households in their consumption of each of the different food groups toward the income changes of the same group?

1.1. Changing the Diet of People

The diet of the people living in Erbil in Iraq is changing rapidly from a traditional one, consisting of food from domestic harvesting activities, to one which includes more and more industrial foods imported from the neighboring countries' markets. It is natural and unintentional that peoples' dietetic habits affect surrounding areas. Iraqi Kurdistan is not an exception to this rule, because it has as neighbors many distinct nationalities with distinct dietetic habits; to the northwest Turkey and Turkish people, in the east Iran and the Persian people, and in the south and west it is neighbors with the Arabs. The major part of the food of the Kurdish people is produced by its neighbors, especially Turkey. That is why food habits and food consumption is partly influenced by the people from the neighboring countries.

Whilst the main purpose of food production is consumption and this is an important economic activity, at the same time it has a significant impact on other macroeconomic variables such as: production, savings, employment, unemployment, inflation and economic growth. Consumption in each community has a prominent role to access community development. So, in a country that is seeking development, consumption is very important (Mousaaei, 2009).

In underdeveloped countries whose overall development confidence relies on oil sales, the world oil prices directly affect the whole of the country. The wars and insecurity in the country or region also play a high role in the lives of people. In times when these societies are most vulnerable the most important things are the food habits of people and their food baskets.

During the 1980s, Iraq had one of the highest levels of per capita food availability in the Middle East. Calorie availability data from FAOSTAT 2015b (Table 1.1) shows 3321 Kcal/capita/day in 1985, while at the same time this amount was 2587 Kcal/capita/day in the rest of the world. Due to the war in Iraq, production and transportation of food declined quickly in 1990 when general trade sanctions dramatically decreased the country's purchasing power. The price of food was at a great height, the rate of unemployment grew, and salaries and benefits dropped dramatically. Poverty affected a large area and a great number of people. The previous diet was unachievable for most people. Deprivation changed the eating habits of most people. Rationing further influenced these habits. In an attempt to overcome the food security crisis, the Government of Iraq (GOI) re-introduced a public food rationing system in September 1990 (Anonym, 2011).

In answer to a request by the GOI, the World Food Programme (WFP), as a part of the UN Inter-Agency Humanitarian Program, started an Emergency Operation (EMOP) in 1991. At its peak, the program provided food to more than two million of the country's 22 million people to complement the GOI rations. The WFP's emergency support was to cover the basic food needs of the most defenseless people in Iraq. By the end of the WFP EMOP in 1998, the WFP had provided over 600,000 MT of food valued at USD 259 million. Food accessibility has developed considerably since the beginning of the Oil-for-Food Program in 1997. This indicates a significant improvement in the food prepared prior to 1997. The Oil for Food Program has grown overall access to food and there has been sustained improvement in the overall nutritional status between November 1997 and June 2001 in the North of Iraq (Anonym, 2011).

Once again in 2003, following the allies attack on Iraq, the situation changed and the food supply was faced with a sharp drop. After the fall of the Iraqi regime in 2003, once again the situation of the Iraqi people, especially the Iraqi Kurdistan people saw day-to-day improvements. The nutritional status of the population was growing, but this boom was not sustainable. In 2014, coinciding with the attack by ISIS terrorists on different parts of Iraq, economic problems and disagreements between the federal government and the KRG, a significant fall in world oil prices, and a lack of funds for Iraq had an effect. While doing this research, the economic situation of the Kurdish people suffered a sharp drop and all of these factors have had a negative impact on people's nutrition.

As we can see in Table 1.1, from post-1990 until 2011 the eating habits of people suffered a sharp drop and have not returned to the past position. The amount of calories, fat and protein consumed are lower than the world average, although from 2005 there has been an increase, but the growth rate is very low compared to other countries at the same time. In other countries and also in the world generally the amount of calories and consumed fat and protein has been growing at a slow and regular pace over these years. This reflects the economic growth, nutritional improvement of people and income increases, as well as the security and stability of these countries. In 1985, the amount of calories, fat and protein consumed for all countries shown were higher than the world average; also in 2011, all other countries except Iraq were higher than the world average. In Turkey, between 1985 and 2011 the amount of consumed protein saw a slight decline, but relative to other countries the amount of calories, fat and protein consumed was always higher than the world average. This indicates that Turkish people consume more food and they have a better diet relative to other countries. In Saudi Arabia and Iran the amount of calories and consumed fat and protein during the period shown were a little more than, or near to, the world average. We can see that after 1990 the diets in other countries are improving and are better than the diet of the Iraqi people.

Table 1.1 Calorie (kcal/capita/day), fat (g/capita/day) and protein (g/capita/day) in Iraq and some countries

Year	Iraq			Turkey			Iran			Saudi Arabia			World		
	Calorie	Fat	Protein	Calorie	Fat	Protein	Calorie	Fat	Protein	Calorie	Fat	Protein	Calorie	Fat	Protein
1985	3321	75.90	86.69	3626	85.60	108.58	2712	56.40	71.63	2703	70.20	77.49	2587	64.00	69.47
1990	3249	72.90	84.18	3775	93.92	109.25	2883	63.70	75.56	2871	86.70	79.88	2621	67.40	70.49
1995	2202	71.90	46.74	3715	96.20	109.28	3026	67.50	78.77	2852	74.60	78.70	2664	69.40	72.65
2000	2192	51.40	52.17	3662	100.10	105.32	3027	62.00	82.23	3113	91.00	83.83	2728	73.50	75.08
2005	2354	60.20	54.25	3611	105.00	103.31	3057	66.30	84.52	2973	82.00	82.53	2763	77.20	76.12
2006	2379	55.70	54.81	3648	108.20	103.04	3015	68.00	83.46	3016	83.80	81.49	2780	78.50	76.84
2007	2394	55.70	56.87	3631	113.50	102.74	3039	73.20	84.46	3017	81.30	83.00	2809	80.00	78.18
2008	2408	65.50	57.51	3597	110.40	100.70	3039	74.10	82.95	2977	81.90	79.83	2826	80.20	78.73
2009	2436	65.00	61.54	3622	112.50	100.87	3028	76.80	85.11	2967	82.50	79.89	2826	81.10	78.89
2010	2495	66.90	60.81	3646	113.00	103.81	3058	75.90	86.24	3099	92.10	85.69	2851	81.90	80.09
2011	2489	69.00	61.40	3680	121.10	104.81	3058	74.20	86.46	3122	96.20	87.00	2870	82.60	80.49

Source: FAOSTAT 2015b

2. LITERATURE REVIEW

Economists and economic policy makers have often debated and been interested in the analysis of household income allocation between goods and services. In any economic system, producers produce the goods and services and clients consume them. The customers, who mainly are households, always need to buy goods and services, but faced with limited income and high prices they will never be able to supply all of their needs. Hence, they are often faced with the problem of how to allocate their limited income to maximize their utilities. They will always change their demand appropriately with changes in the relative prices of goods and services. On the other hand, producers only motivation is to maximize business profits for which they need a demand for goods and services. Investigating the factors affecting demand will support manufacturing firms to increase their capabilities in compliance with the current status and future consumption needs in order to maximize their profits (Partovi, 2009). Due to the importance of food consumption and its role in the economy, researchers from around the world have undertaken many research studies in this respect. The following discussion considers some of these studies.

Molina (1994) investigated the demand for food consumption in Spain, and presented a demand system for household food consumption. In this study, he made an estimation of the food demand system parameters by using the Almost Ideal Demand System (AIDS) model. He estimated elasticities for food groups that included: bread and cereals, meat, fish, milk and eggs, fruit and vegetables, and other foods. The results of this study indicated that in terms of income elasticity, bread and cereals, meat, fish, milk and eggs groups were necessary goods, while fruit and vegetables and other food groups with elasticity higher than one were luxury goods. According to the results, all the food groups in terms of price elasticity were inelastic.

Halbrendt et al. (1994) investigated rural consumer behavior in China, using the data from the Guangdong household survey. They used an AIDS model to estimate elasticities for food items. They found meats, poultry, fruit, sweets, and durable goods were most responsive to expenditure changes.

Wu et al. (1995) estimated the demand system for six food categories (rice, pork, vegetables, fish, eggs and fruit) of urban households in China by using a two-stage budgeting procedure which incorporates an Almost Ideal Demand System (AIDS) in each

stage. They obtained data from the household consumption survey. They concluded that the Chinese market for food is not a stable food market.

Esfandiyari (1998) used an AIDS model to estimate food demand for urban households in Iran by using time-series data for 1974-1994. He investigated income share and demand for wheat (bread-flour and noodles), meat, dairy products and eggs, and fruit and vegetables. The results showed the expenditure share for the food investigated out of all food expenditures were 1.4% for flour and noodles, 9% for bread, 33% for meat, 7.8% for poultry, 2.5% for seafood, 16.4% for dairy and eggs and 29.9% for fruit and vegetables. The findings also indicated the elasticities for all food groups and found that price elasticity for flour and noodles, bread, and seafood were greater than one and for meat, poultry, dairy products and eggs, and fruit and vegetables were less than one, as well as that all income elasticities for all food groups were about one.

Abdulai (1999) investigated the effect of household demographic variables and estimated price and expenditure elasticities on Indian food items by using a Linear Approximate Almost Ideal Demand System (LA/AIDS). He used recent household survey data in rural and urban areas. The results showed that for food groups (meat, fish, and eggs; cereals and pulses; milk and milk products; edible oils; vegetables and fruit; other foods) demand was elastic only for milk and milk products in both rural and urban areas. Generally, the demographic variables such as region, household size, education level of household head, and seasonality have a significant impact on food demand.

Gould (2002) presented a study to recognize the important factors of expenditure on food for consumption by households in three Chinese urban provinces by household-level data. He examined the role of household income via the estimation food consumption parameters. Results showed overall food in terms of income were inelastic.

Chern et al. (2002) analyzed the food consumption patterns to estimate the food demand structure in Japan. The data was obtained from the Annual Report on the Family Income and Expenditure Survey in 1997 and the number of observations used for estimation was 95,223 households. They estimated the demand system for 11 main food items that contained non-glutinous rice, bread, noodles, fresh fish and shellfish, fresh meat, milk, eggs, fresh vegetables, fresh fruit, fats and oil, and food away from home. They applied the Working-Leser model estimated by OLS, Heckman's sample selection model, and Tobit model for the zero-consumption and for complete demand system analysis they used a Linearly Approximated Almost Ideal Demand System (LA/AIDS), they also used

the Nonlinear Almost Ideal Demand (AIDS) System. The results showed that the expenditure elasticity of rice is positive and close to one. This proved that rice in Japan is a normal good. The results from the meat categories also showed that the expenditure elasticity of beef is higher than one, while other meat products were inelastic.

Ishida et al. (2003) presented a study to investigate the structural changes in food consumption expenditure in West Malaysia after the early 1970s. They have estimated Engel's expenditure elasticities for food items by using cross-sectional data from the Household Expenditure Survey. The results showed the expenditure elasticities of food away from home and the elasticities expenditures for meat, fruit and vegetables, milk and dairy products were comparatively high, but at same time, those of rice and sugar were low. Moreover, the share of food away from home will increase with income enhancement, as expected.

Yen et al. (2004) investigated the household food consumption in urban China. They obtained their data from the 2000 Urban Household Survey. Their sample size was 3715 households. They used four demographic variables, namely, age of the household head, household size, and two dummy variables for education of the household head, along with five other dummy variables for regions, namely, North, Northeast, South, East, and West, with the reference region as Pastoral. Their study estimated a system for eleven food groups. The results suggested that vegetables and grain are consumed by all households, but the proportion of consuming households are also high for fruit, eggs, fish, pork and fats and oils, respectively. Milk and other meat are the least popular foods. Parameter estimates of the Translog demand system were presented through the demographic variables. They reported the total food expenditure elasticities, which were all positive and significant at the 1% level. These positive expenditure elasticities suggested that all products were considered normal goods.

Dawoud (2005) investigated food consumption patterns in rural and urban Egypt and estimated partial and complete food demand systems based on a LA/AIDS model by using data from the Central Agency for Public Mobilisation and Statistics of the Government of Egypt. He presented an estimation of expenditure elasticities for rural and urban areas and for each household size, using an Engel double-log model of household expenditures. His results show increasing consumption of vegetables and meats with higher income. Furthermore, the expenditure elasticities in rural areas are larger than urban areas, and the expenditures on most food categories increased when household size

decreased. The results showed the expenditure elasticities for all food groups were positive and less than one, except for fruit, meats, and milk that were identified as luxuries. The cereals group had the lowest expenditure elasticity of demand.

Regorsek et al. (2006) evaluated food consumption patterns in Slovenia. Food items were divided into seven major groups. They estimated elasticities for food groups by using LA/AIDS and cross-sectional household data from the Household Budget Survey 2001. Empirical results showed expenditure elasticities were positive and those close to one were general demands, but dairy products and vegetables have expenditure elasticities higher than one. Also, demand for meat and fish in terms of income was inelastic.

Barikani et al. (2007) in Iran estimated the demand for food within the framework of a system by using an AIDS model in both dynamic and static mode. They used time series data for 1974-2003. The results indicated that the results in dynamic mode were better than static mode. In accordance with theoretical expectations, all the cross price elasticities obtained were negative and all income elasticities obtained were positive.

Pomboza and Mbaga (2007) estimated demand elasticities for food in Canada by using the 2001 Food Expenditure Survey data. The empirical model used in this study is similar to the AIDS model. The food groups studied included: beef, pork, poultry, other meat, fish, dairy, eggs, bakery, cereal and pasta products, fruit, vegetables, fats and oils, other food, and non-alcoholic beverages. Results suggested the demand for poultry, other meat, dairy, fruit, nonalcoholic beverages and other food were more price elastic than the other food groups, and expenditure elasticities were positive and less than one with the exception of fruit and vegetables groups.

Akbay et al. (2007 and 2008) estimated food consumption patterns in Turkey by using a LA/AIDS model and data from the 2003 Turkish Household Expenditure Survey. They indicated that the meat and meat products group had the highest expenditure elasticity; they also found that an increase in income would increase the demand for meat and meat products more than the demand for other goods. The price has more impact on the demand for fats and oils and non-alcoholic beverages. They also used regional and seasonal differences and socio-demographic factors to describe differences in food consumption patterns in Turkey.

Bahmani and Ashghari (2009) used an Almost Ideal Demand System to estimate households' food demand in rural Iran in the years 1982 to 2005. They used time-series

data from a survey that annually collected rural expenditure and income data. They reduced the number of variables into four food subgroups that consisted of: 1) bread, rice and cereals, 2) dairy products and eggs, 3) red and white meat and 4) other foods. The results showed that the bread, rice and cereals subgroup was on average 31%, meat 21%, dairy products and eggs approximately 12% and other foods subgroup 36% of the total food expenditure allocated of the rural household food expenditure. The price elasticity of bread, rice and cereals subgroups were lowest and the price elasticity of dairy products and eggs subgroup was highest. Also, the grain group was luxury goods while the dairy products and eggs subgroup was necessary goods.

