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Econometric analysis of the changes in food consumption expenditure patterns in Egypt

Dawoud, Seham D. Z.*

Department of Agricultural Economics, Faculty of Agriculture, Damietta University, Egypt.

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This paper analyses the changes in food expenditure patterns over time in Egypt with special emphasis on the differences between urban and rural sectors. Engel curves for food groups are estimated by using double-log function type. The method used for estimating regression equations is the Weighted Least Squares (WLS). Data used in the study are obtained from the Household, Income, Expenditure, and Consumption Survey (HIECS) conducted by the Central Agency for Public Mobilisation and Statistics (CAPMAS) of Egypt for five survey periods from 1990/1991 to 2009/2010. Food consumption expenditure patterns have changed over the five conseculative survey periods as a result of economic changes. Estimated expenditure elasticities for food groups are positive and less than one except for fish, milk-eggs, and fruits, as they moved up to the necessity commodities in 2009/2010. The estimated expenditure elasticities for food groups have decreased significantly over the time. There are statistically significant variations between the urban and rural expenditure elasticity of most food commodities, except for cereals, milk-eggs, fruits, and beverages. Elasticities tend to be higher in rural areas than urban ones. The expenditure elasticities of food groups are lower at high-income groups than low-income ones. These results provide the guideline for future policy implication in respect of the demand management and food consumption in Egypt.

Key words: Food consumption expenditure, Engel curves, expenditure elasticity, Egypt.

INTRODUCTION

In Egypt, as in most developing countries, food dominates consumers' budgets. In 1990/1991, rural areas consumers spent almost 60%t of their incomes on food whereas urban consumers split their expenditure about evenly between food and non-food items. In 2009/2010, food expenditure share declined to over 50% in rural areas and to about 40% in urban areas (CAPMAS, 1990/1991 and 2009/2010). The food's share of total expenditure in Egypt rural areas was much higher than the urban areas. Household consumption patterns have been changing especially, after economic liberalisation programs. These changes have led to changes in real income and income distribution, affecting household expenditure behaviour.

In the economic theory, the relationship between income level and the quantity purchased is interpreted by income consumption curves. German economist Ernst Engel had established this approach firstly in the 19th century. Since then the curve that shows the influence of the changes in the consumer income on the quantity demanded is called Engel curve. The household expenditure behaviour can be analysed by using Engel curves (Sadoulet and Janury, 1995). Engel curve show how the preferences between goods change when

*Corresponding author. E-mail: sdawoud@du.edu.eg.

there is an increase in the household income while the prices of the goods are fixed. Households primarily tend to satisfy their household's basic needs and as the level of welfare increases, the share of expenditure on necessities such as food decreases.

The relationship between demand and total expenditure can be used to derive expenditure elasticities of demand for goods. These elasticities represent the percentage of change in the quantity demanded as a response to the percentage change in the income level. According to Engel curve, the commodities are classified into two categories as necessities and luxuries. If the income elasticity of demand for certain goods is less than one, such goods are necessities and if it is larger than one, it would be luxury goods.

Engel curves were widely examined by using different econometric methods for different groups of goods. For example, Working (1943) proposed the log-linear budget share specification, which is known as the Working-Leser model, since Leser (1963) found that this functional form fit better than some alternatives. Houthakker (1957) analysed the income elasticities of 30 different countries for four different expenditure groups. Chesher and Rees (1987) estimated the income elasticity of demand for cheese, meat, and fats in Great Britain by developed Almost Ideal Demand model's Engel curve assuming that price does not change during the period of the survey. Banks et al. (1997) analysed Engel curve and consumer demands with the help of British data. You (2003) used models in the study where food, transportation, cigarette and alcohol expenditures were examined with Engel functions.

In Egypt, several studies have been conducted to estimate income elasticity using the HIECS (Shapouri and Soliman, 1984; Soliman, 1992). These studies used a consumption-income relation specified with a double log functional form. Soliman and Eid (1995) compared the changes in expenditure elasticity over a long period, including the dramatic change in the Egyptian economy from a central planned system to an open market system. Another study by Sleem and Abdul Azziz (2006) dealt with estimating the consumption function of animal products using HIECS of the year 1999/2000. It tested three functional forms: the linear, semi-log, and double-log, for fresh red meat, poultry, and fish. Atta (2006) estimated the Engel curve function for the relation between per capita annual consumption of grains as a function of annual per capita expenditure calculated from the 1999/2000 HIECS. The study tried four functional form: linear, double-log, semi-log, and quadratic forms. These functions were estimated for both major urban and rural regions of Egypt. Fabiosa and Soliman (2008) estimated a system of Engel functions for two survey periods, 1999/2000 and 2004/2005, to quantify the impact of changes of income on household expenditure behavior and to investigate how expenditure responsiveness changes with income.

Ragab et al. (2008) estimated the Engel's curve model using the double-log form. The model estimated the relation between the per capita annual expenditure on each food animal product commodity and the total per capita annual expenditure. The study compared the average estimated elasticity of the years 1999/2000 and 2004/2005.

The analysis of changing food consumption pattern over time reveals a clear picture of living standard and the economic growth of the country. This would help in designing appropriate policies related to food production and distribution. Therefore, this paper aims to analyse econometrically the changes in food expenditure patterns in Egypt over time, as the result of economic improvements, with special emphasis on the difference between urban and rural areas, as well as at different income levels.

Specifically, there are five aims for this study as follows: First; studying the changes in consumption expenditure patterns in Egypt. Second, estimating the expenditure elasticities of demand for different food groups. Third, estimating the changes in the expenditure elasticities for different food groups between the years 1990/1991, 1994/1995, 1999/2000, 2004/2005, and 2009/2010. Fourth, determinating the differences in food expenditure patterns between rural and urban households (Location effect). Finally, estimating the differences between the food expenditure patterns of households at different income levels (Income level effect).

MATERIALS AND METHODS

Estimation models

The most available data of Egyptian Household Surveys are very highly aggregated household expenditure and contains no information on consumed quantities and consequent prices. Furthermore, the data provided by the surveys are completed in a short time-span, prices faced by all households can be regarded as constant. This allows focus on responses of household demand to variations in income or total expenditure. Therefore, this study used the specification of the Engel model, which uses only expenditure data.

The choice of an appropriate functional form in estimating Engel's curve gets importance. There are many functional forms that are used to estimate Engel curves. In this study, a double logarithmic functional form is used to estimate expenditure elasticities. This functional type has proven to be the most appropriate way of estimating the expenditure elasticity of demand because of its simplicity and quite easy estimation and interpretation (Ahmed et al., 2012). Also, expenditure coefficient is the coefficient of elasticity and there is no need of calculation.

