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An Analytical Study of the Production, Consumption and Average Per Capita of Plant Oils

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Abstract:
The average value of total value of vegetable oils and fats imports amounted to about 996 million dollars. The deficit in the trade balance is about 880 million dollars during the study period (2001-2019).
The research goal identifies the impact of categories (family size - average annual household income - educational degree of the head of the family) on the average annual per capita share of different types of vegetable oils. The research relied on the quantitative descriptive and analytical approach, The research relied on published and unpublished data and the data obtained from the study sample.
Results: The regions of East, West, North, and South Cairo represent about 42%, 13.7%, 16.7%, and 27.6% of the total study sample of about 460, the percentage of families consuming Soybean oil, mixed oil, sunflower oil, corn oil, other oils, vegetable ghee was about 8.3%, 53.9%, 50.2%, 28.9%, 28.5%, 17.0%, respectively, the average annual per capita consumption of vegetable oils was about 2.6,1.88,3.29,0.25,0.13,4.53 kg/per capita for each of Soybean Oil, Mixed Oil, Sunflower Oil, Corn Oil, Other Oils, and vegetable ghee respectively, with an average annual per capita consumption of about 12.68 kg/per capita at the level of the study sample.
The most important factors affecting the average annual per capita consumption of vegetable oils are the size of the family and the level of family income.
Key words*: vegetable oils, annual per capita consumption, gap, self-sufficiency ,food security.*

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I. Introduction:

Vegetable oils occupy an advanced position in the Egyptian food consumption patterns, as they are included in most Egyptian meals because they contain important fat-soluble vitamins and essential fatty acids. The local production of vegetable oils varies, as the average local production of nutritional vegetable oils (soya bean oil - olive oil) Cotton seed - sunflower oil - corn oil - other oils (olive oil - flaxseed - etc..)) about 242 thousand tons, while the average available for local consumption amounted to about 1,657 million tons, which was reflected in the gap in vegetable oils to reach about 1,416 million tons to represent The percentage of self-sufficiency is about 15.3%, of which 10.9% are from imported vegetable seeds, which means that the percentage of self-sufficiency in vegetable olives produced from local seeds is estimated at 4.3%, and the average amount of net food from vegetable oils is about 926 thousand. The average annual per capita share is about 9.6 kg per capita bringing the average daily per capita share to about 26.3 g / day, providing the individual with about 168.9 calories, representing 4.6% of the average daily calories obtained from various food sources It also provides the individual with about 26.3 gm. of fat For about 33.8% of the average daily amount of fat obtained from different food sources during the period (2017-2019) *(MALR-Food Balance sheet)*

The average value of Egypt's imports of vegetable oils amounted to about $1.26 billion to fill the vegetable oil gap, which represents a heavy burden on the balance of payments during the period (2017-2019) *(www.fao.org)*

Research Problem:

Providing food security comes at the forefront of the programs that the state pays attention to in the sustainable agricultural development strategy *(Bassyouni, G.A. 2017)*, given the increase in local demand for vegetable oils as a result of the population increase and the diminishing ability of local production to provide the required needs *(Khalil M. E et.al 2016)*, which was reflected in the widening gap between production and consumption, which leads to an increase in imports. of oils *(Abdel Aal, N.M. 2014)* and facing the risks of fluctuations in world prices, which negatively affect the balance of payments, the rise in consumer prices and the increase in the value of food support *(Al-Gharib Nadia A et.al 2014)*

Research Goal:

The research aims to identify the indicators of the current status of nutritional vegetable oils, estimate the size of the gap, self-sufficiency rates *(Sound, S. A , Gomaa, N . F 2017)* , and the average per capita share of nutritional vegetable oils, and study the trade balance.

Also The study aims to identify the effect of the categories of (family size - education degree of the head of the family - average annual income of the family) on the average number of family members, types of vegetable oils consumed by the family, their various uses, the number of times of reuse, and the average annual per capita share of different types of vegetable oils.