Hoang's (2009) study analyzed the food consumption demand of Vietnamese households using data from the Vietnamese household survey in 2006. Demand elasticities were estimated by using the AIDS model. The results showed that food demand in Vietnam is affected by income, price, and also socioeconomic and geographic factors. In this study, all food has positive expenditure elasticities. In particular, rice had a mean expenditure elasticity of 0.36. Thus, an increase in the income by 1 percent leads to an increase in rice demand by 0.36 percent, on average. It indicates that food consumption in urban and rural areas, and among regions and income groups are different.

Yen and Bilgic (2013) investigated household demand for sixteen food groups in Turkey by using data from the Turkish Household Expenditure Survey. They estimated the LA/AIDS model with Shonkwiler and Yen's two-step procedure. They found all expenditure elasticities are positive. Also, their results showed that bread, other cereals, bovine, mutton, giblets, and cheese have high expenditure elasticities. They also indicated that demographic variables play important roles in the design of household food demand. Finally, the recommended elasticity estimates can inform policy deliberations.

Sahinli (2013) investigated household demand parameters for food groups in Turkey. In this study, price and expenditure elasticities were calculated by using the AIDS model; the data came from the Household Budget Surveys from 2002 to 2011. The study estimated price and expenditure elasticities for food groups in five income groups. According to the results, all price elasticities were negative; also, food group elasticities for all income groups estimated in this study were normal goods.

Alexandri et al. (2014) made an estimation of the food demand system parameters in Romania by using the AIDS model. They used data from the Household Budget Survey from the 1st quarter of the year 2011 and determined the food demand system parameters

for households from the urban and rural areas. Results showed that the expenditure elasticities in the rural area are higher than in the urban area, mainly due to the fact that the rural people have lower incomes.

Rehman et al. (2014) evaluated the household food demand patterns among five different income groups in urban and rural areas of Pakistan. They estimated food expenditure and household size elasticities. For the purposes of the analysis the cross-sectional data were taken from the Pakistan Social and Living Standard Measurement Survey 2010-11 and used the Engel Expenditure elasticities tool in the household analysis to estimate demand parameters of cereals, pulses, fruit, vegetables, dairy products, chicken, meat, fish, condiments, sugar, edible oils, drinks and miscellaneous food products. The results indicated for all the income and household size elasticities are positive and significant at one percent level of significance. They also indicated that the urban food consumption is higher in the upper-income group, but households in other groups or classes of rural areas are more food responsive. Urban households presented higher elasticities overall in lower income groups, lower middle-income groups, and middle-income groups, whereas households belonging to upper-middle income groups and upper-income groups of the rural area are also more food responsive.

The rural and urban food consumption in Pakistan were estimated by Ahmad et al. (2015). They obtained data from the Household Integrated Economic Survey 1998-99. They used the method of Ordinary Least Squares for calculating expenditure elasticities. In this study, analysis of the rural-urban food consumption at the household level was carried out by dividing the households into five income groups. The expenditure elasticities of different food groups were estimated across the different income levels. The results presented that rural and urban households have different food consumption demands. Also, households both in rural and urban areas in the low level income groups spend a larger share of their income on wheat, pulses and vegetables, but high income groups spend on rice, meat and fish, milk and milk products.

3. MATERIAL AND METHODS

3.1. Material

3.1.1. Study area

The study area was the city of Erbil, which is located about 350 km north of Baghdad in northern Iraq. The city of Sulaimaniyah is located at the southeast of Erbil, Dohuk and Mosul are at the west, and Kirkuk is located at the east. The international border with Turkey and Iran runs along the north and northeast of Erbil (Aziz, 2014) (Figure 3.1).

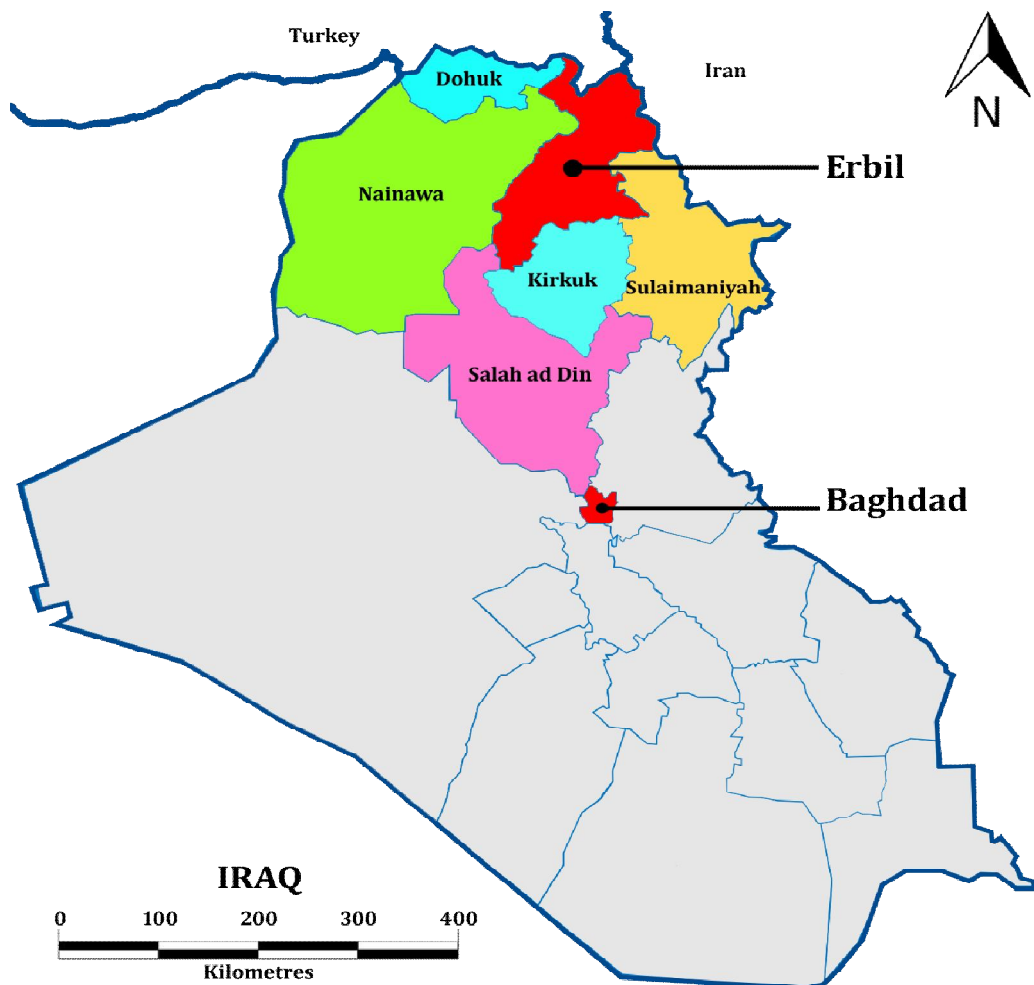


Figure 3.1. The city of Erbil in IRAQ (Anonym, 2014)

3.1.2. Survey sampling

The sample size was determined by using the ungrouped one stage random likelihood sampling method based on household (Collins, 1986) (Aydin and Kilic, 2013):

$$n = \left(\frac{Z_{\alpha/2}}{d} \right)^2 \times p \times q$$

where:

n = The sample size

$Z_{\alpha/2}$ = The significant level (assumed to be 95%)

p = The probability of examined situation occurring ($p = 0.5$ is used to the absence of preliminary information concerning consumers food demand awareness levels)

q = Probability of the situation not occurring ($q = 1 - p$)

d = The margin of error (assumed to be 95%)

According to the method used, the sample size was 384. Questionnaires were distributed randomly. However, only 305 questionnaires were entered into the study because a number of questionnaires, for various reasons, could not be entered into the research. The reasons for this were the non-return of some questionnaires, incomplete questionnaires and the late return of some questionnaires (Table 3.1).

Table 3.1. Number of complete and incomplete questionnaires	
Description	Quantity
Reliable questionnaires	305
Unfilled questionnaires	5
Unreliable questionnaires	26
Late returns questionnaires	18
Not returned questionnaires	30
Total	384

3.1.3. Design of the questionnaire

The initial oral research asked a few questions about the quantity and amount of food consumed by several households. We found that a common questionnaire could not be used in this research because families did not remember precisely their food consumption in the past month, despite the 24-hour dietary recalls, two-day dietary records, three-day dietary records and one week dietary records. Therefore, for the first

time in the literature we designed a questionnaire to record purchased and consumed household food for 30 consecutive days. This was called a 30-days dietary record and consumption questionnaire. Although this questionnaire had some problems such as being time consuming, long-term and costly, we finally achieved a result that was very close to reality. The first part of the questionnaire contained regular demographic questions about the household, housewife and other members of the family, and also included a number of questions about monthly income and all sources of family income. The next part of the questionnaire included household food consumption and expenditure including fuel, water, oil, and 70 kinds of common food and food groups in the Erbil province of Iraq.

A total of 385 questionnaires were distributed randomly among the households of Erbil in different areas, together with explanations and training on how to respond and fill out the questionnaires. If people were happy to answer, questionnaires were given to them. For various reasons, some people refused to answer questions, some people for the reason that 30 days was a long time to record their food intake, and some because their household members did not like the disclosure of their information. The survey was done in November 2014.

3.1.4. Data entry and analysis

When printing the questionnaires a series was printed on each questionnaire. When the questionnaires were returned the first step was to enter the data and develop an Excel spreadsheet, by using the series of the questionnaires and the corresponding data of each observer in a row. The preparatory work, such as arranging, sorting, correcting and revising the data was completed in the Excel file then the data were exported to the SPSS program. Descriptive statistics were also needed. Statistical tests were carried out by IBM SPSS Statistics. Finally, for estimation of the food groups demand model and also estimating the income and expenditure elasticities of food the SHAZAM 10.0 Program was used.

3.2. Methods

In this study, we used Double logarithmic regression to estimate total food expenditure demand parameters:

$$\ln(\text{FoodExp}) = \alpha + \beta \ln(\text{Income}) + \sum_k \gamma_k * D_k + \varepsilon_i \quad \text{Eq. (3.1)}$$

where, *FoodExp* is the total food expenditure, *Income* is the monthly income of household, α , β and γ are the coefficient, D_k indicates demographics and other variables and ε_i is the random disturbances assumed with zero mean and constant variance.

It's easy to estimate food income elasticity from above equation 1. Income elasticity of total food expenditure on this model equals to coefficient of income variable, β . To estimate each food items demand parameters, flexible model known as the Working-Leser (WL) model recommend as log-liner budget share specification is used. This model can be expressed as:

$$w_i = \beta_0 + \delta_i \ln(M) + \sum_k \gamma_k * D_k + \varepsilon_i \quad \text{Eq. (3.2)}$$

where, w_i is the expenditure share of the i^{th} food items, β_0 is the constant, δ_i is coefficient of income, M is the total expenditure of all food items entered in the model, D_k indicates demographics and other variables, ε_i is the random disturbances assumed with zero mean and constant variance.

The expenditure elasticity of each food item (e_i) is calculated as follows (Green and Alston, 1990):

$$e_i = 1 + \left(\frac{\delta_i}{w_i} \right) \quad \text{Eq. (3.3)}$$

where δ_i is coefficient of income and w_i is expenditure share of each food item.

Then, income elasticity of each food item calculated as:

$$\eta_i = \beta * e_i \quad \text{Eq. (3.4)}$$

where β is income elasticity of total food expenditure and e_i is the food expenditure elasticity of each food items.

4. RESULTS AND DISCUSSION

4.1. Socio-Demographic Characteristics of Households

The survey results showed that 98% of the sample was constituted of Muslim families, and only 2% were of other religions such as Christian and Yezidi, etc. (Figure 4.1).

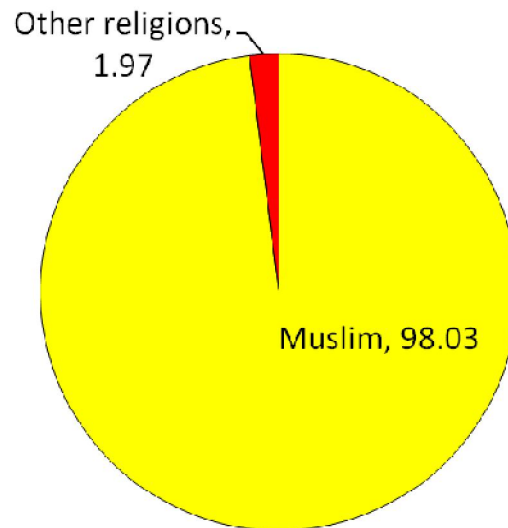


Figure 4.1. Household's religion groups

The Kurdish households constituted 97% of the sample and only 3% of the sample was other religion groups (Arabs 1.3%, Christian 1.6% and Turk 0.3%).

The United Nations High Commissioner for Refugees (UNCHR) (2007), report concerning Erbil stated that about 67% of people were Muslim and about 33% of people had other religions (Christian 32% and others 1%). The sample results were different to the United Nation (UN) report.

In 90% of the sample the father of the household was alive and in 1.5% of households the father had left. In 8.5% of families the mother was the head of the family, or if the mother had died, an older child within the household had taken over as household head.

The average age of the head of the household was 45.1 (± 12.89) years. The minimum age of the household head was 23 years and the maximum age was 77 years (Figure 4.2).

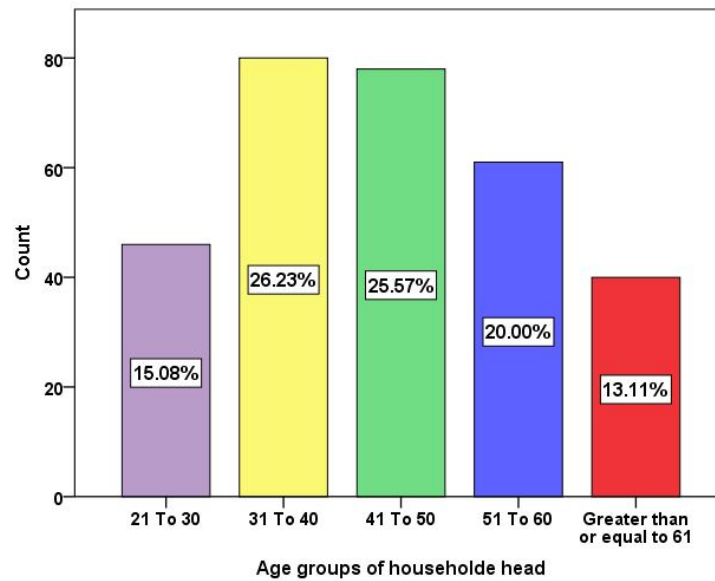


Figure 4.2. Age groups of households head

In this study, the results showed that men constituted 90.5% and women 9.5% of household heads (Figure 4.3). In the UNCHR (2007) report, 86.94% of household heads were male and 13.06% were female. A report by Iraq Family Health Survey (IFSH) (2007) reported that the household head is female in 10.2% of Iraqi households. Our results are close to these reported results.