In estimation of Engel curves, total expenditure is commonly used as a proxy of income for two reasons (Deaton, 1997; Tansel, 2002): First, total household expenditure tends to be more accurately reported, is easier to measure than total household income, and is measured with less error of measurement particularity in developing countries. Second; income may be subject to transitory fluctuations since savings allow smoothing of

expenditure over time. Thus, the total expenditure elasticities are calculated instead of income elasticities.

The general model for estimation defined below represents the double-log functional form and has the advantage that the estimated parameter b_i can be readily interpreted as expenditure elasticity.

$$\ln x_{ij} = a_i + b_i \ln y_j + \eta_i \quad (1)$$

Where the subscript j denotes total expenditure group and the subscript i denotes commodity group. So, x_{ij} is the mean annual per capita expenditure on a commodity group i of households from expenditure group j, a_i and b_i are the estimated coefficients, y_j is the mean annual total per capita expenditure of households from expenditure group j, and (η_i) is the disturbance term. As pointed out before, the derivation of the Engel function assumes constant prices. Equation (1) is estimated for each of the 10 food commodity groups, for each survey (1990/1991, 1994/1995, 1999/2000, 2004/2005, and 2009/2010) in both rural and urban Egyptian areas as shown in Table 5. To find out the factors that cause the changes in expenditure patterns over time, consumption expenditure patterns of the urban and rural households, and the households at different income levels were analysed. Dummy variables are included to test these factors. The equations used for these are in the following forms.

Time effect

In order to estimate the difference in the elasticity for each commodity group over time, dummy variables are used between the years 1990/1991, 1994/1995, 1999/2000, 2004/2005, and 2009/2010. There are five years of the Egyptian Household Income, Expenditure, and Consumption Surveys (EHIECS). Therefore, the number of dummies is four (Gujarati, 1995). Assuming that the five years data have a common slope but different intercepts in the regression of annual per capita expenditure share for a food group on average annual total expenditures[1]. The equation used for this is of the form:

$$\begin{aligned}\ln x_{ij} = {} & a_{i0} + b_{i0} \ln y_j + a_{i1} D_1 + b_{i1}(\ln y_j D_1) + a_{i2} D_2 + b_{i2}(\ln y_j D_2) \\ & + a_{i3} D_3 + b_{i3}(\ln y_j D_3) + a_{i4} D_4 + b_{i4}(\ln y_j D_4) + \eta_i\end{aligned} \quad (2)$$

Where D_1 = 1, if 1994/1995, 0 if otherwise, D_2 = 1, if 1999/2000, 0 if otherwise, D_3 = 1, if 2004/2005, 0 if otherwise, and D_4 = 1, if 2009/2010, 0 if otherwise. b_{i1}, b_{i2}, b_{i3} and b_{i4} are the estimated coefficients, In this case b_{i1} indicates how much the consumption expenditure elasticity of the 1994/1995 differs from the consumption expenditure elasticity of the otherwise. b_{i2} indicates how much the consumption expenditure elasticity of the 1999/2000 differs from the consumption expenditure elasticity of the otherwise, etc. All other variables have been as defined above. Table 6 shows the results of Model 2.

[1] The first year data (1990/1991) is treated as the base year and the intercept a_{i0} reflects the intercept of this year.

Location effect

Dummy variable was also used to see the differences in total expenditure elasticities of urban and rural households. The model is the same as Equation (2) except for the dummy variable.

$$\ln x_{ij} = a_i + b_{i0} \ln y_j + b_{i1} D + b_{i2}(\ln y_j D) + \eta_i \quad (3)$$

where D = 0 for rural data, 1 for urban data, b_{i2} is the differences in total expenditure elasticities of urban and rural households. Table 7 shows the results of model 3.

Income levels effect

In order to determine the differences between the consumption patterns of households at different income levels, the data set is divided into two subsets according to income categories. Dummy variable is used to see the differences in total expenditure elasticities of different income levels. The model is the same as Equation (2) except the dummy variable.

$$\ln x_{ij} = a_i + b_{i0} \ln y_j + b_{i1} D + b_{i2}(\ln y_j D) + \eta_i \quad (4)$$

where D = 0 for the first set (low income), and 1 for the second set (high income). b_{i2} shows how much the expenditure elasticity of low income groups differs from the expenditure elasticity of high income groups. Table 8 shows the results of model 4.

Simultaneous effect of total expenditure, time, location, and income levels

Important determinants of food expenditure patterns are the income (or expenditure) level of the household, the time, the local food habits and the income level. These determinants are analysed simultaneously by using dummy variables for each food group (Equation 5).

$$\begin{aligned}\ln x_{ij} = {} & a_{i0} + b_{i0} \ln y_j + a_{i1} D_1 + b_{i1}(\ln y_j D_1) + a_{i2} D_2 + b_{i2}(\ln y_j D_2) + a_{i3} D_3 + b_{i3}(\ln y_j D_3) \\ & + a_{i4} D_4 + b_{i4}(\ln y_j D_4) + a_{i5} D_5 + b_{i5}(\ln y_j D_5) + a_{i6} D_6 + b_{i6}(\ln y_j D_6) + \eta_i\end{aligned} \quad (5)$$

where: D_1 = 1, if urban, 0 if rural , D_2 = 1, if 1995, 0 if otherwise, D_3 = 1, if 2000, 0 if otherwise, D_4 = 1, if 2005, 0 if otherwise, D_5 = 1, if 2010, 0 if otherwise, and D_6 = 1, if high income level, 0 if low income level. All other variables have been as defined above.

The Central Agency for Public Mobilisation and Statistics (CAPMAS) of Statistics of Egypt publishes the data in the grouped form. For this reason, the Weighted Least Squares (WLS) regression is used to estimate the above models (1), (2), (3), (4) and (5). The weights is the proportion of population in each income class. The Weighted Least Squares (WLS) has an advantage over Ordinary Least Squares (OLS) when data used are group averages, as is the case in this study. The use of grouped data in the regression analysis causes heteroscedasticity in the disturbance terms. The WLS procedure gives more importance to observations associated with income classes with larger proportions of population, whereas OLS treats the observations as of equal importance. Expenditure elasticities are calculated as $(\varepsilon_i = b_i)$,

where b_i is the coefficient of regression.