Methodology and Data Sources:

The research relied on the descriptive and quantitative analytical method, where some statistical methods were used, such as the arithmetic mean and the geometric mean to calculate the averages of ratios and estimate the equations of the general Regression model. and conducting an analysis of variance test for different levels of morality to find out the moral differences *(Allen, R.G.D. 1976)* between the averages according to the categories of family size, family income and the level of education of the head of the family.

The research relied on published and unpublished data from various agencies (Economic Affairs Sector, Ministry of Agriculture and Land Reclamation - Central Agency for Public Mobilization and Statistics - Ministry of Trade and Industry - Food and Agriculture Organization of the United Nations (FAO) - United Nations database) in addition to the data obtained from study sample.

II. Discussion:

1- The Current Situation of Production, Consumption, Gap, Self-Sufficiency and The Average Annual Per Capita Share of Edible Vegetable Oils and Fats:

By studying the development of the total quantity of vegetable oils and fats production during the study period (2001-2019), the data in Table (1) show that the average total production of vegetable oils and fats amounted to 655 thousand tons, and the average total amount of consumption was about 1,561 thousand tons, bringing the average amount of the gap to 905 thousand tons, representing an average self-sufficiency about 42%, and the average annual per capita share of dietary vegetable oils and fats amounted to about 13.3 kg.

The results of the general time trend equations presented in Table (2) show that there is a statistically significant annual increase in the amount of production estimated at 5.8% of the average total production of vegetable oils and fats, where the annual increase represents 31.1 thousand tons, and the coefficient of determination reached 0.36 Which means that 36% of the changes in the total amount of vegetable oils and fats production are due to the time component. It is also evident from the same table that there is a statistically significant annual increase in the amount of consumption estimated at 5.9% of the average amount available for consumption of vegetable oils and fats for consumption, where the annual increase represents 81.6 thousand tons and the coefficient of determination is 0.42, which means that 42 % of the changes in the total amount for consumption of vegetable oils and fats are due to the element of time, which confirms the increase in domestic demand for vegetable oils and fats.

This is reflected in the statistically significant annual increase in the size of the gap, which is estimated at 6.1% of the average amount of the gap in vegetable oils and fats, where the annual increase in the gap represents about 50.5 thousand tons, and the coefficient of determination reached 0.45, which means that 45% Changes in the total gap amount in dietary vegetable oils and fats are due to the time component.

In spite of this, the self-sufficiency percentage of vegetable oils and fats decreases with an annual decrease that is not statistically significant.

The results show that there is a statistically significant annual increase in the average annual per capita share of vegetable oils and fats, estimated at 2.9% of the annual per capita share of vegetable oils and fats, where the annual increase represents 0.348 kilograms, and the coefficient of determination is 0.23, which means that 23% of the changes in the average annual per capita share of dietary vegetable oils and fats are due to time.

The results also show that the state is striving to increase the local production of vegetable oils and fats and pay attention to the manufacture of oils to meet the increase in local demand as a result of the population increase and the increase in the average annual per capita share, due to the difficulty of achieving self-sufficiency as a result of the insufficiency of local oilseeds.

Table (1): Development of Production, Consumption, Gap, Self-Sufficiency and Average Annual Per Capita for Vegetable Oils and Fats During the Period (2001-2019).

year	Population (thousand people)	Production (thousand ton)	Consumption (thousand ton)	Gap (deficiency or surplus) (thousand ton)	Self -Sufficiency	Average Annual Per Capita
2001	67.20	215	664	-449	32	8.6
2002	68.30	290	615	-325	47	7.3
2003	69.43	261	637	-376	41	7.5
2004	70.59	674	1540	-866	44	14.5
2005	71.78	857	1902	-1045	45	17.7
2006	72.99	1032	2214	-1182	47	19.3
2007	74.23	474	1013	-539	47	10.7
2008	75.49	407	968	-561	42	9.8
2009	76.78	400	938	-538	43	9.3
2010	78.08	380	880	-500	43	8.5
2011	79.39	623	1699	-1076	37	15.8
2012	80.72	784	1824	-1040	43	14.6
2013	82.06	919	2232	-1313	41	18.1
2014	90.42	855	2009	-1154	43	15.2
2015	92.44	438	968	-530	45	7.7
2016	94.45	1007	2520	-1513	40	18.2
2017	96.44	1106	2636	-1530	42	17.6
2018	97.15	1033	2715	-1682	38	18.9
2019	98.90	699	1684	-985	42	12.6
Mean	80.89	655	1561	-905	42	13.3
Std.	10.72	293	712	426	4	4.4

Source: Collected and calculated from the data of the Ministry of Agriculture and Land Reclamation, Economic Affairs Sector, Food Balance sheet, various issues.