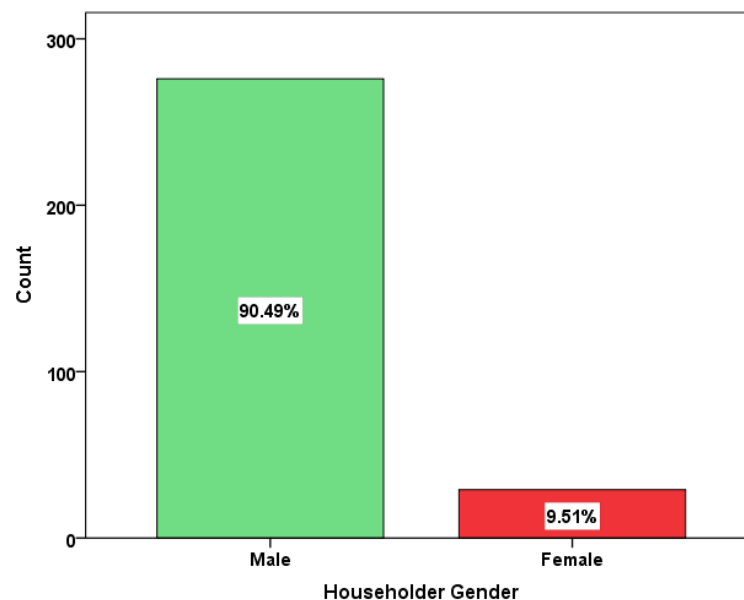


Figure 4.3. Gender of households head

The proportion of household heads having jobs was 76.7% and 23.3% of them did not work for various reasons. About 63.0% of household heads had one job and about 14.0% of household heads had more than one job (Figure 4.4).

UNCHR (2008) reported that 31.15% heads of households surveyed did not have a job, 68.85% of household heads had a job and worked. The reported results are close to our results.

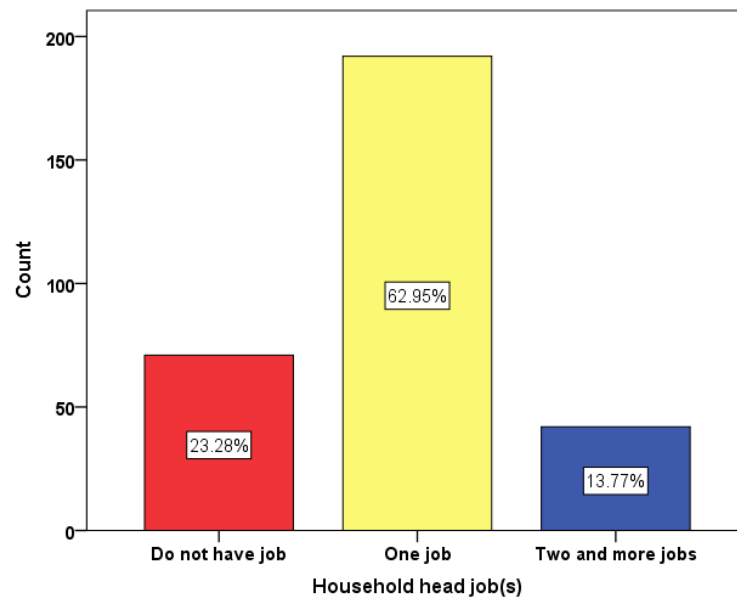


Figure 4.4. Households head job(s)

In the case of the household heads' education, 30.16% were illiterate or were only able to read and write; 28.52% of household heads had been educated from primary level to high school, and 41.31% had an academy education (Figure 4.5).

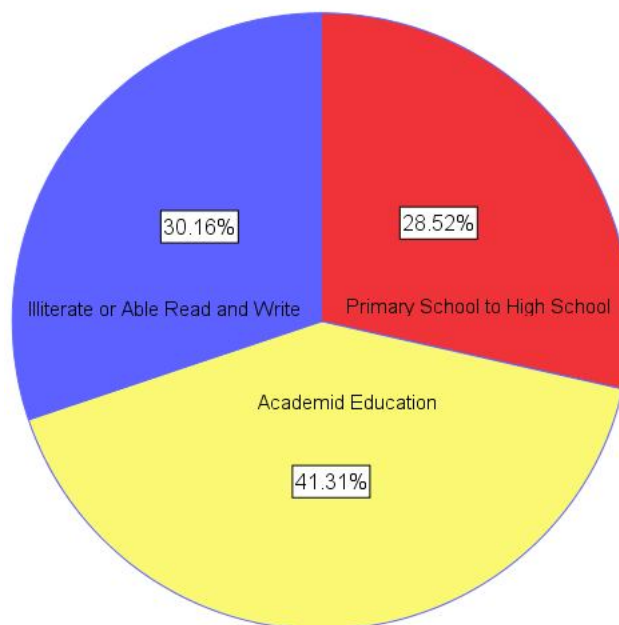


Figure 4.5. Education level of households head

IFHS (2006) reported that 25.3% of people were illiterate, 42.6% had a primary education and 11.6% had a secondary education, in the Kurdistan region of Iraq.

The average of size of the household in the sample was 5.4 (± 2.41) people. The minimum household size was 2 people and the maximum household size was 18. The total number of family members in this sample was 1644 people. We can conclude that the sample was predominantly young families because the age of 75.4% of household members was less than or equal to 35 years. The proportion of male and female members was almost the same, because 50.46% of household members were male and 49.64% were female.

The UNCHR (2008) reported that the average of family size in Erbil was 4 and 49.08% of household members were male and 50.92% were female. The proportion of household members below 18 years old was 38.12%, between 18 and 59 years old was 56.41% and above 60 years old was 5.47%. In addition, IFSH (2006) suggested that Iraqi households have on average 6.4 persons per household.

In this sample, 22.2% of household members were illiterate and 77.8% were literate. 31.5% of all household members were students at different levels of study. 65% of all household members were unemployed and only 35% had a job. IFSH (2006) reported that 25.8% of household members were illiterate or able to read and write, 71.3% had a primary to high school education level and 3% had an academic education in the Kurdistan region of Iraq.

In terms of living space, about 76.4% of households were living in their own homes. 4.9% of households lived in a home that was not their own but they were not paying a monthly rent. 4.9% of households were living in their own homes but paying monthly installments and another 13.8% were tenants and paying monthly rent.

The IFSH (2006) report suggested that 81.5% of Iraqi households own or partly own their houses and the proportion of rented accommodation in urban areas is 18.5%. These results correspond almost exactly with the results we have achieved.

In the case of the ownership of personal cars, about 78.7% of households had at least one car, only 21.3% of households had no car. 86.6% of households had at least one computer at home and 21.3% of households had no computer at home. 73.1% of households had various internet services in their homes and 26.9% of households were lacking an internet service.

The percentage of those households that had two meals per day was 8.5%, 81.6% ate three meals, and 9.8% ate more than three meals during a day (24 hours). The preferred meal for 76.7% of households was lunch, 15.4% favored dinner and 7.9% would prefer breakfast. Most people's breakfast included dairy products, eggs, tahina, honey and jams. 91.5% of families ate a full meal for lunch, 3.3% had simple food, 4.9% had fast food and 0.3% did not eat lunch. 53.4% of families ate a full meal for dinner, 30.8% had simple food, 2.3% had fast food, 10.8% ate dairy products, 1.6% ate vegetables and salad, and 1% did not have dinner.

Within a month, 39% of households had never eaten out, 40% had eaten out between one and three times and 21% had eaten out more than three times. 54.4% of households bake all or part of the bread consumed at home and 45.6% of households bought their bread from the bakery.

Most of the households (96.7%) used only LPG for cooking and 3.3% used other fuels along with LPG. About 53.8% of households had guests during the month between zero and five times, 24.9% entertained between six and ten times and 21.3% of households had guests more than ten times during a month. About 64.6% of households went to a party less than or equal to five times during a month, 20% of households partied between six and ten times, and 15.4% of households had gone to a party more than ten times in a month.

4.2. Household Food Consumption Expenditure by Socio-Demographic Characteristics of Household

Table 4.1 shows the household food consumption by socio-demographic characteristics of household.

The results indicated the average food consumption has no significant differences at 95% significance levels between people in different religious groups (P: 0.850), while the average food consumption of the Muslim households was less than other religious groups.

The average food consumption has significant differences at 95% significance levels in nationality groups of households (P: 0.001) and shows that the Kurdish people have more food consumption than other ethnic groups.

The results indicated that the average food consumption in households living in their own homes has a significant difference at 95% confidence levels compared with the households that did not have their own home (P: 0.001). The average food consumption for the households that had their own home was higher than others.

We found the average food consumption in households that had a car was higher than households that did not have car and the difference between those was a statistically difference at 95% significance levels (P: 0.000).

Those households that had computer at home consume more food than those households that do not have computer at home. Between those was a statistical difference at 95% significance levels (P: 0.000).

The results show the average food consumption in households that had an internet service at home to be statistically different at 95% significance levels compared with the households that did not have an internet service at their homes (P: 0.000). The households with internet service at home had more food consumption than those households without.

When the household head was a man the average food consumption in those households was more than those where the household head was a woman. The results show there are statistical differences at 95% significance levels between the gender of household heads (P: 0.000).

In terms of education of household heads, the results suggested the existence of significant difference at 95% significance levels between household heads in different education level groups (P: 0.000). The results also show that the households with a less educated household head had more food consumption on average.

The results indicate that those households that had guests during the survey time had significant difference at 95% significance levels between those households that not had guests (P: 0.001). The average amount of food consumption in those households with guests was more than those households that did not have guests during the survey time. While the results show that the average food consumption in those households that went to a party during the survey time was more than those households that did not, this difference was not statistically significant at 95% significance levels (P: 0.053).

Table 4.1. Household food consumption by socio-demographic characteristics of household

Variables	Categories	Households food consumption (IQD)			
		Mean	Std. Deviation	Test value	P. Value
Religion	Muslim	629841.97	263737.929	-0.189 ^a	0.850
	Others	650333.33	184418.049		
Nation	Kurdish people	630530.51	264695.710	3.265 ^a	0.001**
	Others	621825.00	182944.210		
Type of house	Personal	657071.67	263611.699	3.265 ^a	0.001**
	Otherwise	543431.25	239378.629		
Do you have car?	Yes	660162.50	264821.790	3.918 ^a	0.000**
	No	519780.77	221201.908		
Do you have computer?	Yes	653563.45	267028.118	5.693 ^a	0.000**
	No	480097.56	164308.588		
Do you have Internet at home?	Yes	667154.71	280380.756	5.183 ^a	0.000**
	No	529868.90	169187.123		
Gender of household head	Male	650775.86	251713.994	-0.443 ^a	0.658
	Female	628087.86	263632.848		
Education level of household head	Illiterate	735129.89	300084.928	15.280 ^b	0.000**
	Primary to high school edu. level	641560.34	227608.797		
	Academic edu.	545849.60	225035.421		
Do you have guest during this month?	Yes	645913.98	262587.413	-3.481 ^a	0.001**
	No	462105.77	192714.869		
Do you go to the party during this month?	Yes	613910.16	240858.327	1.978 ^a	0.053*
	No	715586.73	344065.183		
Does the man of house work?	Yes	701240.00	218158.492	2.106 ^a	0.036**
	No	616324.51	268175.679		
Does the woman of house work?	Yes	671121.83	263410.693	4.258 ^a	0.000**
	No	535606.52	234664.935		
Do the man & woman of house work?	Yes	520855.92	210830.895	-4.317 ^a	0.000**
	No	666548.91	267835.364		

Note: ** indicate significance levels at 5%, * indicate significance levels at 10%.

a is t-test value, b is F-test value

The results show that in those households where the man of the house does work the average food consumption was higher than those households where the man of the house did not work. This difference was statistically significant at 95% significance levels (P: 0.036). Also, in those households where the woman of the house worked the average food consumption was higher than those households in which the woman did not work. This difference was statistically significant (P: 0.000). While the average household food consumption in those households in which both the man and the woman of the house worked is lower than those households where neither worked, these two groups are statistically different at 95% significance levels (P: 0.000) (Table 4.1).

In this study, in order to analyze all the statistical parameters we divided monthly household income into three groups (low income, middle income and high income) so that each group had almost same quantity in terms of observation number. The results show that the income groups are statistically different at 95% significance levels (P: 0.000) (Table 4.2).

Table 4.2. Description of income groups (IQD)

Income groups	Mean	N	Std. Dev	Min.	Max.	F-Test	P-Value
Low Income	1100910.89	101	324488.778	330000	1550000		
Mid Income	1951915.05	103	236892.920	1564000	2400000	299.531	0.000*
High Income	3860222.77	101	1368177.329	2460000	11900000		
Total	2302038.52	305	1413056.950	330000	11900000		

* indicate significance levels at 5%

Note: 100 USD dollars exchanged by 124,100 IQD and 100 Turkish Lira exchanged by 47,750 IQD (Rudaw Report, 18/7/2015).

IHSES (2007b) reported that the average income per month in Erbil households is 1,856,000 IQD. This result is different to the results found in this study, however, this survey was conducted 8 years ago and since this time the income of households will have changed.

Table 4.3 presents the results of the test of homogeneity of the three income groups' variances for economic and socio-demographic variables examined by the Levene test. The results show the variance in the three income groups for monthly income, monthly food expenditure, household size, number of employed members, number of male members, number of female members, number of students, number of literates, members aged 16-30 years and members age ≥ 31 years. The variables are statistically different at the 95 % significance level, while the results indicate variances of income group for

household head age, household head gender, household head education level, number of unemployed, number of illiterates and members aged ≤ 15 years; the variables are not significant statistically.