Data

The analysis is based on secondary data of the Egyptian Household Income, Expenditure, and Consumption Surveys (EHIECS), for the years 1990/1991, 1994/1995, 1999/2000, 2004/2005, and 2009/2010. These surveys were conducted by the official statistical agency of Egypt, the Central Agency for Public Mobilisation and Statistics (CAPMAS). Due to lack of access to the original data on individual household surveys we rely on the average annual data on household incomes and expenditure by income group, as taken from the official publications for the 1990/1991, 1994/1995, 1999/2000, 2004/2005, and 2009/2010 surveys. Some differences between the surveys under study can be seen. For instance, the household in the sample fall into 14 expenditure categories for 1990/1991 and 1994/1995 years, and 20 for 1999/2000, 2004/2005 and 2009/2010 years according to their average annual per capita expenditure, for urban and rural areas. Over the 5 years research period, the expenditure groups had provided 176 observations for each variable. In order to make the five survey periods comparable, expenditure data have been deflated by the consumer price index (CPI). The total annual per capita expenditure and per capita expenditure on major commodity groups were calculated in real values.

RESULTS AND DISCUSION

Descriptive analysis of consumption expenditure patterns

Here, the developments in consumption expenditure patterns in Egypt from 1990/1991 to 2009/2010 with special emphasis on the differences between urban and rural sectors is highlighted. All expenditures in this and subsequently are adjusted to 2010 market prices by the CPI. Total per capita expenditure (sum of food and non-food expenditure) is used as an approximation for per capita consumer income. The average consumption expenditure and its expenditure share is calculated for food and non-food and for each food commodity group in both rural and urban sectors over the five survey periods from 1990/1991 to 2009/2010.

Allocation of total expenditure between food and non-food

Table 1 shows per capita total expenditure and expenditure allocation between food and non-food in Egypt for the five years included in the study. At the aggregated level of analysis, differences between rural and urban expenditure patterns are noticeable. In 2009/2010, per capita expenditure in urban areas exceeded that in rural areas where average total expenditure in rural Egypt was only 59.83% of urban expenditure. This suggests a worsening of the rural-urban income differential since 1990/1991, where average rural expenditure was 85.32% of urban expenditure. In 1990, rural per capita food expenditure was the same in urban per capita food expenditure; in 2009/2010 it dropped to 75%. Thus in 2009/2010, a rural consumer spent about three quarters of what an urban consumer spent on food and about half on non-food.

In each of the five years, food's share of total expenditure in rural Egypt was much higher than the urban, as shown in Table 1. In 1990/1991, urban consumers split their expenditure evenly between food and non-food items, whereas in rural areas consumers spent almost 60% of their incomes on food. Food expenditure share declined in both rural and urban areas over the five years. It declined in rural areas from 59.35% in 1990/1991 to 50.35% in 2009/2010, a drop of 9% points. During the same period, food expenditure share in urban areas also decreased, from 49.96% in 1990/1991 to 39.97% in 2009/2010, a drop of 10% points. From 1990/1991 to 2009/2010, per capita total expenditure increased 32% in rural areas and 88% in urban areas. For non-food expenditure share, it increased over the same period from 40.65% in 1990/1991 to 49.65% in 2009/2010 in rural areas and from 50.04% in 1990/1991 to 60.03% in 2009/2010 in urban.

Table 2 shows urban and rural expenditures in various years relative to the 1990 levels. Both food and non-food expenditures increased, but non-food expenditure increased much faster. Per capita urban expenditure increased by 88% from 1990/1991 to 2009/2010 compared to only 32% in rural areas. Over the same period, both per capita non-food and food expenditures increased faster in urban than rural areas. Per capita non-food and food expenditures in urban areas increased by 126 and 50%, compared to only 61 and 12% respectively in rural areas. It is observed that per capita total expenditure and food and non-food expenditures, for rural and urban consumers decreased in 2009/2010 compared to the previous year (2004/2005). This resulted from decreasing the real individual income.

Allocation of expenditure for different food groups

According to the available data, there are ten food sub-groups including cereals, meat, fish, milk-eggs, fruits, oils-fats, vegetables, sugar, other food products, and beverages. Each food group includes commodities that have similar nutritional value and whose prices are very likely to move in tandem. The average per capita expenditure and its expenditure share is calculated for each food commodity group at the rural and urban levels and over the time from 1990/1991 to 2009/2010. All expenditures here and subsequently in this study are adjusted to 2010 market prices by the CPI.

Tables 3 and 4 show average annual per capita expenditure (LE) on different food groups and their expenditure shares in both rural and urban Egypt at 2010

Table 1. Average Annual per capita consumption expenditure (LE*) for food and non-food in urban and rural areas at 2010 market prices, 1990/1991 to 2009/2010.

Category			1990/1991	1994/1995	1999/2000	2004/2005	2009/2010
Rural	Food	Value	1226.74	1507.58	1601.73	1639.66	1372.19
		%	59.35	56.37	50.86	50.28	50.35
	Non-food	Value	840.09	1166.95	1547.51	1621.18	1353.36
		%	40.65	43.63	49.14	49.72	49.65
	Average	Value	2066.82	2674.47	3149.24	3260.84	2725.54
		%	100.00	100.00	100.00	100.00	100.00
Urban	Food	Value	1210.05	2104.88	2279.87	2222.94	1820.65
		%	49.96	46.79	38.84	40.83	39.97
	Non-food	Value	1212.13	2393.83	3589.96	3220.96	2734.73
		%	50.04	53.21	61.16	59.17	60.03
	Average	Value	2422.17	4498.71	5869.82	5443.89	4555.38
		%	100.00	100.00	100.00	100.00	100.00

Source: Computed based on data from HIECS, CAPMAS, 1990/1991, 1994/1995, 1999/2000, 2004/2005, and 2009/2010.
LE*: Egyptian Pound.

Table 2. Change in average per capita expenditure for food and non-food in urban and rural areas since 1990/1991 to 2009/2010 (1990 = 1.00).

Category		1990/1991	1994/1995	1999/2000	2004/2005	2009/2010
Rural	Food	1.00	1.23	1.31	1.34	1.12
	Non-food	1.00	1.39	1.84	1.93	1.61
	Average	1.00	1.29	1.52	1.58	1.32
Urban	Food	1.00	1.74	1.88	1.84	1.50
	Non-food	1.00	1.97	2.96	2.66	2.26
	Average	1.00	1.86	2.42	2.25	1.88

Source: Computed based on data from HIECS, CAPMAS, 1990/1991, 1994/1995, 1999/2000, 2004/2005, and 2009/2010.

market prices and over the time from 1990/1991 to 2009/2010.

In rural areas, the total average per capita expenditure on food group in 1990/1991 was 1226.47 LE/year (2009 prices), from which 29.83% were allocated to cereals group. However, in urban areas, it was 1210.07 LE/year (2009 prices), from which 24.28% were allocated to meat group. The average per capita expenditure on meat occupied the largest share within the structure of food expenditure, in urban areas. It is higher for urban than rural areas. The expenditure share on meat was 24.28% in 1990/1991 for urban versus 22.78% for rural areas. Over the years of the study, the meat share increased until 2004/2005. It increased to 28.48 and 27.49% of total expenditure for urban and rural areas, respectively. This means that the Egyptian consumers tended to believe in the nutritional superiority of animal products and they were ready to spend more on these products.