Table (2): General Regression Equations for Local Production of the Most Important Vegetable Oils During the Period (2001-2019).

Item	Regression Equations	T-Test	R^2	F-Test	Annual change rate (%)
Population	$Y_i^{\wedge} = 62.326 + 1{,}856\ x_i$	17.8^{*}	0.95	315.2^{*}	2.3
Production	$Y_i^{\wedge} = 345 + 31.1\ x_i$	3.07^{*}	0.36	9.4^{*}	5.8
Consumption	$Y_i^{\wedge} = 745 + 81.6\ x_i$	3.48^{*}	0.42	12.1^{*}	5.9
Gap (deficiency or surplus)	$Y_i^{\wedge} = 401 + 50.5\ x_i$	3.7^{*}	0.45	13.7^{*}	6.1
Self-Sufficiency (%)	$Y_i^{\wedge} = 42{,}9 - 0.075 x_i$	0.48	0.01	0.232	-0.1
Average Annual Per Capita	$Y_i^{\wedge} = 9.826 + 0.348\ x_i$	2.10^{**}	0.23	$4{,}40^{**}$	2.9

(*) significance at (0.01), (**) significance at (0.05)
Source: Collected and calculated from table (1).

2- The Trade Balance of Edible Vegetable Oils and Fats:

By studying the development of the average quantity, value and price of a ton of vegetable oils and fats exports during the study period (2001-2019), the data in Table (3) show that the average quantity of exports of vegetable oils and fats amounted to 96 thousand tons, and the average price per ton of vegetable oils and fats

exports About 1054 dollars/ton. The average total value of vegetable oils and fats exports is about 116 million dollars. The data of the same table also shows that the average quantity of vegetable oils and fats imports amounted to 1026 thousand tons, and the average price per ton of vegetable oils and fats imports was about $930/ton, where the average value of the total value of vegetable oils and fats imports amounted to about 996 million dollars. The deficit in the trade balance is about 880 million dollars, representing a percentage of 10.4% covering the value of exports to the value of imports. The results of Table (4) show that there is a statistically significant annual increase in the average quantity of vegetable oils and fats exports, estimated at 10.9% of the average quantity of vegetable oils and fats exports, where the annual increase represents 7.29 thousand tons, and the coefficient of determination is 0.33 This means that 33% of the changes in the amount of exports of food oils and vegetable fats are due to time.

The results also show that there is a statistically significant annual increase in the average price of a ton of vegetable oils and fats exports, estimated at 4% of the average price of vegetable oils and fats exports, where the annual increase represents 39.4 dollars/ton, and the coefficient of determination is 0.40, which means 40% of the changes in the export price of edible vegetable oils and fats are due to time. This is reflected in the statistically significant annual increase in the value of vegetable oils and fats exports, which is estimated at about 15% of the average value of vegetable oils and fats exports, as the annual increase represents 9.51 million dollars, and the coefficient of determination is 0.24, which means that 24% of the Changes in the value of exports of edible vegetable oils and fats are due to the time component.

The indicators of the same table also show the statistically significant annual increase in the average quantity of imports of vegetable oils and fats, which is estimated at about 5% of the average quantity of imports of vegetable oils and fats, as the annual increase represents 40.14 thousand tons, and the coefficient of determination is 0.24, which means that 24 % of changes in the quantity of imports of dietary vegetable oils and fats are due to the time component. It was found that there was a statistically significant annual increase in the average price of a ton of vegetable oils and fats, estimated at 5.7% of the average price of a ton of vegetable oils and fats imports, as the annual increase represented 40.76 dollars/ton, and the coefficient of determination was 0.36, which means that 26% of the changes in the import price of vegetable oils and fats are due to time. Which is reflected in the increase in the value of imports of vegetable oils and fats with a statistically significant annual increase estimated at 10.7% of the average value of imports of vegetable oils and fats, where the annual increase represents 64.24 million dollars, and the coefficient of determination reached 0.32, which means that 32% Some of the changes in the value of imports of vegetable oils and fats are due to the element of time.