Table 4.3. Test of homogeneity of income group's variances for economic and socio-demographic variables

Economic and socio-demographic variables	Levene Test	P-Value
Monthly Income (IQD.)	40.067	0.000*
Food Expenditure (IQD.)	12.347	0.000*
Age of household head	0.792	0.454
Gender of household head	0.967	0.381
Education level of household head	2.525	0.082
Household Size	3.851	0.022*
Number of Employments	300.964	0.000*
Number of Unemployment	0.329	0.720
Number of Males	8.273	0.000*
Number of Females	3.605	0.028*
Number of Students	4.765	0.009*
Number of Illiterates	0.722	0.487
Number of Literates	26.540	0.000*
Member Age ≤ 15 Years	0.140	0.869
Member Age 16-30 Years	19.710	0.000*
Member Age ≥ 31 Years	5.355	0.005*

* indicate significance levels at 5%

Table 4.4 presents the F-test results for the monthly income, monthly food expenditure, and some demographic variables. The results show the monthly income (P: 0.000), monthly food expenditure (P: 0.000), age of household head (P: 0.000), education level of household head (P: 0.001), household size (P: 0.000), number of employed members (P: 0.000), number of male members in household (P: 0.000), number of female members in household (P: 0.001), number of literates (P: 0.000) and household members aged 16-30 years and members aged ≥ 31 years (P: 0.000). These variables were statistically different at the 99 % significance level in income groups, while the other variables were not statistically different in terms of income groups. We can also see that when monthly income increases the household food expenditure will increase.

The results suggest that when there is an increase in the age of the household head the monthly income and monthly food expenditure will increase, while when there is an

increase in the education level of the household head there will be a decrease the household's monthly income and monthly food expenditure, but this difference is not statistically significant at the 95% significance level (P: 0.056) (Table 4.4).

As well as an increase in the household size, the number of employed members in the household, number of male members, number of female members, number of literate members, number of household members aged 16-30 years and number of household members aged ≥ 31 years will increase the monthly income and monthly food expenditure.

Table 4.4. Description of some socio-demographic variables by income groups

Variables	Income Group						Average		F-Test	P-Value
	Low Income		Mid Income		High Income		Mean	St. Dev		
	Mean	St. Dev	Mean	St. Dev	Mean	St. Dev				
Monthly income (IQD)	1100910.89	324488.78	1951915.05	236892.92	3860222.77	1368177.32	2302038.52	1413056.95	299.531	0.000***
Food expenditure (IQD)	478930.69	141172.35	639919.42	217433.52	771693.56	312130.51	630245.08	262206.69	39.606	0.000***
Age of household head	39.08	12.389	44.77	11.118	51.47	12.151	45.10	12.887	26.814	0.000***
Gender of household head	1.079	0.271	1.107	0.310	1.099	0.300	1.095	0.294	0.237	0.789
Education level of household head	1.356	0.729	1.000	0.852	0.980	0.883	1.111	0.839	6.685	0.001***
Household size	4.39	1.892	5.52	2.326	6.26	2.599	5.39	2.409	17.114	0.000***
Number of employments	1.01	0.100	1.08	0.269	1.48	0.502	1.19	0.390	57.556	0.000***
Number of unemployment	1.61	0.489	1.63	0.485	1.60	0.492	1.62	0.487	0.081	0.923
Number of males	1.31	0.464	1.51	0.502	1.64	0.481	1.49	0.501	12.504	0.000***
Number of females	1.37	0.484	1.52	0.502	1.63	0.484	1.51	0.501	7.592	0.001***
Number of students	1.29	0.455	1.36	0.482	1.26	0.439	1.30	0.460	1.328	0.266
Number of illiterates	1.08	0.271	1.08	0.269	1.10	0.300	1.09	0.280	0.183	0.833
Number of literates	1.50	0.502	1.71	0.457	1.80	0.400	1.67	0.471	12.082	0.000***
Member age <= 15 years	1.52	1.270	1.45	1.342	1.14	1.449	1.37	1.361	2.213	0.111
Member age 16-30 years	1.61	1.095	2.33	1.779	2.69	1.885	2.21	1.681	11.529	0.000***
Member age >= 31 years	1.26	0.902	1.75	0.871	2.43	1.276	1.81	1.134	32.664	0.000***

Note: ***, ** and * indicate significance levels at 1%, 5% and 10% respectively.

Table 4.5 shows the results of homogeneity of variances test for all food groups in the three income groups to which the Levene Test was applied. The results presented variance for all food groups and are statistically different at the 95% significance level in income groups, except the condiments group. The results indicate variances of income group for this food item are not statistically significant.

Table 4.5. Test of homogeneity of income group's variances for food group

Food Item	Levene Test	P-Value
Cereals and Bread	12.022	0.000*
Meat	9.383	0.000*
Dairy Products	6.070	0.003*
Vegetables	14.494	0.000*
Fruits	8.539	0.000*
Oil	7.623	0.001*
Eggs	4.678	0.010*
Potato	3.251	0.040*
Sugar And Sweet	8.933	0.000*
Condiments	2.997	0.051
Drinks	9.047	0.000*
Food Away From Home	9.937	0.000*
Hot Drinks	13.267	0.000*

* indicate significance levels at 5%

Table 4.6 describes the consumption of food groups by income groups. The results indicate that the consumption of all food groups in income groups has statistical difference at 95% significance level, except the eggs group. When there is an increase in the monthly income of the household there is an increase in the consumption of all the food groups that have a statistical difference in income groups. Among the food groups studied, only the consumption of eggs group was not significantly different between income groups. This may be due to the popularity of eggs among people; there was no good substitute for eggs, and the price of eggs is cheap and also almost constant in all shopping centers.

The results indicate that people in various income groups have different diets. They also spend different amounts of their income purchasing each of the food groups. People consume food commensurate with their income and if they had more monthly income they would allocate a larger share of it to buy food (Table 4.6).

Table 4.6. Description of food group's consumption by income groups (IQD)

Food Groups	Income Group						Average		F-Test	P-Value
	Low Income		Mid Income		High Income					
	Mean	St. Dev	Mean	St. Dev	Mean	St. Dev	Mean	St. Dev		
Cereals and Bread	100898.515	35260.055	121851.942	58350.261	146490.099	65163.534	123072.131	57395.243	17.724	0.000***
Meat	113378.713	55886.040	154594.660	86926.201	184319.307	103018.409	150789.344	88865.837	18.055	0.000***
Dairy Products	36398.515	23145.901	49250.000	26505.896	53363.861	38721.676	46356.557	30939.698	8.691	0.000***
Vegetables	47448.020	22962.287	59839.806	30900.593	78301.980	42399.223	61850.000	35289.834	22.293	0.000***
Fruits	33445.545	22063.052	49868.932	32127.272	64393.564	44679.013	49240.164	36364.795	20.682	0.000***
Oil	16460.396	8305.927	19354.369	10697.176	26774.752	20097.777	20853.279	14586.924	14.653	0.000***
Eggs	6866.337	5531.225	8686.408	7796.814	8358.911	6042.290	7975.246	6564.994	2.236	0.109
Potato	7824.257	5798.765	8851.942	6682.894	10272.277	7377.169	8981.967	6704.654	3.450	0.033**
Sugar And Sweets	34970.297	33087.295	54861.650	42034.354	64534.653	59471.170	51477.869	47617.640	10.777	0.000***
Condiments	20628.713	14864.497	25810.680	13775.354	30074.257	19150.768	25506.557	16488.232	8.736	0.000***
Drinks	17066.832	10890.070	21781.553	14419.982	23975.743	17203.181	20946.885	14642.969	6.070	0.003***
Food Away From Home	32826.733	39187.159	50007.282	70756.161	61965.347	106891.657	48277.869	78012.838	3.622	0.028**
Hot Drinks	10717.822	6010.581	15160.194	8977.699	18868.812	10684.954	14917.213	9356.776	21.849	0.000***

Note: ***, ** and * indicate significance levels at 1%, 5% and 10% respectively.

Table 4.7 shows the proportions of food groups consumed shared by the three income groups. The results show the expenditure on meat constituted a large share in all three income groups and also, the expenditure share of meat was not statistically significant in income groups. The expenditure proportion of the eggs group was the minimum expenditure share and this item was statistically significant at 95% confidence level in income groups.

Furthermore, the expenditure share of cereals and bread was at the 95% confidence level and the expenditure share of dairy products, fruit and potatoes was at the 99% confidence level. This was statistically significant in income groups while expenditure share of other food groups did not have a statistical difference in income groups (Table 4.7).

The results suggested that the minimum and maximum expenditure share of food groups in all three income groups were the same. So, we can say that the households in the three different income groups spend the same proportion of their expenditure to consume mostly the same food items (Table 4.7).

Table 4.7. Proportions of food group's consumption share by income groups (%)

Food Groups	Income Group			Total	F-Test	P-Value
	Low Income	Mid Income	High Income			
	Mean					
Cereals and Bread	21.44	19.00	19.51	19.98	4.46	0.012**
Meat	23.35	23.21	23.56	23.37	0.05	0.954
Dairy Products	7.74	7.93	6.77	7.49	2.41	0.092*
Vegetables	9.99	9.47	10.27	9.90	1.05	0.350
Fruits	7.00	7.88	8.26	7.71	2.38	0.095*
Oil	3.46	3.07	3.50	3.34	2.30	0.102
Eggs	1.48	1.35	1.11	1.31	3.44	0.033**
Potato	1.69	1.39	1.38	1.49	2.51	0.083*
Sugar And Sweets	6.86	8.27	8.08	7.74	2.17	0.116
Condiments	4.25	4.11	3.90	4.09	0.67	0.514
Drinks	3.71	3.62	3.27	3.53	1.08	0.340
Food Away From Home	6.78	8.31	7.87	7.66	0.59	0.553
Hot Drinks	2.25	2.39	2.51	2.38	1.34	0.263
Total	100.00	100.00	100.00	100.00		

Note: ***, ** and * indicate significance levels at 1%, 5% and 10% respectively.

Table 4.8 presented the results of Pearson correlation between the monthly income, monthly food expenditure and some socio-demographic variables. The results suggested that the monthly food expenditure, age of household head, household size, number of employed members, number of male members, number of female members and number of literates have a significant relationship at the 0.01 confidence level with the monthly income, and all relationships were positive. However, the household head education level, number of unemployed, number of students, number of illiterates and number of household heads' job(s) did not have a significant relationship with monthly income. The number of employed members and monthly food expenditure, respectively, has the strongest relationship and the number of female members has the weakest relationship with monthly income.

Table 4.8. Pearson correlation between socio-demographic variables and income and food expenditure

Variables	Monthly Income		Monthly Food Expenditure	
	r	P-Value	r	P-Value
Monthly Income	-	-	0.479	0.000**
Monthly Food Expenditure	0.479	0.000**	-	-
Age of Household Head	0.351	0.000**	0.358	0.000**
Household Head Education Level	-0.109	0.058	-0.287	0.000**
Household Size	0.377	0.000**	0.455	0.000**
Number of Employments	0.526	0.000**	0.354	0.000**
Number of Unemployment	0.036	0.530	0.198	0.001**
Number of Males	0.306	0.000**	0.351	0.000**
Number of Females	0.243	0.000**	0.322	0.000**
Number of Students	-0.035	0.547	0.161	0.005**
Number of Illiterates	0.109	0.057	0.013	0.820
Number of Literates	0.264	0.000**	0.395	0.000**
Number of households head Job(s)	-0.027	0.641	-0.112	0.051

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

The results also show that the monthly income, age of household head, household size, number of employed members, number of unemployed members, number of male members, number of female members, number of students and number of literates have a significant relationship at the 0.01 confidence level with the monthly food expenditure. All of the relationships mentioned were positive. In contrast, household head education level has a significant relationship at the 0.01 confidence level but this relationship was negative. While the number of illiterates and number of household heads' job(s) did not

have a significant relationship with monthly food expenditure, monthly income and household size, respectively, have the strongest relationship and number of students has the weakest relationship with monthly food expenditure (Table 4.8).

Table 4.9 presents the average amount of monthly household food expenditure for the 13 food groups studied. The results show that the meat and meat products group, followed by cereals and bread, in that order were the two highest and eggs and potatoes, in that order, were the two lowest amounts of household food expenditure during the survey time.

Food away from home and the cereals and bread groups, in that order, accounted for the maximum amount of food expenditure, whereas in this sample some food groups were at zero consumption including: fruit, eggs, potatoes and food eaten away from home. Some of the other food groups such as the dairy products, oil, sugar and sweets, condiments, and drinks groups accounted for less food expenditure (Table 4.9).

The average food expenditure in the entire sample was 630,245.08 (± 262206.68) IQD. The average of the minimum and maximum amounts of food expenditure was 168,750.00 and 1,968,000.00 IQD, respectively (Table 4.9).

Table 4.9. Discretion of monthly household's food expenditure

Food Item	Mean (IQD)	St. Dev	Minimum (IQD)	Maximum (IQD)
Cereals and Bread	123072.13	57395.24	29000.00	366500.00
Meat	150789.34	88865.84	15000.00	537000.00
Dairy Products	46356.56	30939.70	4000.00	219000.00
Vegetables	61850.00	35289.83	11000.00	250500.00
Fruits	49240.16	36364.80	0.00	253000.00
Oil	20853.28	14586.92	3750.00	150000.00
Eggs	7975.25	6564.99	0.00	41000.00
Potato	8981.97	6704.65	0.00	33000.00
Sugar And Sweet	51477.87	47617.64	3000.00	304250.00
Condiments	25506.56	16488.23	2250.00	104000.00
Drinks	20946.89	14642.97	4000.00	99500.00
Food Away From Home	48277.87	78012.84	0.00	712000.00
Hot Drinks	14917.21	9356.78	4000.00	50000.00
Total	630245.08	262206.68	168750.00	1968000.00

Figure 4.6 indicates the average monthly household consumption for all studied food groups in order from the highest to the lowest consumption of food groups. As we can

see, meat and meat products is the highest and eggs is the lowest level of consumption among all food groups.