The second largest expenditure share went to the cereals group. The expenditures on cereal products were much higher for rural resulting from the high quantity consumed from these products. In 1990/1991 it was 29.83 and 19.33% for rural and urban areas, respectively. However, in 2009/2010, the cereals share decreased to 18.49% for rural areas versus 13.25% for urban.

Something similar took place in the case of vegetables group, its relative importance in 1990/1991 was 11.89% in both rural and urban. It increased to 14.76% of total average per capita expenditure in rural areas and to 12.84% in urban areas. With respect to Milk-Eggs and Oils–Fats, and fruits, their relative importance in rural areas increased from 8.68, 8.30 and 4.44% in 1990/1991 to 11.45, 9.12 and 6.08% in 2009/2010, respectively. However, in urban areas, their relative importance increased from 11.97, 7.51 and 6.07% in 1990/1991 to 14.80, 8.31 and 7.07% in 2009/2010, respectively. The

Table 3. Average annual per capita expenditure (LE) on different food groups in rural Egypt at 2010 market prices, 1990/1991 to 2009/2010.

Food groups	1990/1991		1994/1995		1999/2000		2004/2005		2009/2010	
	Value	%	Value	%	Value	%	Value	%	Value	%
Cereals	365.88	29.83	349.74	23.20	312.04	19.48	308.24	18.80	253.74	18.49
Meat	279.41	22.78	374.47	24.84	425.70	26.58	450.76	27.49	345.51	25.18
Fish	42.35	3.45	61.32	4.07	77.94	4.87	91.43	5.58	79.00	5.76
Milk – Eggs	106.47	8.68	130.79	8.68	147.26	9.19	170.59	10.40	157.05	11.45
Fruits	54.41	4.44	75.00	4.97	92.74	5.79	101.51	6.19	83.44	6.08
Oils – Fats	101.76	8.30	133.95	8.88	135.22	8.44	143.70	8.76	125.07	9.12
Vegetables	145.88	11.89	209.74	13.91	210.00	13.11	222.52	13.57	202.55	14.76
Sugar	53.82	4.39	71.32	4.73	78.27	4.89	81.68	4.98	62.91	4.59
Other food products	39.12	3.19	56.84	3.77	68.92	4.30	25.04	1.53	23.56	1.72
Beverages	37.06	3.02	43.95	2.91	53.63	3.35	44.20	2.70	39.26	2.86
T. food expenditure	1226.47	100.00	1507.63	100.00	1601.73	100.00	1639.66	100.00	1372.19	100.00

Source: Computed based on data from HIECS, CAPMAS, 1990/1991, 1994/1995, 1999/2000, 2004/2005, and 2009/2010.

Table 4. Average annual per capita expenditure (LE) on different food groups in urban Egypt at 2010 market prices, 1990/1991to 2009/2010.

Food groups	1990/1991		1994/1995		1999/2000		2004/2005		2009/2010	
	Value	%	Value	%	Value	%	Value	%	Value	%
Cereals	233.87	19.33	335.99	16.0	311.35	13.66	305.61	13.75	241.20	13.25
Meat	293.82	24.28	521.08	24.7	626.40	27.48	633.00	28.48	484.97	26.64
Fish	66.59	5.50	135.48	6.4	152.58	6.69	154.46	6.95	131.02	7.20
Milk – Eggs	144.85	11.97	270.69	12.9	300.09	13.16	320.63	14.42	269.46	14.80
Fruits	73.46	6.07	156.30	7.4	183.84	8.06	170.30	7.66	128.64	7.07
Oils – Fats	90.85	7.51	164.01	7.8	154.37	6.77	167.49	7.53	151.38	8.31
Vegetables	143.94	11.89	258.61	12.3	251.83	11.05	245.87	11.06	233.87	12.84
Sugar	58.81	4.86	95.12	4.5	106.38	4.67	106.93	4.81	80.69	4.43
Other food products	59.27	4.90	98.97	4.7	109.14	4.79	39.44	1.77	35.78	1.96
Beverages	43.71	3.61	68.64	3.3	83.86	3.68	79.21	3.56	63.75	3.50
T. food expenditure	1210.07	100.00	2104.88	100.00	2279.87	100.00	2222.94	100.00	1820.65	100.00

Source: Computed based on data from HIECS, CAPMAS, 1990/1991, 1994/1995, 1999/2000, 2004/2005, and 2009/2010.

smallest expenditure share went to the beverages in1990/1991 and to other food products in 2009/2010. It was higher for urban than rural areas. It is interesting to note that the expenditure shares of different food groups in both rural and urban Egypt decreased in 2009/2010 compared to 2004/2005. This resulted from the rising food prices in 2008, known as food crisis, faced by Egyptian households. The Egyptian government responded to this crisis by raising the food subsidy budget (Ramadan and Thomas, 2010).

Expenditure elasticities of demand for different food groups

Table 5 presents the expenditure elasticity for food group and its sub-groups. For each commodity, income elasticity is computed separately for each year. The trends of the elasticity over time are assessed. As can be expected, total expenditure (income) variable is an important determinant of food expenditure. Most of the coefficients appear to be significant at the one significance level, and expenditure elasticities have the expected positive signs. The R squares of the models indicate reasonably good fit for all equations. All models have highly significant coefficients for the intercept variable (a_j) and the slope (b_j).

Table 5 shows the expenditure elasticities for food group and its sub-groups over the five years that were estimated by model 1. Estimated expenditure elasticity for food group is positive and less than one for all the years, implying that it is normal good for Egyptian households, that is, as income increases their expenditure will increase at a lower rate. It is 0.81

Table 5. Estimated expenditure elasticities of demand for different food groups (1990/1991 - 2009/2010).