Table (3): Development for Egyptian Trade Balance for Vegetable Oils and Fats During the Period (2001-2019).
(quantity : thousand ton, value : million dollar, Price: dollar/ton)

year	Export			Import			Value of tread balance	
	quantity	value	Price	quantity	value	Price	Gap (deficiency or surplus)	%
2001	27.8	17.8	641.0	557.8	212.2	380.4	-194.4	8.4
2002	25.0	14.3	572.7	372.9	186.6	500.5	-172.3	7.7
2003	33.8	22.7	670.5	277.0	152.4	550.0	-129.7	14.9
2004	29.6	23.6	796.8	883.4	362.4	410.3	-338.8	6.5
2005	26.6	21.6	814.8	1070.4	449.1	419.6	-427.5	4.8
2006	17.6	14.5	825.6	1205.9	478.8	397.1	-464.3	3.0
2007	14.3	12.2	853.4	557.2	355.4	637.7	-343.1	3.4
2008	113.1	88.1	779.4	1403.2	1647.7	1174.2	-1559.6	5.3
2009	154.1	207.5	1346.7	669.3	1247.0	1863.2	-1039.5	16.6
2010	153.3	157.5	1027.4	2051.2	2058.8	1003.7	-1901.3	7.6
2011	248.2	438.5	1767.0	1209.3	2042.6	1689.1	-1604.0	21.5
2012	195.2	290.8	1490.0	1204.5	1759.7	1461.0	-1468.9	16.5
2013	82.8	116.5	1407.0	1375.8	1605.3	1166.8	-1488.8	7.3
2014	139.9	140.5	1005.0	1099.4	1104.3	1004.4	-963.7	12.7
2015	83.2	83.9	1008.5	675.5	738.8	1093.7	-655.0	11.4
2016	85.9	101.4	1180.7	773.8	727.1	939.7	-625.7	13.9

2017	101.8	156.1	1533.8	1367.0	1323.3	968.1	-1167.3	11.8
2018	77.0	112.6	1462.3	937.2	1260.9	1345.4	-1148.4	8.9
2019	215.2	181.0	841.0	1801.9	1202.7	667.5	-1021.7	15.0
Mean	96.0	115.9	1053.9	1025.9	995.5	930.1	-879.7	10.4
Std.	71.7	110.6	350.6	465.9	641.0	450.7	555.8	5.1

Source: Collected and calculated from the data of Food and Agriculture Organization of the United Nations https://www.fao.org/faostat/

Table (4): General Regression Equations for Egyptian Trade Balance for Vegetable Oils and Fats During the Period (2001-2019).

Item	Regression Equations	T-Test	R^2	F-Test	Annual change rate (%)
Export quantities	$\hat{Y_i} = 23.15 + 7.29\ x_i$	2.87^{**}	0.33	8.26^{**}	10.9
Export Value	$\hat{Y_i} = 20.76 + 9.51\ x_i$	2.28^{**}	0.24	$6{,}57^{**}$	15.0
Price/ton	$\hat{Y_i} = 660 + 39.4\ x_i$	3.36^{*}	0.40	11.32^{*}	4.0
Import quantities	$\hat{Y_i} = 625 + 40.14\ x_i$	2.29^{**}	0.24	5.24^{**}	5.0
Import Value	$\hat{Y_i} = 353 + 64.24\ x_i$	2.82^{**}	0.32	7.93^{**}	10.7
Price/ton	$\hat{Y_i} = 523 + 40.76\ x_i$	2.44^{**}	0.26	5.94^{**}	5.7
Gap (deficiency or surplus)	$\hat{Y_i} = 332.4 + 54.7\ x_i$	2.74^{**}	0.31	7.53^{**}	10.3
(Export/Import) Value %	$\hat{Y_i} = 6.82 + 0.357\ x_i$	1.77	0.16	3.12	4.2

(*) significance at (0.01), (**) significance at (0.05)
Source: Collected and calculated from table (3)

The indicators of the same table also show that there is a statistically significant annual increase in the average value of the deficit in the trade balance of vegetable oils and fats, estimated at 10.3% of the average value of the deficit in the trade balance of vegetable oils and fats, where the annual increase represents 54.7 million dollars, and the coefficient of The definition is 0.31, which means that 31% of the changes in the import quantity of dietary vegetable oils and fats are due to the time component.