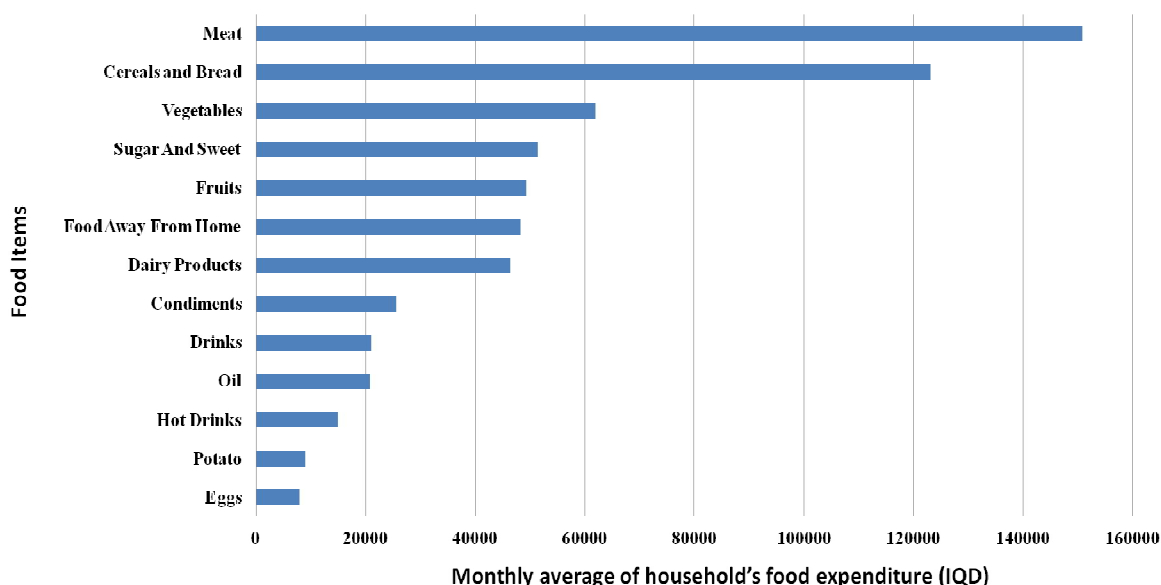


Figure 4.6. Monthly household's food expenditure

Table 4.10 presents the average urban household expenditure by some governorates and in the whole of Iraq, as reported in IHSES (2007a). This result is comparable with our results, considering that there have been several years since the IHSES survey. It can be said that both results are close.

Table 4.10. Urban average household expenditure by governorate

Food Items	Monthly Food Expenditure (IQD/month)					
	Erbil	Duhouk	Ninevah	Sulaimaniya	Kirkuk	Iraq
Cereals	83300	74100	60600	84100	69000	65400
Meat	103100	77700	57700	117000	54900	60800
Fish	4100	2600	2100	5200	3400	9700
Milk, cheese, and eggs	51000	63500	50100	48900	46200	49700
Oils and fats	14300	18800	17000	17500	14000	12800
Fruit	55300	38500	19100	68600	24300	30300
Vegetables	98900	88900	67000	88900	79300	83300
Sugar and Sweets	28600	27600	28200	36600	24000	26800
Foodstuff products	3600	4800	5300	5200	4000	7000
Coffee, tea and cocoa	3900	6500	6100	6600	5200	4500
Water drinks	13000	11200	8400	15900	8400	10600
Total	459100	414200	321600	494500	332700	360900

Source: IHSES: Expenditure, 2007

Table 4.11 shows the average food consumption share of total food expenditure for all food groups by percentage. The results in this sample indicate that at the highest level households paid on average 23.37% of their income for the purchase of meat and meat products, followed by 19.98% of their income for the purchase of cereals and bread, while at the lowest level they paid 1.49% of their income for potatoes and 1.31% of their income for eggs, monthly.

Table 4.11. Food consumption share of total food expenditure for all food groups (%)

Food Item	Mean	St. Dev	Minimum	Maximum
Cereals and Bread	19.98	6.22	5.84	40.89
Meat	23.37	8.24	3.87	50.68
Dairy Products	7.49	4.05	0.72	23.88
Vegetables	9.90	3.96	2.00	21.42
Fruits	7.71	4.26	0.00	27.23
Oil	3.34	1.59	0.62	10.38
Eggs	1.31	1.02	0.00	6.82
Potato	1.49	1.10	0.00	7.46
Sugar And Sweet	7.74	5.27	0.75	26.77
Condiments	4.09	2.18	0.71	17.18
Drinks	3.53	2.28	0.60	17.28
Food Away From Home	7.66	10.25	0.00	50.66
Hot Drinks	2.38	1.16	0.50	7.40

Figure 4.7 shows the average of monthly food consumption share of total food expenditure for all food groups studied from the highest expenditure share to the lowest expenditure share of food groups, respectively. The results indicate that the meat and meat products have the highest and eggs the lowest share of total food expenditure among all food groups.

In a study in Iran Esfandiyari (1998) showed that the expenditure share for flour and noodles was 1.4%, 9% for bread, 33% for meat, 7.8% for poultry, 2.5% for seafood, 16.4% for dairy and eggs, and 29.9% for fruit and vegetables. These results are high when compared with our results and in our study households consume less food and they spend a smaller share of expenditure on the food groups mentioned.

Bahmani and Ashghari (2009) showed that in rural Iran the bread, rice and cereals subgroup accounted for on average 31%, meat 21%, dairy products and eggs approximately 12% and other foods subgroup 36% of total food expenditure allocated from

the rural household food expenditure. When compared with our results we can say that the expenditure share of meat out of total food expenditure is close to our results.

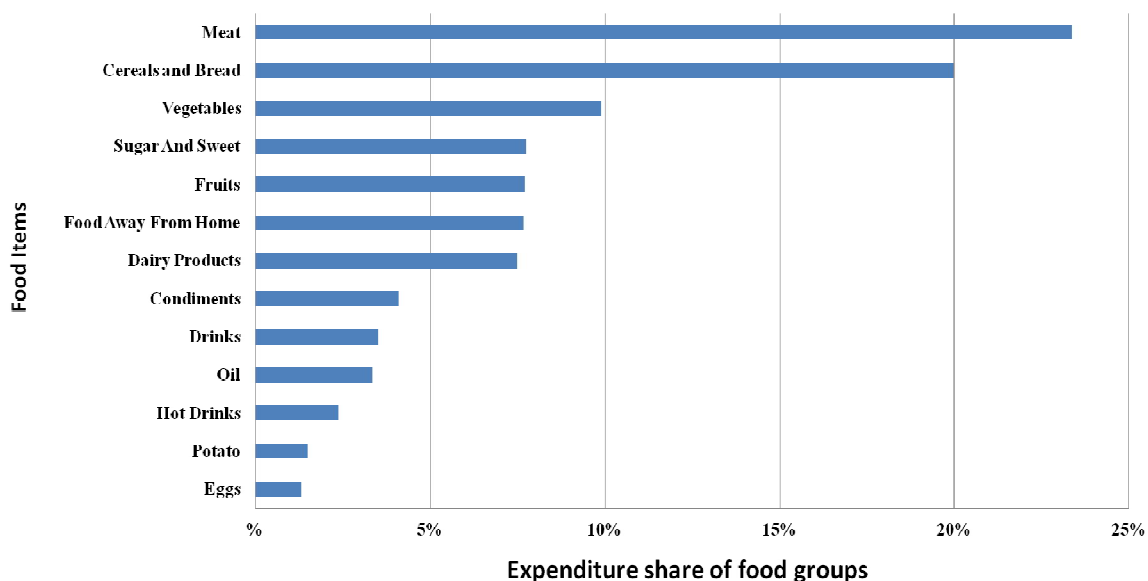


Figure 4.7. Monthly share of total food expenditure for all food groups

The average of income shares for all food groups are presented in Table 4.12. The meat and meat products with 8.13% of income share, the cereals and bread with 6.78% and then vegetables with 3.34% share of monthly income were the three highest levels of budget shares among all food groups. Hot drinks with 0.79%, potatoes with 0.51% and eggs with a 0.45% share of monthly income were the three lowest levels of budget shares of monthly income. Thus, we can see their share of monthly income is less than one percent. On average, households paid about 34.9% of their monthly income for food consumption during the survey month. Income shares of dairy products, fruit, sugar and sweets and food away from home were more than two percent. The oil, condiments and drinks groups have income shares less than two percent and more than one percent. The maximum income share was 35.07% which belongs to the cereals and bread group while the minimum income share was 0.00% which belongs to the eggs, potatoes and food away from home groups.

Table 4.12. Monthly income shares for food groups (%)

Food Item	Mean	St. Dev	Minimum	Maximum
Cereals and Bread	6.78	4.30	1.06	35.07
Meat	8.13	5.55	0.61	30.33
Dairy Products	2.54	1.94	0.15	11.40
Vegetables	3.34	2.37	0.38	19.38
Fruits	2.54	2.02	0.00	15.88
Oil	1.13	0.91	0.11	7.58
Eggs	0.45	0.49	0.00	3.51
Potato	0.51	0.50	0.00	3.67
Sugar And Sweet	2.61	2.37	0.17	15.22
Condiments	1.46	1.71	0.11	19.85
Drinks	1.17	0.96	0.11	7.15
Food Away From Home	2.49	3.59	0.00	21.50
Hot Drinks	0.79	0.56	0.11	4.17

Figure 4.8 shows the average monthly income shares for all food groups in this study, from the highest income share to the lowest income share of food groups, respectively. The results show that the meat and meat products group have the highest and the eggs group has the lowest share of monthly income among all food groups.

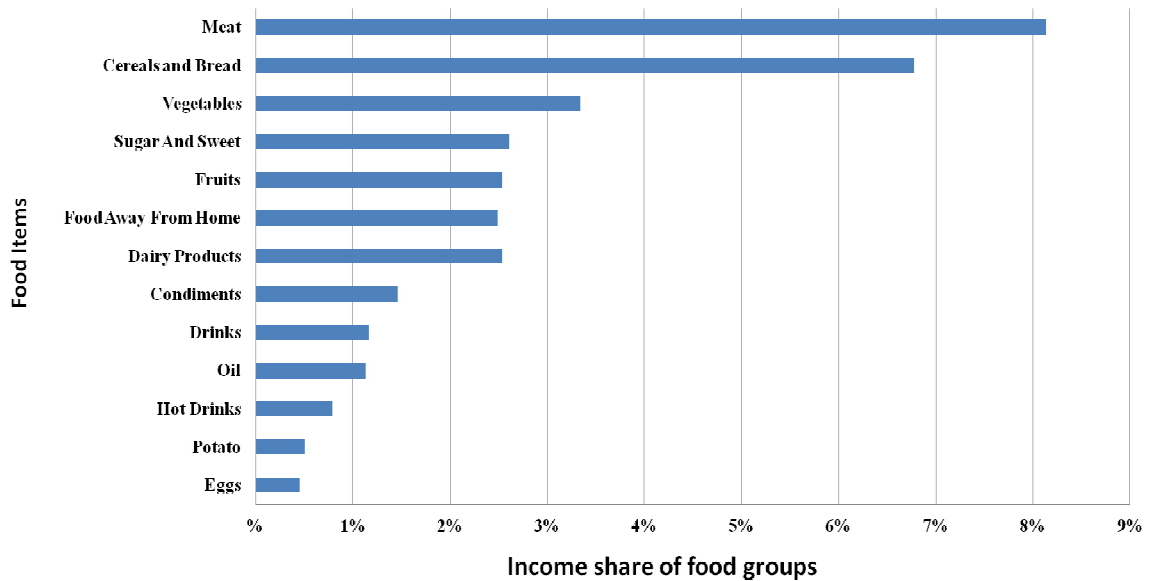


Figure 4.8. Monthly income share for food groups

4.3. Estimated Parameters from Food Demand Models

A double log regression model was used to estimate the demand parameters of total food expenditure. A complete set of all variables used in the model are given in Table 4.13.

Table 4.13. Descriptive statistics for used variables in the model

Name	Definition	Mean	St. Dev
Income	Total household income (IQD)	2302038.520	1413056.950
FExpend	Total Food expenditure (IQD)	630245.080	262206.690
HSize	Household size	5.390	2.409
EduL1	Education level of household head (1: if illiterate and can read & write; 0: Others)	0.213	0.410
EduL2	Education level of household head (1: if primary, secondary and high school; 0: Others)	0.193	0.396
EduL3	Education level of household head (1: if academic degree; 0: Others)	0.413	0.493
HAge1	Age of household head (1: if Less than or equal to 35; 0: Others)	0.308	0.463
HAge2	Age of household head (1: if higher than or equal to 36 and Less than or equal to 50 ; 0: Others)	0.361	0.481
HAge3	Age of household head (1: if higher than or equal to 51; 0: Others)	0.331	0.471
MWork	Employment status of household head? (1: if work; 0: others)	0.239	0.427
WWork	Employment status of woman of household? (1: if work; 0: others)	0.698	0.460
NWorker	Number of worker(s) in household.	1.885	1.125
EatOut	Do the household have eat out? (1: yes; 0: No)	0.390	0.489

Estimates of the parameters of the model for total food expenditure were conducted via the Log Likelihood Function in which the R-Squared of 0.42 indicates that about 42% of the variability of household income share on total food consumption was explained by the explanatory variables included in this model (Table 4.14).

In the estimated demand model for total food expenditure, the household income, household size, age of household head 2 (higher than or equal to 36 and less than or equal to 50 years), employment status of household women and food away from home variables had significant effects on total food consumption demand at the 95% confidence level. The household head's education level 3 (academic education) also has a significant effect on the demand for all food at the 99% confidence level. All the variables mentioned have a positive impact except household head's education level 3 and food away from home that both had a negative influence on total food expenditure (Table 4.14).

The result suggests that in the survey area with an increase in the monthly income households tend to consume more food. Hence, we can say that with a one percentage change of total income the total food expenditure will change by about 0.3%, as expected. Also, in households with more members there will be an increase in total food expenditure, too. Those households with more members aged in the higher than or equal to 36 years old range and in the less than or equal to 50 years old range will consume more food than

others and such households spend more money on food, monthly. The results indicated that those households that have a household head with an academic education level consume less food than others, and also that when the woman of the house works such households consume more food and will increase their monthly total food expenditure. While those households that have food away from the home expect to decrease the cost of monthly food expenditure (Table 4.14).

Table 4.14. Estimated parameter of Working-Leser Model for total food consumption

Variables	Total food consumption		
	Estimated Parameter	T-Ratio	P-Value
Constant	8.704	14.890	0.000***
TFExpend	0.302	7.054	0.000***
Hsize	0.032	3.226	0.001***
EduL2	-0.017	-0.310	0.757
EduL3	-0.098	-1.747	0.082*
HAge2	0.119	2.242	0.026**
HAge3	0.090	1.376	0.170
MWork	-0.038	-0.708	0.480
WWork	0.126	2.620	0.009***
NWorker	-0.019	-0.875	0.382
EatOut	-0.099	-2.578	0.010**
R ²	0.416	0.3962	
LLF	-65.850		

Note: ***, ** and * indicate significance levels at 1%, 5% and 10% respectively.

The relationships between the consumption of all food groups and the socio-economic and demographic characteristics of the households were analyzed using the Working-Leser demand model.

The estimated value of system R-Square is a satisfactory value, the entire demand system of food explained about 77.3% of the variation with all the predictors together that were mentioned in Table 4.12. The results of the Chi-Square test showed that the estimated demand model is statistically significant at the 95% significance level (Table 4.15).

In the whole demand system 130 variables were entered to estimate the demand system of food; the results show that 32 variables are statistically significant at the 95% significance level and 42 variables have a statistical effect at the 90% significance level on the entire estimated demand system.