Food groups	1990/1991				1995/1996				1999/2000				2004/2005				2009/2010			
	α_j	β_j	R^2	F	α_j	β_j	R^2	F	α_j	β_j	R^2	F	α_j	β_j	R^2	F	α_j	β_j	R^2	F
Cereals	0.74 (1.54)	0.64 (7.73)**	0.69	59.74**	1.31 (4.01) **	0.57 (14.01)**	0.88	196.37**	2.36 (13.89) **	0.42 (21.63)**	0.93	467.77**	1.91 (9.29)**	0.46 (18.97)**	0.91	360.03**	2.14 (7.35)**	0.41 (11.46)**	0.78	131.33**
Meat	-1.65 (-9.28)**	0.94 (41.07)**	0.98	1687.03**	-1.81 (-7.56)**	0.96 (33.12)**	0.97	1096.73**	-0.08 (-0.52)	0.75 (38.94)**	0.97	1516.50**	0.48 (2.75)**	0.70 (33.24)**	0.97	1104.63**	0.44 (2.04)*	0.69 (26.29)**	0.90	690.97**
Fish	-4.65 (-15.21)**	1.11 (28.82)**	0.97	830.38**	-5.82 (-8.11)**	1.24 (14.43)**	0.89	208.29**	-2.96 (-7.27) **	0.90 (18.96)**	0.91	359.43**	-2.08 (-6.81)**	0.82 (22.87)**	0.93	523.25**	-2.70 (-9.03)**	0.89 (24.36)**	0.88	593.27**
Milk-Eggs	-3.02 (-20.62)**	1.04 (55.04)**	0.99	3029.88**	-4.11 (-7.23)**	1.13 (16.49)**	0.91	271.97**	-2.31 (-6.52)**	0.91 (21.84)**	0.93	477.12**	-1.84 (-4.19)**	0.87 (16.49)**	0.87	272.02**	-1.15 (-4.03)**	0.80 (22.67)**	0.87	513.89**
Oils-Fats	-1.44 (-4.43)**	0.78 (18.46)**	0.93	340.74**	-1.74 (-4.29)**	0.82 (16.78)**	0.92	281.57**	0.25 (0.92)	0.56 (17.94)**	0.90	321.78**	2.03 (7.66)**	0.37 (11.41)**	0.77	130.11**	1.83 (10.23)**	0.39 (17.65)**	0.80	311.38**
Fruits	-4.82 (-21.44)**	1.16 (40.36)**	0.98	1628.98**	-6.69 (-12.18)**	1.37 (20.66)**	0.94	426.74**	-4.00 (-13.04)**	1.06 (29.18)**	0.95	851.23**	-2.03 (-10.64)**	0.84 (37.08)**	0.97	1374.55**	-2.21 (-10.80)**	0.84 (33.69)**	0.94	1134.81**
Vegetables	-0.32 (-1.30)**	0.75 (21.43)**	0.94	459.10**	-1.49 (-3.92)**	0.81 (17.80)**	0.92	316.97**	0.65 (2.56)**	0.55 (18.33)**	0.90	335.98**	3.14 (17.00)**	0.28 (12.47)**	0.80	155.62**	3.32 (24.27)**	0.26 (15.30)**	0.75	233.94**
Sugar	-2.23 (-14.88)**	0.82 (42.11)**	0.98	1773.43**	-2.52 (-8.68)**	0.85 (24.09)**	0.96	580.21**	-1.66 (-9.84)**	0.75 (37.28)**	0.97	1389.94**	-0.40 (-1.95)*	0.60 (24.05)**	0.94	578.51**	-0.40 (-1.85)	0.58 (21.89)**	0.86	479.21**
Others	-1.08 (-3.12)**	0.62 (14.74)**	0.89	217.38**	-0.47 (-1.03)	0.58 (10.47)**	0.81	109.63**	-1.23 (-6.54)**	0.68 (30.74)**	0.96	944.95**	-1.88 (-6.61)**	0.64 (18.70)**	0.90	349.52**	-1.25 (-5.30)**	0.57 (19.72)**	0.83	388.75**
Beverages	-2.27 (-17.40)**	0.75 (44.03)**	0.98	1930.32**	-1.99 (-5.10)**	0.73 (15.49)**	0.90	239.95**	-0 .81 (-5.47)**	0.56 (32.30)**	0.97	1042.96**	-1.57 (-3.66)**	0.68 (13.04)**	0.82	170.04**	-1.52 (-4.30)**	0.66 (15.19)**	0.86	231.02**
Total Food	0.86 (3.78)**	0.81 (27.58)**	0.96	760.87**	0.77 (1.98) *	0.78 (12.75)**	0.87	162.44**	1.95 (8.46)**	0.67 (24.29)**	0.94	590.19**	2.46 (12.54)**	0.61 (25.31)**	0.94	640.75**	2.69 (17.08)**	0.57 (29.28)**	0.95	857.51**

Source: Computed based on data from HIECS, CAPMAS, 1990/1991, 1994/1995, 1999/2000, 2004/2005, and 2009/2010. ** Indicates significant at one percent level of significance; * Indicates significant at five percent level of significance. The numbers in parentheses are t-Values.

in 1990/1991 and declines over time, with estimates of 0.78, 0.67, 0.61, and 0.57 respectively. There are variations in elasticities for commodity groups that tend to indicate a difference in households' attitudes toward these groups as their income rises. The corresponding expenditure elasticities are reported for the five survey periods of 1990/1991, 1994/1995, 1999/2000, 2004/2005, and 2009/2010 in Egypt. In 1990/1991, the expenditure elasticities for food groups are positive and less than one except for fish, milk-eggs, and fruits, indicating that most of food groups are normal and necessary goods for Egyptian households. The commodities of fish, milk-eggs, and fruits are luxuries with elasticities that exceed one, while they moved up to the necessity commodities in 2009/2010 with estimates of 0.89, 0.80, and 0.94. respectively. Where an increase in total expenditure by one percent would tend to cause a 0.78% increase in fish expenditure in Egypt, it will be probably caused by a shift to higher quality fish (expensive species of fish). Increased total expenditure had a clear impact on the expenditure of milk-eggs; a one percent increase in total expenditure would tend to cause an increase in expenditure on milk and its products by 0.80. Also, fruits group has a relatively high expenditure elasticity of 0.94. For meat the expenditure elasticity was about one, identify it as near to luxury commodity. It declined to 0.69 in 2009/2010, which identifies it as necessity.

The elasticity of cereals group is relatively similar at low numbers, which means that the consumption of these commodities is relatively

little affected by income changes. The cereals group has an expenditure elasticity of 0.64, which means that as total expenditure rises by one percent the expenditure on cereals would tend to

Table 6. The changes in expenditure elasticities for different food groups from 1990/1991 to 2009/2010 (Time effect).