Table 4.15. Test model fit of entire demand system of food

Parameter	Value
System R-Square	0.773
Test of the overall significance	451.610
Chi-Square with 120 D.F. (P-value)	0.000*
Log of likelihood function	8352.550
Likelihood ratio test of diagonal covariance matrix	1503.600
Chi-Square with 66 D.F. (P-value)	0.000*

* indicate significance levels at 5%.

Estimates of the parameters of the model for cereals and bread expenditure were conducted via a Log Likelihood Function of which the R-Squared of 0.25 indicates that about 25% of the variability of households' income share on cereals and bread expenditure was explained by the explanatory variables included in this model (Table 4.16).

Table 4.16 reports the estimated parameters in the demand model for the consumption of cereals and bread group. At the 95% level of confidence were the variables total food consumption, age of household head 2 (higher than or equal to 36 and less than or equal to 50 years), working woman in the household and food away from home. Also at the 99% level of confidence, the size of household and age of household head 3 (older than 50 years) had significant effects on cereals and bread consumption demand. The total food consumption had negative and the other variables had positive impact on the demand for cereals and bread.

Table 4.16. Estimated parameter of Working-Leser Model for cereals and bread group consumption

Variables	Cereals and Bread		
	Estimated Parameter	T-Ratio	P-Value
Constant	0.870	7.018	0.000***
TFExpend	-0.055	-5.665	0.000***
Hsize	0.003	1.882	0.061*
EduL2	-0.008	-0.800	0.425
EduL3	-0.009	-0.919	0.359
HAge2	0.019	2.003	0.046**
HAge3	0.019	1.667	0.097*
MWork	-0.013	-1.326	0.186
WWork	0.018	2.173	0.031**
NWorker	0.002	0.670	0.503
EatOut	0.036	5.198	0.000***
R ²	0.254		
LLF	8352.550		

Note: ***, ** and * indicate significance levels at 1%, 5% and 10% respectively.

The result indicates that in the survey area when there is an increase in the total food expenditure, the household's share of cereals and bread consumption decreases, as

expected. The households with more members will increase their expenditure on cereals and bread. Such households with more members aged in the higher than or equal to 36 years and less than range, equal to 50 years, and also older than 50 years were expected to consume more food in the cereals and bread group. The results indicated that when the household woman goes to work such households consume more cereals and bread and will increase their monthly expenditure on cereals and bread. Furthermore, those households that have food away from home expect to consume more cereals and bread (Table 4.16).

Table 4.17 shows the Estimates of the parameters of the model for meat and meat products expenditure were conducted via a Log Likelihood Function of which the R-Squared of 0.05 indicates that about 5% of the variability of household income share on meat and meat products expenditure was explained by the explanatory variables included in this model. The results show the estimated parameters for the model of meat and meat products consumption demand and suggests that only the total food expenditure significantly effects meat consumption at the 95% confidence level and the correlation that existed was positive.

The result suggests that in this sample with an increase in the total food expenditure, the frequency of use of meat and meat products per month increases among the households, hence, households tend to consume more meat and meat products, as expected (Table 4.17).

Table 4.17. Estimated parameter of Working-Leser Model for meat group consumption

Variables	Meat and meat products		
	Estimated Parameter	T-Ratio	P-Value
Constant	-0.274	-1.479	0.140
TFExpend	0.040	2.779	0.006***
Hsize	-0.002	-0.889	0.375
EduL2	-0.024	-1.638	0.102
EduL3	-0.019	-1.296	0.196
HAge2	0.012	0.842	0.401
HAge3	0.007	0.437	0.663
MWork	-0.014	-0.996	0.320
WWork	0.004	0.276	0.783
NWorker	-0.003	-0.641	0.522
EatOut	0.006	0.565	0.572
R ²	0.051		
LLF	8352.550		

Note: ***, ** and * indicate significance levels at 1%, 5% and 10% respectively.

Estimates of the parameters of the model for dairy products were conducted via a Log Likelihood Function of which the R-Squared of 0.07 indicated that about 7% of the variability of household income share of dairy products consumption was explained by the explanatory variables included in this model (Table 4.18).

Table 4.18 shows the estimated parameter for dairy products consumption demand. Only household head's education level 3 (academic education) had a significant effect on demand for dairy products at the 99% level of confidence and the correlation between them is a positive correlation.

The results indicate that families whose household head has an academic education consume more dairy products, or in other words have a greater awareness of the benefits of dairy which in turn causes an increase in the consumption of dairy products (Table 4.18).

The result suggests that in this sample dairy consumption does not depend on more existing variables in this demand model. This indicates that overall dairy products consumption among families is normal and necessary goods and those families in any situation can consume dairy products and spend a part of their income on their purchase (Table 4.18).

Table 4.18. Estimated parameter of Working-Leser Model for dairy products group consumption

Variables	Dairy Products		
	Estimated Parameter	T-Ratio	P-Value
Constant	0.047	0.518	0.605
TFExpend	0.003	0.364	0.716
Hsize	0.000	-0.041	0.968
EduL2	-0.004	-0.582	0.561
EduL3	0.013	1.771	0.078*
HAge2	-0.009	-1.326	0.186
HAge3	-0.012	-1.467	0.143
MWork	-0.001	-0.169	0.866
WWork	0.003	0.408	0.683
NWorker	-0.002	-0.923	0.357
EatOut	0.000	0.087	0.931
R ²	0.069		
LLF	8352.550		

Note: ***, ** and * indicate significance levels at 1%, 5% and 10% respectively.

Estimates of the parameters of the model for vegetables were conducted via a Log Likelihood Function of which the R-Squared of 0.11 indicates that about 11% of the

variability of household income share of vegetables consumption was explained by the explanatory variables included in this model (Table 4.19).

On the basis of the estimated vegetables demand model results, the total food consumption had a significantly negative effect and the household head's education level 2 (primary, secondary and high school), household head's education level 3 (academic education), household working woman and food away from home have significantly positive effects on vegetables demand at the 95% confidence level (Table 4.19).

The results show that households with less food expenditure tend to consume more vegetables and will increase their expenditure on this food item, as expected. In households where the education level of the household head is primary, secondary and high school and also in households with a household head having education level 3 (academic education) the families tend to consume more vegetables and will increase their vegetables expenditure. The results indicated that when the woman of the house goes to work such households consume more vegetables and will increase their monthly expenditure on vegetables. Furthermore, those households that have food away from home expect to consume more vegetables (Table 4.19).

Table 4.19. Estimated parameter of Working-Leser Model for vegetables group consumption

Variables	Vegetables		
	Estimated Parameter	T-Ratio	P-Value
Constant	0.270	3.125	0.002***
TFExpend	-0.016	-2.399	0.017**
Hsize	0.001	0.607	0.544
EduL2	0.014	2.056	0.041**
EduL3	0.015	2.222	0.027**
HAge2	0.009	1.336	0.183
HAge3	0.007	0.844	0.399
MWork	0.011	1.643	0.102
WWork	0.012	2.091	0.037**
NWorker	0.003	1.448	0.149
EatOut	0.017	3.564	0.000***
R ²	0.110		
LLF	8352.550		

Note: ***, ** and * indicate significance levels at 1%, 5% and 10% respectively.

Estimates of the parameters of the model for fruit were conducted via a Log Likelihood Function of which the R-Squared of 0.08 indicates that about 8% of the variability of household income share of fruit consumption was explained by the explanatory variables included in this model (Table 4.20).

Estimated results in the model of fruit consumption demand suggest that only the food away from home significantly affects fruit consumption at the 95% confidence level and the correlation that existed is positive. The age of the household head 3 (age of household head older than 50 years) also had significantly positive effects on fruit consumption at the 99% confidence level (Table 4.20).

The results show that families with a household head aged older than 50 years consume more fruit and those households expend more money on fruit than others. In addition, those households that have food away from home expect to consume more fruit and increase their monthly fruit expenditure (Table 4.20).

Table 4.20. Estimated parameter of Working-Leser Model for fruits group consumption

Variables	Fruits		
	Estimated Parameter	T-Ratio	P-Value
Constant	0.101	1.071	0.285
TFExpend	-0.003	-0.452	0.651
Hsize	0.001	0.862	0.389
EduL2	0.010	1.366	0.173
EduL3	0.005	0.623	0.534
HAge2	0.006	0.769	0.442
HAge3	0.015	1.737	0.083*
MWork	0.002	0.273	0.785
WWork	-0.007	-1.011	0.313
NWorker	0.000	-0.023	0.982
EatOut	0.019	3.556	0.000***
R ²	0.084		
LLF	8352.55		

Note: ***, ** and * indicate significance levels at 1%, 5% and 10% respectively.

Estimates of the parameters of the model for oil consumption were conducted via a Log Likelihood Function of which the R-Squared of 0.25 indicates that about 25% of the variability of household income share of oil consumption was explained by the explanatory variables included in this model (Table 4.21).

In the estimated demand model for oil consumption, at the 95% confidence level, the total food expenditure, household size, age of household head 3 (older than 50 years) all have significant effects on oil consumption demand. The total food consumption had a negative and the other variables had a positive correlation with demand for oil consumption. Also, at the 99% confidence level, the age of household head 2 had a positive significant effect on oil consumption demand (Table 4.21).

The results show that households with less food expenditure consume more oil. Such households with more members will increase their oil expenditure and those households in which the education level of the household head is primary, secondary and high school will tend to consume more oil and will also increase their oil expenditure. Also, we expected that with an increase in the age of the household head there would be an increase in oil expenditure (Table 4.21).

Table 4.21. Estimated parameter of Working-Leser Model for oil group consumption

Variables	Oil		
	Estimated Parameter	T-Ratio	P-Value
Constant	0.205	6.450	0.000***
TFExpend	-0.015	-5.886	0.000***
Hsize	0.002	5.453	0.000***
EduL2	0.000	0.144	0.885
EduL3	0.000	0.125	0.901
HAge2	0.005	1.920	0.056*
HAge3	0.006	2.151	0.032**
MWork	0.003	1.035	0.302
WWork	0.001	0.434	0.665
NWorker	0.001	0.985	0.325
EatOut	0.003	1.518	0.130
R ²	0.250		
LLF	8352.550		

Note: ***, ** and * indicate significance levels at 1%, 5% and 10% respectively.

Estimates of the parameters of the model for eggs consumption were conducted via a Log Likelihood Function of which the R-Squared of 0.09 indicates that about 9% of the variability of household income share of eggs consumption was explained by the explanatory variables included in this model (Table 4.22).

In the estimated demand model for eggs consumption, at the 95% confidence level, two variables have a significant effect on eggs consumption demand. The first was total food expenditure with a negative impact and the second was the household size variable which had a positive impact on demand for eggs. The number of employed members in the household also had a significant effect on eggs with a negative impact at the 99% confidence level (Table 4.22).

The results show that those households with less food expenditure consume more eggs. Also, with an increase in the household size the families tend to consume more eggs, therefore, eggs expenditure will increase, too. The results reported a negative impact for the number of employed members in the household, so we expected that with a decrease in

the number employed families would consume more eggs, hence, the eggs expenditure will increase (Table 4.22).

Table 4.22. Estimated parameter of Working-Leser Model for eggs consumption

Variables	Eggs		
	Estimated Parameter	T-Ratio	P-Value
Constant	0.078	3.497	0.001***
TFExpend	-0.005	-3.066	0.002***
Hsize	0.001	3.174	0.002***
EduL2	-0.002	-1.233	0.218
EduL3	0.002	0.948	0.344
HAge2	0.002	0.948	0.344
HAge3	0.002	1.193	0.234
MWork	0.001	0.664	0.508
WWork	0.000	0.263	0.793
NWorker	-0.001	-1.915	0.057*
EatOut	0.000	0.153	0.878
R ²	0.092		
LLF	8352.550		

Note: ***, ** and * indicate significance levels at 1%, 5% and 10% respectively.

Estimates of the parameters of the model for potatoes were conducted via a Log Likelihood Function of which the R-Squared of 0.14 indicates that about 14% of the variability of household income share of potato consumption was explained by the explanatory variables included in this model (Table 4.23).

At the 95% level of confidence, the total food consumption, working woman and food away from home variables have a significant effect on potato consumption in the estimated demand model for potato consumption. At 99% confidence level the household head's education level 2 (primary, secondary and high school) has a significant effect on demand for potatoes. The total food consumption had a negative effect and the other variables had a positive impact on potato consumption demand (Table 4.23).

The results indicate that households with less food expenditure consume more potatoes. Also, the households where the education level of the household head is primary, secondary and high school tend to consume more potatoes and will increase their potato expenditure. In this regard, when the woman of the household goes to work such households consume more potatoes and will increase their monthly expenditure on potatoes. The households that have food away from home expect to consume more potatoes, too (Table 4.23).

Table 4.23. Estimated parameter of Working-Leser Model for potato group consumption

Variables	Potato		
	Estimated Parameter	T-Ratio	P-Value
Constant	0.098	4.167	0.000***
TFExpend	-0.007	-3.629	0.000***
Hsize	0.000	1.278	0.202
EduL2	0.003	1.820	0.070*
EduL3	-0.002	-0.963	0.336
HAge2	0.000	0.007	0.994
HAge3	-0.001	-0.394	0.694
MWork	-0.002	-1.018	0.309
WWork	0.003	2.080	0.038**
NWorker	0.000	-0.435	0.664
EatOut	0.004	2.944	0.003***
R ²	0.140		
LLF	8352.550		

Note: ***, ** and * indicate significance levels at 1%, 5% and 10% respectively.

Estimates of the parameters of the model for sugar and sweets expenditure were conducted via a Log Likelihood Function of which the R-Squared of 0.11 indicates that about 11% of the variability of household income share of sugar and sweets group consumption was explained by the explanatory variables included in this model (Table 4.24).

Table 4.24 reports the estimated parameters for consumption demand of the sugar and sweets group. In the estimated demand model the total food expenditure, household size, working household head and food away from home variables had a significant effect on sugar and sweets consumption demand at the 95% confidence level. At the 99% level of confidence the household head's education level 2 (primary, secondary and high school) has a significant effect on consumption demand for sugar and sweets. All the variables mentioned have a positive impact except household size which has a negative correlation with expenditure on sugar and sweets.

The results indicate that unlike most of the food groups studied, with an increase in food expenditure, people consume more sugar and sweets. Also, in families who have fewer members people are more inclined to consume sugar and sweets. Furthermore, households where the education level of the household head is primary, secondary and high school tend to consume more sugar and sweets. When the man of the house works, such households consume greater amounts of sugar and sweets. The households that have food away from home expect to consume more too (Table 4.24).