Food groups	a_{i0}	b_{i0}	1994/1995		1999/2000		2004/2005		2009/2010		R^2	F
			a_{i1}	b_{i1}	a_{i2}	b_{i2}	a_{i3}	b_{i3}	a_{i4}	b_{i4}		
Cereals	0.39(1.24)	069(17.42)**	0.92(1.87)	-0.13(-2.14)**	2.04(5.04)**	-0.28(-5.77)**	1.52 (3.12)**	-0.23(-4.03)**	1.74 (3.50)**	-0.28 (-4.62)**	0.86	113.07**
Meat	-1.57(-10.15)**	0.94(47.52)**	-0.24(-0.84)	0.02(0.62)	1.62(6.79)**	-0.19(-6.71)**	2.05 (6.25)**	-0.24 (-5.95)**	2.39 (7.69)**	-0.29 (-7.73)**	0.97	676.09**
Fish	-4.67 (-14.29)**	1.11 (26.83)**	-1.14 (-1.86)	0.13 (1.73)	1.71 (3.40)**	-0.21 (-3.39)**	1.65 (2.38)*	-0.29 (-2.20)*	2.25 (3.43)**	-0.22 (-3.18)**	0.92	230.49**
Milk-Eggs	-3.25 (-12.09)**	1.04 (30.48)**	-0.85 (-1.68)	0.09 (1.38)	0.95 (-2.29)*	-0.13 (-2.66)**	1.42 (2.49)**	-0.17 (-2.51)**	2.67 (4.94)**	-0.22 (-4.76)**	0.94	286.75**
Oils-Fats	-1.41 (-6.31)**	0.77 (27.18)**	-0.32 (-0.77)	0.04 (0.85)	1.66 (4.81)**	-0.21 (-4.98)**	3.44 (7.25)**	-0.41 (-7.05)**	3.24 (7.19)**	-0.39 (-7.00)**	0.91	197.09**
Fruits	-4.82 (-21.21)**	1.16 (39.94)**	-1.87 (-4.37)**	0.21 (4.07)**	0.82 (-2.35)*	-0.10 (-2.39)*	2.13 (4.43)**	-0.32 (-4.25)**	3.23 (7.08)**	-0.32 (-6.93)**	0.96	531.22**
Vegetables	-0.83 (-4.24)**	0.75 (30.37)**	-0.66 (-1.81)	0.06 (1.42)	1.48 (4.94)**	-0.20 (-5.48)**	3.97 (9.64)**	-0.47 (-9.37)**	4.36 (11.15)**	-0.49 (-10.75) **	0.93	236.56**
Sugar	-2.25 (-16.28)**	0.82 (46.33)**	-0.26 (-1.01)	0.03 (0.80)	0.60 (2.80)**	-0.08 (-2.98)**	1.86 (6.34)**	-0.22 (-6.17)**	2.32 (8.34)**	-0.24 (-8.65)**	0.97	672.58**
Others	-0.86 (-3.42)**	0.62 (19.31)**	0.39 (0.82)	-0.04 (-0.65)	-0.37 (-0.95)	0.06 (1.31)	-1.02 (-1.98)*	0.02 (0.35)	0.14 (0.27)	-0.05 (-1.84)	0.94	300.59**
Beverages	-2.38 (-12.26)**	0.77 (30.95)**	0.30 (0.81)	-0.02 (-0.54)	1.67 (5.57)**	-0.20 (-5.65)**	0.81 (1.96)*	-0.09 (-1.76)	1.66 (4.26)**	-0.20 (-4.13)	0.94	284.31**
Total Food	0.58 (4.43)**	0.85 (50.48)**	-0.33 (-1.34)	0.02 (0.79)	1.19 (5.89)**	-0.15 (-6.21)**	1.75 (6.29)**	-0.22 (-6.38)**	2.24 (8.48)**	-0.24 (-8.75)**	0.97	738.48**

Source: Computed based on data from HIECS, CAPMAS, 1990/1991, 1994/1995, 1999/2000, 2004/2005, and 2009/2010. ** Indicates significant at one percent level of significance; * Indicates significant at five percent level of significance. The numbers in parentheses are t-Values.

rise by only 0.64%. It declined over time with an estimate of 0.41 in 2009/2010. This result is consistent with the fact that the consumption of cereals commodities is important for the poor and is likely to decrease with higher income. The estimated expenditure elasticity for vegetables group was 0.75 in 1990/1991 and declined to only 0.26 in 2009/2020, the lowest, compared to other food sub-groups in the same year. Similar trend is observed for the oils-fats group with an estimate of 0.78 in 1990/1991 and declines to only 0.39 in 2009/2020. This means that a one percent increase in total expenditure would tend to cause an increase in the expenditure on the oils-fats group by 0.39% in 2009/2020. With higher income perhaps the quantity of oils-fats consumed will not increase but the quality of oils-fats consumed will improve, where in Egypt, the consumption of hydrogenated oils and sunflower oil increased more with higher income than the consumption of cottonseed oil. The estimated expenditure elasticities for food group and its selected sub-groups for 1990/1991 are relatively higher than those obtained from other years. This can be explained by the economic situation in Egypt. Many households, especially the poor, face tight budgetary constraints and all of the selected food commodity groups are considered as very important groups because they fulfill fundamental needs of people.

Changes in the expenditure elasticities for different food groups over time

To examine the significance of change of commodity group elasticities over time, data groups that belong to common commodity groups from 1990/1991 to 2009/2010 were put together in one group. Regression equations were estimated by model 2 from associated group. The symbols of the dependent variables represent the related commodity groups. The estimated coefficients are indicated by how much the consumption expenditure elasticity of the 1990/1991 differs from the consumption expenditure elasticity of the otherwise. The findings can be summarised as shown in Table 6.

All food commodity groups show significant decrease in the total expenditure elasticity up to 2000 except for beverages and other food groups. While fruits, fish, and milk-eggs were luxury commodities in 1990/1991, they moved up to the necessity commodities up to 2000 except for fruits up to 2005. The expenditure elasticity of meat was near to the luxury commodities in 1990/1991, it moved up near to the necessity commodity up to

Table 7. The equations of food groups for urban and rural households.

Food groups	a_{i0}	b_{i0}	a_{i1}	b_{i1}	R^2	F
Cereals	1.67 (6.54)**	0.52 (16.64)**	0.09 (0.26)	-0.05 (-1.10)	0.78	200.52**
Meat	-1.13 (-5.74)**	0.89 (36.09)**	0.44 (1.82)	-0.06 (-2.14)*	0.95	1162.90**
Fish	-4.63 (-14.39)**	1.11 (27.52)**	1.56 (3.98)**	-0.17 (-3.47)**	0.92	691.54**
Milk-eggs	-2.41 (-8.33)**	0.93 (25.67)**	0.37 (1.03)	-0.02 (-0.52)	0.93	717.17**
Oils-fats	-1.12 (-4.48)**	0.76 (24.18)**	0.95 (3.04)**	-0.14 (-3.61)**	0.89	447.86**
Fruits	-4.53 (-15.77)**	1.12 (31.15)**	0.59 (1.70)	-0.07 (-1.52)	0.94	923.45**
Vegetables	-0.60 (-1.96)**	0.73 (19.29)**	1.59 (4.20)**	-0.21 (-4.52)**	0.81	247.84**
Sugar	-2.43 (-14.69)**	0.84 (40.77)**	0.96 (4.63)**	-0.13 (-5.05)**	0.96	1355.04**
Others	-2.07 (-4.06)**	0.72 (11.65)**	1.73 (2.52)**	-0.19 (-2.31)*	0.58	79.29**
Beverages	-2.28 (-8.64)**	0.76 (22.44)**	0.40 (1.06)	-0.05 (-1.02)	0.91	596.89**
Total food	0.86 (5.30)**	0.81 (39.69)**	0.61 (3.06)**	-0.08 (-3.41)**	0.96	1344.64**

Source: Computed based on data from HIECS, CAPMAS, 1990/1991, 1994/1995, 1999/2000, 2004/2005, and 2009/2010. ** Indicates significant at one percent level of significance; * Indicates significant at five percent level of significance. The numbers in parentheses are t-Values.