Table 4.24. Estimated parameter of Working-Leser Model for sugar and sweets group consumption

Variables	Sugar and Sweets		
	Estimated Parameter	T-Ratio	P-Value
Constant	-0.469	-4.086	0.000***
TFExpend	0.043	4.814	0.000***
Hsize	-0.004	-2.447	0.015**
EduL2	0.016	1.708	0.089*
EduL3	0.002	0.236	0.814
HAge2	-0.008	-0.906	0.366
HAge3	-0.015	-1.401	0.162
MWork	0.018	2.060	0.040**
WWork	-0.012	-1.529	0.127
NWorker	0.000	0.157	0.875
EatOut	0.014	2.136	0.034**
R ²	0.110		
LLF	8352.550		

Note: ***, ** and * indicate significance levels at 1%, 5% and 10% respectively.

Estimates of the parameters of the model for condiments expenditure were conducted via the Log Likelihood Function of which the R-Squared of 0.08 indicates that about 8% of the variability of household income share of the condiments group consumption was explained by the explanatory variables included in this model (Table 4.25).

The results suggest that only food away from home significantly affects condiments consumption at the 95% confidence level and the correlation that existed is positive. If the household head has an education level 3 (academic education) there is also a significant effect on condiments consumption at the 99% confidence level and the existing impact is negative (Table 4.25).

The result shows that a household with a household head at education level 3 (academic education) tends to consume less condiments and so will decrease their condiments expenditure. In other words, with an awareness of the harms of spices or condiments people consume less. Those households that have food away from home also expect to consume condiments; hence expenditure on condiments will increase (Table 4.25).

Table 4.25. Estimated parameter of Working-Leser Model for condiments group consumption

Variables	Condiments		
	Estimated Parameter	T-Ratio	P-Value
Constant	0.081	1.676	0.095*
TFExpend	-0.003	-0.774	0.439
Hsize	0.000	-0.007	0.994
EduL2	-0.004	-1.086	0.278
EduL3	-0.007	-1.837	0.067*
HAge2	0.001	0.168	0.867
HAge3	-0.002	-0.513	0.608
MWork	-0.003	-0.731	0.465
WWork	0.000	0.014	0.989
NWorker	0.000	-0.233	0.816
EatOut	0.010	3.818	0.000***
R ²	0.080		
LLF	8352.550		

Note: ***, ** and * indicate significance levels at 1%, 5% and 10% respectively.

Estimates of the parameters of the model for the consumption of water and other drinks were conducted via the Log Likelihood Function of which the R-Squared of 0.12 indicates that about 12% of the variability of household income share of the water and other drinks group was explained by the explanatory variables included in this model (Table 4.26).

Table 4.26 presents the estimated parameter for water and other drinks demand, the total food consumption and household size had significant effects on demand for drinks at the 95% confidence level, and the correlation between variables mentioned and drinks consumption demand are negative.

The results indicate that households with less food expenditure consume more water and other drinks. Also, in families with fewer members people are more inclined to consume water and other drinks. So, we expect that with an increase in household size there would be a decrease in the expenditure on water and other drinks (Table 4.26).

Table 4.26. Estimated parameter of Working-Leser Model for water and other drinks group consumption

Variables	Water and Other Drinks		
	Estimated Parameter	T-Ratio	P-Value
Constant	0.175	3.541	0.000***
TFExpend	-0.009	-2.468	0.014**
Hsize	-0.002	-2.936	0.004***
EduL2	-0.004	-1.122	0.263
EduL3	-0.004	-1.005	0.316
HAge2	-0.002	-0.610	0.543
HAge3	-0.006	-1.332	0.184
MWork	0.001	0.242	0.809
WWork	0.000	0.011	0.992
NWorker	0.001	0.872	0.384
EatOut	0.001	0.264	0.792
R ²	0.120		
LLF	8352.550		

Note: ***, ** and * indicate significance levels at 1%, 5% and 10% respectively.

Estimates of the parameters of the model for expenditure on food away from home were conducted via the Log Likelihood Function of which the R-Squared of 0.16 indicates that about 16% of the variability of household income share of food away from home was explained by the explanatory variables included in this model. In this model, we extracted the eating out variable from the model due to the existence of a correlation between the eating out variable and the food away from home item (Table 4.27).

In the estimated demand model for consumption of food away from home, at the 95% confidence level, the variables total food consumption, age of household head 2 (between 36-50 years old), and age of household head 3 (older than 50 years old) had a significant effect on food away from home consumption demand. At the 99% level of confidence, education level 3 (academic education level) significantly affects consumption of food away from home. The total food expenditure and education level 3 had positive and the other variables had negative influence on demand for food away from home (Table 4.27).

The result suggests that in this sample with increases in the total food expenditure, people tend to have more food away from home, so there is an increase in the expenditure on this item, as expected. Also, we expected the household who had household heads older than 35 years to have less food away from home, while the younger households tended to have more food away from home. Households with members having an academic education will increase their monthly expenditure on food away from home too, because this group have more food away from home (Table 4.27).

Table 4.27. Estimated parameter of Working-Leser Model for food away from home consumption

Variables	Food away from home		
	Estimated Parameter	T-Ratio	P-Value
Constant	-0.643	-3.015	0.003***
TFExpend	0.058	3.511	0.001***
Hsize	-0.005	-1.581	0.115
EduL2	0.013	0.744	0.457
EduL3	0.033	1.924	0.055*
HAge2	-0.048	-2.887	0.004***
HAge3	-0.060	-3.064	0.002***
MWork	0.009	0.563	0.574
WWork	-0.020	-1.345	0.180
NWorker	0.002	0.321	0.749
R ²	0.160		
LLF	8163.56		

Note: ***, ** and * indicate significance levels at 1%, 5% and 10% respectively.

Estimates of the parameters of the model for hot drinks consumption were conducted via the Log Likelihood Function of which the R-Squared of 0.14 indicates that about 14% of the variability of household income share in the hot drinks group was explained by the explanatory variables included in this model (Table 4.28).

Table 4.28. Estimated parameter of Working-Leser Model for hot drinks group consumption

Variables	Hot Drinks		
	Estimated Parameter	T-Ratio	P-Value
Constant	0.095	3.831	0.000***
TFExpend	-0.006	-3.161	0.002***
Hsize	0.001	3.861	0.000***
EduL2	0.002	1.007	0.315
EduL3	0.000	-0.231	0.817
HAge2	0.001	0.275	0.784
HAge3	0.002	1.054	0.293
MWork	0.002	0.810	0.419
WWork	0.001	0.545	0.586
NWorker	-0.001	-0.815	0.416
EatOut	0.003	1.974	0.049**
R ²	0.140		
LLF	8352.550		

Note: ***, ** and * indicate significance levels at 1%, 5% and 10% respectively.

On the basis of these results, the total food consumption had a significant negative effect and household size and food away from home had a significant positive effect on hot drinks consumption at the 95% level of confidence (Table 4.28).

The result shows that households with less food expenditure consume more hot drinks, so when there is a decrease in total food expenditure of one percent the expenditure

on hot drinks will increase 0.6%, as expected. In households who have more members people are more inclined to consume hot drinks. Also, those households that have food away from home expect to consume more hot drinks (Table 4.28).

Overall, as the results showed, we can say that all of the variables entered in the model had an impact on the food demand models, although their impact was low, but at least every variable had an impact on one demand model.

4.4. Expenditure and Income Elasticities

Table 4.29 displays expenditure and income elasticities for the study area for 13 food groups that were estimated in this study.

4.4.1. Expenditure elasticities

Expenditure elasticities were calculated by using expenditure parameters and the budget share of food groups as given formulas in Section 3.

Expenditure elasticities give the proportionate change in spending as total food expenditure changes, meaning that households tend to spend more on better quality food as they get richer. The expenditure elasticity expressed the sensitivity of a food group relative to total food expenditure with the assumption of constant foods prices.

The results for expenditure elasticities show all the estimated elasticities were positive. Potato ($e_{Potato} = 0.553$) and sweets and sugar group ($e_{Eat\ out} = 1.762$) had the minimum and maximum expenditure elasticity, respectively. Hence, a change of total food expenditure will have the most effect on consumption of food away from home and it will have less effect on total expenditure on potatoes (Table 4.29).

The results reported that the expenditure elasticities for meat, dairy products, sugar and sweets and food away from home were higher than one, while the cereals, vegetables, fruit, oil, potatoes, drinks and hot drinks categories had expenditure elasticity of less than unity (Table 4.29).

On the basis of the results and with an assumption that all food prices are constant, when there is an increase of 10% in the total food expenditure of a household, there will be increases of about 7.3% in expenditure on cereals groups, while there will be an increase of about 11.7% in expenditure on meat and meat products (Table 4.29).

4.4.2. Income elasticities

We also calculated the income elasticity for all food groups of household consumption.

The income elasticity of a good is a measure of the responsiveness of expenditure on, or consumption of, a good to a change in real income. Income elasticity also indicates that if there is a change of one percent in income (with all other conditions remaining constant, including the price of goods at the same time), the demand for goods will also change.

The results show the income elasticities of all food groups were positive. This suggests that all food groups are normal goods for Erbil's households and this implies that the purchasing power of Erbil's urban consumers is high. Furthermore, the income elasticity of all food groups were smaller than one, therefore, these food groups are considered essential goods. On the other hand, we can say that income had a positive effect on the demand in all food groups. With the increase in income, the quantity of all types of food demanded significantly increased, as expected (Table 4.29).

The results of the estimated income elasticities shows that income had the maximum effect on the demand for food away from home ($\eta_{Eat\ out} = 0.531$) and had the minimum effect on demand for potatoes ($\eta_{Potato} = 0.167$). Of the 13 estimated elasticities, three were in the range 0.1-0.2, eight were in the range 0.2-0.4 and two were higher than 0.4. So, all the elasticities found were inelastic in terms of income (Table 4.29).

Table 4.29. Expenditure and income elasticity for all food groups

Food Item	Expenditure Elasticity	Income Elasticity
Cereals and Bread	0.727	0.219
Meat and Meat Products	1.171	0.353
Dairy Products	1.034	0.312
Vegetables	0.837	0.252
Fruits	0.957	0.289
Oil	0.564	0.170
Eggs	0.593	0.179
Potato	0.553	0.167
Sugar and Sweets	1.554	0.469
Condiments	0.929	0.280
Water and Drinks	0.732	0.221
Food Away From Home	1.762	0.531
Hot Drinks	0.744	0.224

In rural Iran Bahmani and Ashghari (2009) found that the grain group was a luxury good while the dairy products and eggs subgroup were necessary goods, but in our study all goods were necessary goods.

Dawoud's (2005) study in Egypt indicated that expenditure elasticities for fruit, meats, and milk were higher than one; therefore, these have been identified as luxury goods, but in our study all food was found to be normal and necessary goods. On the other hand, he found the cereals group had the lowest expenditure elasticity, but we found that potatoes had the lowest expenditure elasticity.

Empirical results of a food consumption study in Slovenia by Regorsek et al. (2006) found that estimated expenditure elasticities the same as our findings for all food groups were positive, but their results showed dairy products and vegetables have expenditure elasticities higher than one, while in our study all food had expenditure elasticities less than one. They also found that meat, in terms of income, was inelastic whereas in our study all food groups in terms of income were inelastic.

Esfandiyari (1998) researched urban households in Iran and found income elasticities of about one for all food groups, but in our study, income elasticities for all food groups were below one.

Gould (2002) presented results for three Chinese urban provinces showing income elasticities for all food groups were less than one and inelastic. Our results correspond with his findings.

The result of Akbay et al. (2007 and 2008) in a study of food consumption patterns in Turkey shows the meat and meat products group had the highest expenditure elasticity. This was different to our results, which showed that food away from home had the highest expenditure elasticity.

Pomboza and Mbaga (2007) estimated expenditure elasticities in Canada. They found that expenditure elasticities were positive and less than one with the exception of fruit and vegetables, while our results indicate that all food groups have expenditure elasticities which are positive and less than one. The results of our study, like that of Barikani et al. (2007) in Iran, showed all income elasticities obtained were positive.

Findings such as Ishida et al. (2003) in West Malaysia show expenditure elasticities of meat, dairy products, fruits, vegetables and food away from home were

comparatively high. While they suggested expenditure elasticities for sugar were low, but in our study this was also high.

The results of Molina's (1994) study in Spain point out income elasticity smaller than one for bread and cereals, meat, fish, milk and eggs groups. Hence, these items are necessary goods. Fruit and vegetables and other food groups with elasticity higher than one are luxury goods, but in our study the income elasticities for all food groups were smaller than one, therefore, all food groups were necessary goods.

Yen et al. (2004) in urban China, Hoang (2009) in a study of Vietnam, and Yen and Bilgic (2013) and Sahinli (2013) in Turkey all suggested that all expenditure elasticities were positive, hence, all products were considered normal goods. Our findings showed the same results.

5. CONCLUSIONS

This study set out to estimate budget shares, expenditure and income elasticities for the thirteen main food groups for sample households in Erbil. The results are affected by the age of the household head, which most often was the parent, discussed the sample households were from the younger generation, and it is clear that younger people's food preferences and eating habits are different from older people.

Men were most often the household head; about four-fifths of household heads were working and were self-employed. More than two-thirds of household heads were literate and about one-third had an academic education. In total, close to four-fifths of the population surveyed were literate, and this indicates that the population investigated was a literate population in that society. Approximately four-fifths of households had their own home. This makes people devote a greater share of their income to food and, as test results showed, those families with their own home devoted a larger share of their incomes to food.

Only around one-third of the surveyed sample was working, and this is a sign of high incomes. About one-fifth of households did not have a private car. The results showed that families who had private cars had different average monthly food consumption to families who had no private car. This suggests that families who had no car have less purchasing power and income.

The results showed that income has a positive significant relationship with food consumption and this indicates that as income increases so food consumption will increase and vice versa. The education level of household heads with a monthly income had a negative relationship, but it was not significant. The relationship of the education level of the household head with monthly food consumption was also negative and it was a significant relationship. This indicates that families whose head had a lower education level will have a higher monthly consumption.

The relationship of household size with monthly income and food consumption was a significant and positive correlation, but its relationship with food consumption was more and higher than monthly income. The relationships between the number of male and female members of households with monthly income and food consumption were positive and significant correlations. However, the relationships between the numbers of male

members of households and both were higher. This represents the most effective role of men in income and food consumption.

The greatest share of the household budget was devoted to meat and this is largely due to the high price of meat. The next food category was the cereals and bread group, which had a share of income that was not much different to meat. This is due to the multiplicity of the number of foods in this group and also due to the existence rice in this group as it is the main food of households. Subsequently, food eaten away home, and fruit and vegetables, respectively, have the greatest share of the household budget.

Despite the low price of vegetables and fruit, people spend a large share of their income buying them. That is very important in terms of public health. The result shows zero consumption for fruit, eggs, potatoes and food away from home groups. It is possible there were families who have never been to a restaurant or fast-food outlet during the survey month and this is a natural process. However, in the case of zero consumption of other groups, it is possible that before starting this study family bought large quantities of fruit and potatoes and used those during the survey time. Alternatively, it may be that some families maintain poultry in their home garden and they did not need to buy eggs. The group with the lowest share of income was eggs, perhaps due to the relatively low price of eggs or the reason mentioned above.

The findings presented in this sample are that the variables that have the most impact on food demand were the total food expenditure and food away from home categories. The demographic characteristics did not play an important role in shaping food demand.

Estimated expenditure elasticities for all the studied food groups achieved a positive, which shows that there exists a positive relationship between income and the cost of all food. It means that when there is an increase in household income there is an increase in household food expenditure and vice versa. Expenditure on food away from home sees the greatest change, whereas potatoes have the lowest significant level of sensitivity to real income. This indicates that when there is an increase of a certain percentage in the income, on the assumption of fixed expenditure and price, we can observe the greatest increase in the expenditure on food away from home and the lowest increase in expenditure on potatoes, as expected.

Positive income elasticities were obtained for all food. This suggests all food groups in the city of Erbil were considered to be normal goods. Moreover, the estimated income elasticities were all smaller than one; this means that all the food groups studied are considered to be essential goods. It is expected that an increase of one percent in a household's income will increase the demand for all food groups by less than one percent. According to the results, the food away from home group had the largest, and the potato group had the lowest, sensitivity to income. This suggests that an increase of one percent in a household's income will increase the demand for consumption of food away from home more than, and the demand for consumption of potato less than, other food groups.

Any reduction in a household's income may bring irreparable harm to people in terms of food security. On the other hand, income increases will be helpful to improve the nutrition of people in terms of quality and quantity. It is recommended that increasing income levels, specifically for those with an academic education, will help to convert the relationship between income and education levels into a positive and strong relationship.

Meat is a main item in a household's food basket, but the price of meat is relatively expensive. Therefore, a large share of a household's income is used to buy meat. In this regard, by encouraging farmers to develop production and the meat industry to expand, the price of meat will be reduced and households will need to allocate a smaller share of household income to its purchase. Therefore, people can consume more meat or consume more of other food groups.

It is suggested that boosting domestic agricultural production will contribute towards decreasing food prices. The government could bestow more loans on farmers so people with less money can provide a greater amount of food. Food costs are a major cost in people's lives. When people have to give up less of their household budget they will find more food security. Therefore, they can spend a greater share of their budget on other expenses in life and also on leisure and recreation. Finally, in this way the society will have a happy and joyful population.

REFERENCES

- Abdulai, A., Jain, D.K., Sharma, A.K., 1999. Household Food Demand Analysis in India. *Journal of Agricultural Economics*, 50: 316–327.
- Ahmad, N., Sheikh, M.R., Saeed, K., 2015. Rural Urban Food Consumption Analysis in Pakistan: Expenditure Elasticities Approach. *Pakistan Journal of Commerce and Social Sciences*, 9(1), 159-170.
- Akbay, C., Boz, I., Chern, W.S., 2007. Household Food Consumption in Turkey. *European Review of Agricultural Economics*, 34(2), 209-232.
- Akbay, C., Boz, I., Chern, W.S., 2008. Household Food Consumption in Turkey: a reply. *European Review of Agricultural Economics*, 35(1), 99-102.
- Alexandri, C., Păuna, B., Luca, L., 2015. An Estimation of Food Demand System in Romania–Implications for Population's Food Security. *Procedia Economics and Finance*, 22, 577-586.
- Anonym, 2002. FFQ Sample booklets. Fred Hutchinson Cancer Research Center, URL (access date: 28.07.2015) <http://sharedresources.fhcrc.org/content/ffq-sample-booklets>.
- Anonym, 2002. Soy Food Questionnaire. Fred Hutchinson Cancer Research Center, URL (access date: 28.07.2015) <http://sharedresources.fhcrc.org/sites/default/files/soyQSample.pdf>.
- Anonym, 2005. Population-based Food Consumption Survey of the People of Hong Kong 2005-07, Chinese University of Hong Kong.
- Anonym, 2006. Questionnaire Surveys of Expenditure and Income. Statistical Center of Iran, URL (access date: 28.07.2015) <http://www.amar.org.ir/Portals/0/info-unit/Files/hazineh-daramad-doc-1385.pdf>.
- Anonym, 2009. Elasticity and Its Applications. Ahwaz: Shahid Chamran University, URL (access date: 28.07.2015) http://portal.scu.ac.ir/_Budget/Documents/Fasle3_20091007_083106.pdf
- Anonym, 2011. “Oil for Food” – Food Basket Adequacy Assessment Survey. WFP Iraq – North Coordination Office, URL (access date: 28.07.2015) <http://www.casi.org.uk/info/undocs/wfpnc0111.pdf>.
- Anonym, 2014. Iraq intensity map. 1:100 km. URL (access date: 12.11.2014) <http://www.iraq-businessnews.com/wp-content/uploads/2014/12/141202-iraq-intensity-map.png>
- Aydin, G., Kilic, O., 2013. Factors Affecting Consumers' Awareness of Food Safety: A Case Study in the Urban Area of Samsun Province in Turkey. *Research Journal of Applied Sciences*, 8(6), 330-334.
- Aziz, B.S., 2014. Using GIS-Based System for Determining the Shortest Route to Forest Fires in Erbil. Master Thesis, Agriculture Faculty, University of Kahramanmaras-Turkey.
- Bahmani, M., Asghari, H., 2009. Estimated Food Demand for Rural Families by Using the Almost Ideal Demand System (AIDS). *Journal of Development and Investment*, 2(3), 131-149.

- Barikani, E., Shajari, S., Amjadi, A., 2007. Estimate the Income and Price Elasticities of Demand for Food in Iran by Dynamic Almost Ideal Demand System. *Journal of Agricultural Economics and Development*, 15(60), 125-145.
- Chand S., 2015. Consumption: Importance of Consumption in Economics. Your article library, URL (access date: 03.07.2015) <http://www.yourarticlelibrary.com/economics/consumption-importance-of-consumption-in-economics-813-words/10554/>.
- Chern, W.S., Ishibashi, K., Taniguchi, K., Tokoyama, Y., 2002. Analysis of food Consumption Behavior by Japanese Households. Ohio State University, National Agricultural Research Center and Food and Agriculture Organization of the United Nations.
- Chong, M.Q., 2012. Validating a Food Frequency Questionnaire for Guam. Master Thesis, University of Hawai'i Cancer Center.
- Collins, F.M., 1986. Bactericidal Activity of Alkaline Glutaraldehyde Solution Against a Number of Atypical Mycobacterial Species. *Journal of Applied Bacteriology*, 61(3), 247-251.
- Dawoud, S., 2005. An Analysis of Food Consumption Patterns in Egypt. PhD Dissertation, University of Kiel.
- Esfandiyari, N., 1998. Investigating the Demand for Wheat and Some Food Products in Iran: the Almost Ideal Demand System (AIDS). Master Thesis, Agriculture Faculty, University of Shiraz.
- FAO, 1996. Report of the World Food Summit. Food and Agriculture Organization of the United Nations, Food and Nutrition Division, URL (access date: 03.07.2015) <http://www.fao.org/docrep/003/w3548e/w3548e00.htm>.
- FAO, 2015a. Household Surveys. Food and Agriculture Organization of the United Nations, Food and Nutrition Division, URL (access date: 03.07.2015) <http://www.fao.org/economic/ess/ess-fs/fs-methods/fsreports/en/>.
- FAO, 2015b. FAOSTAT: Food Balance - Food Balance Sheets. URL (access data: 2015-7-7) <http://faostat.fao.org/>.
- Frongillo, E. A., 1999. Validation of Measures of Food Insecurity and Hunger. *The Journal of Nutrition*, 129(2), 506S-509S.
- Goudsblom, J., Jones, E.L., Mennell, S., 1996. *The Course of Human History: Economic Growth, Social Process, and Civilization*. ME Sharpe.
- Gould, B.W., 2002. Household Composition and Food Expenditures in China. *Agribusiness*, 18(3), 387-407.
- Green, R., Alston, J.M., 1990. Elasticities in AIDS Models. *American Journal of Agricultural Economics*, 72(2), 442-445.
- Halbrendt, C., Gempesaw, C., Dolk-Etz, D., Tuan, F., 1994. Rural Chinese Food Consumption: the case of Guangdong. *American Journal of Agricultural Economics*, 76(4), 794-799.
- Hamelin, A.M., Habicht, J.P., Beaudry, M., 1999. Food Insecurity: Consequences for the Household and Broader Social Implications. *The Journal of Nutrition*, 129(2), 525S-528S.

- Healy, A.E., 2012. European Food Consumption: Convergence or Persistent Difference?. PhD Dissertation, University of Limerick.
- Hoang, L.V., 2009. Estimation of Food Demand from Household Survey Data in Vietnam (No. 12).
- IFSH, 2006. Iraq Family Health Survey 2006/7. Ministry of Planning and Development Cooperation URL (Access date: 08.06.2015) http://www.who.int/mediacentre/news/releases/2008/pr02/2008_iraq_family_health_survey_report.pdf.
- IHSES, 2007a. Iraq Household Socio-Economic Survey: Expenditure. The World Bank, URL (Access date: 08.06.2015) <http://web.worldbank.org/wbsite/external/countries/menaext/iraqextn/0,,contentmdk:22032522~pagepk:1497618~p ipk:217854~thesitepk:313105,00.html>.
- IHSES, 2007b. Iraq Household Socio-Economic Survey: Income. The World Bank, URL (access date: 08.06.2015) Available at <http://web.worldbank.org/wbsite/external/countries/menaext/iraqextn/0,,contentmdk:22032522~pagepk:1497618~p ipk:217854~thesitepk:313105,00.html>.
- Ishida, A., Law, S.H., Aita, Y., 2003. Changes in Food Consumption Expenditure in Malaysia. *Agribusiness*, 19: 61–76.
- Karli, B., Bilgiç, A., 2007. Factors Affecting Meat and Meat Products Consumption Quantities in Sanliurfa Province. *Akdeniz Üniversitesi Ziraat Fakültesi Dergisi*, 20(1), 127-136.
- Li, D., 2006. United States Households Consumption, A Comprehensive Analysis (Doctoral Dissertation, Ph. D. Thesis Ed.). College Park: University of Maryland).
- Mirlohi M., HassanZadeh A., Esmaeel Zadeh A., khoshnevissan M., 2013. Meat Consumption Pattern and Priorities in Unban Families in Isfahan- Iran. *J Health Syst Res, Nutrition supplement*: 1562-1571.
- Miura, K., 2012. Socioeconomic Differences in Takeaway Food Consumption Among Adults. Bachelor Thesis, Queensland University of Technology.
- Molina, J.A., 1994. Food Demand in Spain: An Application of the Almost Ideal Demand System, *Journal of Agricultural Economics*, 45: 252-258
- Moomaw, W., Griffin, T., Kurczak, K., Lomax, J., 2012. The Critical Role of Global Food Consumption Patterns in Achieving Sustainable Food Systems and Food for All. United Nations Environment Programme, Tech. Rep.
- Mousaai, M., 2009. The Role of Culture on Consumption Pattern. *Majalle Eghtesad Eslami*, 34(5), 125-50.
- Noel, S.E., Newby, P.K., Ordovas, J.M., Tucker, K.L., 2009. A Traditional Rice and Beans Pattern is Associated with Metabolic Syndrome in Puerto Rican Older Adults. *The Journal of Nutrition*, 139(7), 1360-1367.
- Partovi, B., 2009. Economic Analysis of Consumer Behavior in Urban Areas: a Study Case in Zanzan Province. *Journal of Behavioral Sciences*, 1(1), 65-89.
- Pomboza, R., Mbaga, M.D., 2007. The Estimation of Food Demand Elasticities in Canada (No. 52705). Agriculture and Agri-Food Canada.

- Regoršek, D., Erjavec, E., Pfajfar, L., 2006. Demand for the Main Food Commodities in Slovenia. na.
- Rehman, A., Jian, W., Runqing, Z., 2014. Estimation of Urban-Rural Expenditure and Household Size Elasticities of Food Items in Pakistan:-Evidence From PSLM Survey. *Asian Economic and Financial Review*, 4(2), 183-190.
- Rudaw, 2015. Exchange Rate in the Kurdistan Region. URL (access date: 03.06.2015) <http://rudaw.net/sorani/business/18072015?keyword=%d9%86%d8%b1%d8%ae%db%8c%20%d8%af%d8%b1%d8%a7%d9%88>.
- Şahinli, M.A., 2013. The Turkish Demand for Food. *Electronic Turkish Studies*, 8(8) 2111-2118.
- Singh, P., 2014. *Encyclopedia of Food and Agriculture*. Oxford Book Company.
- Stone, R., 1954. Linear Expenditure Systems and Demand Analysis: An Application to the Pattern of British Demand. *The Economic Journal*, 511-527.
- Taniguchi, K., Chern, W.S., 2000. Income Elasticity of Rice Demand in Japan and Its Implications: Cross-Sectional Data Analysis. In 2000 Annual meeting, July 30-August 2, Tampa, FL (No. 21755). American Agricultural Economics Association (New Name 2008: Agricultural and Applied Economics Association).
- Thanga, J.L., 2013. Food Price Elasticities from Household Survey Data in India: An Application of Single Equation and System Demand Models. *Journal of Emerging Issues in Economics, Finance and Banking*, 2(2): 655-557.
- UNHCR, 2007 and 2008. Rapid Needs Assessment (RNA) of Recently Displaced Persons in the Kurdistan Region. UNHCR: Erbil Governorate, URL (access 08.06 2015) <http://www.unhcr.org/cgi-bin/texis/vtx/search?page=search&query=ethnic+group&skip=0&querysi=erbil&searchin=title&display=10&sort=relevane>.
- Vega, J.D.J.G., Gracia, M.C., 2000. The Role of Economic and Demographic Variables in Mexican Food Consumption. *Journal of Food Distribution Research*, 31(01).
- Wikipedia contributors, "Food," Wikipedia, the Free Encyclopedia, URL (access date: 27.07.2015) <http://en.wikipedia.org/wiki/Food>.
- Wu, Y., Li, E., Samuel, S.N., 1995. Food Consumption in Urban China: An Empirical Enalysis. *Applied Economics*, 27(6), 509-515.
- Yen, S.T., Fang, C., Su, S.J., 2004. Household Food Demand in Urban China: a Censored System Approach. *Journal of Comparative Economics*, 32(3), 564-585.

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