2000. The elasticities of expenditures for meat, fish, milk-eggs, and fruits are relatively high, and those of cereals, vegetables, oils-fats, and sugar are low. This suggests that the food expenditure structure in Egypt has diversified, adding meat, fish, milk-eggs, and fruits to the most dominant food groups, such as cereals, vegetables and sugar.

Differences in food expenditure elasticities of urban and rural households

Food expenditure patterns in Egypt vary substantially between urban and rural consumers, and these patterns have been changing over time. In order to determine the factors that cause changes of commodity group elasticities over the period from 1990/1991 to 2009/2010, consumption expenditure patterns of urban and rural households are analysed. Dummy variable is used to see the differences in food expenditure elasticities of urban and rural households. The regression equations were estimated with urban and rural data group. The regression Model 3 was estimated (Table 7). It is found that there is a difference between the urban and rural total expenditure elasticity for most food commodities. It is obvious the rural elasticity is higher than the corresponding urban elasticity.

Expenditure elasticities of food groups by expenditure quartile

To find out the differences between the consumption patterns of households at different income levels, model (4) was estimated using data of the period from 1990/1991 to 2009/2010. The results of regression equations can be seen at Table 8. As expenditure level becomes higher, expenditure elasticity declines for the highest quartile. This is consistent with the economic theory: at lower incomes, changes in income have a greater effect on expenditures, since spending is more constrained.

At higher incomes, changes in income have less impact on spending decisions on a commodity. The results obtained from the model (4) and Table 8 can be summarised as follows:

i) At most food commodity groups, the differences between the total expenditure elasticities for the lower and higher income groups are statistically significant,
ii) With few exceptions (other food products), the expenditure elasticities of food groups are lower at high-income groups than low-income ones,
iii) Fruits, fish, and milk-eggs, and meat were luxury commodities for low-income groups whereas they are necessity commodities for high-income groups,
iv) The elasticities of expenditures for cereals, vegetables, oils-fats, and sugar were necessity commodities for both low and high-income groups.

Simultaneous effect of total expenditure, time, location, and income levels

The determinants of food expenditure patterns are income (or expenditure) level of the household, the time, the local food habits and the income level. These determinants are analysed simultaneously by using dummy variables for each food group. The results obtained from the model (5) can be summarised as shown in Table 9. There is a marked difference between rural and urban areas in the expenditure on food group

Table 8. Equations of food groups at different expenditure quartile.

Food groups	a_{i0}	b_{i0}	a_{i1}	b_{i1}	R^2	F
Cereals	2.21(5.30)**	0.43(7.81)**	0.35(0.56)	-0.03(-0.38)	0.67	113.69**
Meat	-1.88(-7.66)**	0.99(30.06)**	-0.001(-4.74)**	-0.01(-2.55)**	0.96	1215.67**
Fish	-5.96(-19.53)**	1.29(32.92)**	4.56(10.59)**	-0.55(-10.42)**	0.94	892.58**
Milk-Eggs	-3.71(-12.51)**	1.10(28.93)**	3.12(7.45)**	-0.37(-7.25)**	0.93	718.39**
Oils-Fats	-1.46(-5.03)**	0.79(21.29)**	2.21(5.41)**	-0.27(-5.45)**	0.87	374.14**
Fruits	-5.87(-22.16)**	1.29(38.09)**	3.19(8.55)**	-0.39(-8.54)**	0.96	1290.88**
Vegetables	-1.07(-3.47)**	0.79(19.94)**	3.30(7.59)**	-0.40(-7.58)**	0.83	280.55**
Sugar	-2.22(-11.39)**	0.81(32.62)**	0.48(1.76)	-0.07(-2.03)*	0.95	1109.22**
Others	0.32(0.43)	0.43(4.42)**	-3.22(-3.29)**	0.38(3.16)**	0.58	81.26**
Beverages	-1.81(-7.53)**	0.71(22.68)**	0.92(2.60)**	-0.07(-2.49)**	0.91	558.51**
Total Food	0.57(3.27)**	0.84(37.54)**	1.35(5.47)**	-0.17(-5.57)**	0.95	1362.54**

Source: Computed based on data from HIECS, CAPMAS, 1990/1991, 1994/1995, 1999/2000, 2004/2005, and 2009/2010. ** Indicates significant at one percent level of significance; * Indicates significant at five percent level of significance. The numbers in parentheses are t-Values.

Table 9. Simultaneous effect of total expenditure, time, location, and income levels.

Food groups	a_{i0}	b_{i0}	a_{i1}	b_{i1}	a_{i2}	b_{i2}	a_{i3}	b_{i3}	a_{i4}	b_{i4}	a_{i5}	b_{i5}	a_{i6}	b_{i6}	R^2	F
Cereals	0.39 (1.37)	0.70 (19.16)**	0.24 (1.05)	-0.06 (-2.25)*	0.83 (2.38)*	-0.12 (-2.75)**	1.89 (6.01)**	-0.26 (-6.90)**	1.07 (2.90)**	-0.18 (-4.12)**	1.41 (3.63)**	-0.24 (-5.10)**	0.14 (0.40)	-0.02 (-0.38)	0.93	167.87**
Meat	-2.17 (-12.39)**	1.02 (43.18)**	-0.04 (-0.27)	-0.01 (-0.06)	-0.56 (-2.28)*	0.06 (2.02)*	0.87 (3.78)**	-0.11 (-3.67)**	1.19 (3.88)**	-0.14 (-3.63)**	1.45 (5.48)**	-0.19 (-5.65)**	-0.001 (3.95)**	-0.01 (-0.50)	0.98	916.74**
Fish	-5.98 (-23.29)**	1.17 (37.99)**	0.83 (3.46)**	-0.07 (-2.47)**	-1.90 (-5.23)**	0.23 (5.07)**	0.41 (1.27)	-0.05 (-1.21)	0.63 (1.40)	-0.06 (-1.17)	1.42 (3.49)**	-0.19 (-3.25)**	3.86 (11.12)**	-0.47 (-10.91)**	0.97	529.95**
Milk-eggs	-3.78 (-15.81)**	1.10 (35.34)**	-0.18 (-0.86)**	0.04 (1.87)	-1.34 (-4.02)**	0.15 (3.60)**	0.24 (0.81)	-0.05 (-1.32)	1.11 (2.69)**	-0.14 (-2.67)**	2.40 (6.37)**	-0.30 (-6.28)**	2.68 (8.27)**	-0.33 (-8.16)**	0.97	513.62**
Oils-fats	-2.04 (-7.52)**	0.87 (24.59)**	0.55 (2.29)*	-0.08 (-2.85)**	-0.69 (-1.81)	0.08 (1.98)*	1.03 (3.07)**	-0.14 (-3.38)**	2.21 (4.75)**	-0.27 (-4.67)**	2.31 (5.45)**	-0.28 (-5.33)**	0.70 (2.09)*	-0.09 (-1.99)*	0.93	188.81**
Fruits	-5.55 (-23.21)**	1.25 (40.07)**	-0.15 (-0.66)	0.02 (1.13)	-2.56 (-7.56)**	0.30 (7.18)**	-0.19 (-0.63)	0.02 (0.50)	1.13 (2.70)**	-0.13 (-2.64)**	2.41 (6.37)**	-0.30 (-6.39)**	2.90 (8.97)**	-0.36 (-8.93)**	0.98	654.27**
Vegetables	-2.14 (-10.01)**	0.92 (33.40)**	1.17 (6.17)**	-0.15 (-6.56)**	-1.18 (-3.92)**	0.12 (3. 38)**	0.59 (2.22)**	-0.10 (-3.02)**	2.47 (6.72)**	-0.29 (-6.62) **	3.29 (9.80)**	-0.39 (-9.48)**	1.36 (4.73)**	-0.17 (-4.91)**	0.95	264.86**
Sugar	-2.72 (-16.19)**	0.88 (40.21)**	0.78 (4.95)**	-0.11 (-5.34)**	-0.33 (-1.37)	0.03 (1.12)	0.46 (2.16)*	-0.07 (-2.51)**	1.41 (4.83)**	-0.18 (-4.71)**	2.04 (7.66)**	-0.26 (-7.99)**	-0.31 (-1.37)	0.03 (1.21)	0.97	618.65**
Others	-2.01 (-7.63)**	0.75 (21.99)**	1.74 (7.48)**	-0.19 (-6.76)**	0.57 (1.54)	-0.05 (-1.29)	-0.15 (-0.47)	0.04 (0.91)	-0.60 (-1.33)	0.02 (0.11)	0.69 (1.68)	-0.18 (-3.52)**	-0.41 (-1.14)	0.04 (0.96)	0.97	389.36**
Beverages	-2.49 (-9.24)**	0.78 (22.29)**	0.20 (0.79)	-0.03 (-0.81)	0.23 (-0.34)	-0.02 (-0.34)	1.51 (4.46)**	-0.19 (-4.54)**	0.71 (1.56)	-0.07 (-1.38)	1.65 (3.74)**	-0.20 (-3.67)**	0.34 (0.97)	-0.04 (-0.89)	0.94	194.90**
Total food	0.02 (1.34)	0.92 (41.73)**	0.35 (2.32)*	-0.04 (-2.68)**	-0.47 (-1.98)*	0.03 (1.34)	0.72 (3.41)**	-0.10 (-3.86)**	0.92 (3.15)**	-0.12 (-3.37)**	1.52 (5.68)**	-0.21 (-6.10)**	1.05 (4.58)**	-0.13 (-4.61)**	0.98	593.66**

Source: Computed based on data from HIECS, CAPMAS, 1990/1991, 1994/1995, 1999/2000, 2004/2005, and 2009/2010. ** Indicates significant at one percent level of significance; * Indicates significant at five percent level of significance. The numbers in parentheses are t-Values.

and most of its sub-groups. The rural elasticity is higher than the corresponding urban elasticity. Most of the food commodity groups show significant decrease in the total expenditure elasticity after 2000 except for beverages and other food groups. While fruits, fish, and milk-eggs were luxury commodities in 1990/1991, they moved up to the necessity commodities up to 2010 except for milk after 2005. The expenditure elasticity of meat was near to the luxury commodities in 1990/1991, but moved up near to the necessity commodity up to 2000. It is found

that the total expenditure elasticities of most food commodity groups are lower at high-income groups except for sugar and other food products.

Conclusion

Regarding the structure of food expenditure, we can conclude that the food expenditure patterns have changed over the five survey periods as a result of economic changes. This study aims to find out the changes in food expenditure elasticities of households from 1990/1991 to 2009/2010 surveys. Both food and non-food expenditures increased but non-food expenditure increased much faster. In each of the five years, food's share of total expenditure in rural Egypt was much higher than the urban, and it declined in both rural and urban areas over the time. Estimated expenditure elasticities for food group and its sub-groups are positive and less than one except for fish, milk-eggs, and fruits, indicating that they are normal and necessary goods for Egyptian households.

The estimated expenditure elasticities for food groups have decreased significantly over the time. The commodities of fish, milk-eggs, and fruits are considered as luxury goods with elasticities exceeding one in 1990/1991, while they moved up to the necessity commodities in 2009/2010. Different explanations for the changes of elasticities are discussed. Expenditure elasticity is found to be quite different between urban and rural areas for food commodities except for cereals, milk-eggs, fruits, and beverages, and these elasticities have been changing over time. Elasticities tend to be higher in rural areas than urban ones. At most food commodity groups, the differences between the total expenditure elasticities for the lower and higher income groups are statistically significant. With few exceptions, the expenditure elasticities of food groups are lower at high-income groups than low-income ones. The differences in consumption patterns between rural and urban areas, and among income groups imply that change in consumtion patterns in Egypt will be affected not only by aggregate income growth but also by changes in the distribution of that income.

RECOMMENDATIONS

Several recommendations, based on the results can be made for the future food policies. The following are some of them:

i) Rising of the nutrition and living standard level is recognized by increasing per capita real income,
ii) Increasing food production especially fruits, milk and meat and quantities of food commodities available for human consumption,
iii) Increasing animal production and fisheries, aiming at increasing the per capita consumption of animal protein,
iv) Food subsidies should be better targeted at the poor people, and more public policies favouring the poor are needed.

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