It also shows that there is a statistically significant annual increase in the percentage of exports coverage for imports of vegetable oils and fats, estimated at 4.2% of the coverage percentage of exports for imports of vegetable oils and fats, where the annual increase represents 0.357%, and the coefficient of determination is 0.16, which means that 16% of the Changes in the price of imports of vegetable oils and fats are due to the element of time, as well as the rise in the value of imports and the increase in the burden of the trade balance of vegetable oils and fats.

3- Study sample:

The study relied on the data of a stratified random sample in Cairo Governorate. The sample size amounted to 460 families distributed among the neighborhoods of Al-Marj, Manshaat Nasser, Al-Zawiya Al-Hamra and Dar Al-Salaam, representing about 21.5%, 36.8%, 18.9%, 17.4% of the total population, The population of the regions east, west, north and south of Cairo, and those neighborhoods rank first in terms of population in the previous regions. The study sample was distributed to each neighborhood according to the relative importance of the population census.

The data was collected through a questionnaire that includes general information about the family (family size - average annual income of the family- education degree of the head of the family) and information on the consumption of vegetable oils (quantities of oils consumed - types of oils consumed - uses of oils - what is reused - number of times reuse), and the questionnaire was collected during the period from January to December 2020.

The size of the family was divided into three categories: the first is a small family (1-3 members), the second is a medium family (4-6 members), and the third category (7 members or more) is a large family, and the annual income of the family was divided into three categories. The first is families who obtain Less than 25 thousand pounds annually (low income), the second is families that receive an income between 25-45 thousand

pounds annually (average income), and the third families are families that receive an annual income of more than 45 thousand pounds annually (high income).

The degree of education of the head of the family was divided into four categories. The first are The illiterate or those who know how to read and write (illiterate or literate), the second category with primary or preparatory education (below intermediate) , the third category with Secondary education or intermediate diploma (intermediate or above intermediate) education, and the fourth category is those with a university or Postgraduate education.

3-1- Study results:-

3-1-1- Relative distribution of household sample

Table (5) shows the relative distribution of the study sample, where the regions of East, West, North and South Cairo represent about 42%, 13.7%, 16.7% and 27.6% of the total study sample of about 460, and small families represent 29, 8%, middle families 39.8% and large families 30.4%.The same table shows that 31.3% of families get low annual income, 41.5% of families receive average annual income and, 27.2% of families receive large annual income. It is also clear from the same table that 20.2% of the heads of households are illiterate or literate, 25% have below intermediate education, 30.4% have intermediate or above intermediate education, and 24.3% have university or postgraduate education.

Table (5): The Relative Distribution of the Study Sample's Family According to the Family Size Categories, Education Level Categories of the Head of The Household and Family Income Categories.

Item	Region										Chi-square test
	East Cairo		west Cairo		north Cairo		South Cairo		Total		
	Count	%	Count	%	Count	%	Count	%	Count	%	
Total	193	42.0%	63	13.7%	77	16.7%	127	27.6%	460	100%	
Family Size											
Small Family	46	33.6%	23	16.8%	20	14.6%	48	35.0%	137	29.8%	17.38*
Medium Family	72	39.3%	22	12.0%	35	19.1%	54	29.5%	183	39.8%	
Large Family	75	53.6%	18	12.9%	22	15.7%	25	17.9%	140	30.4%	
Family income											
Low income	66	45.8%	13	9.0%	24	16.7%	41	28.5%	144	31.3%	153.26*
Average income	107	56.0%	50	26.2%	21	11.0%	13	6.8%	191	41.5%	
High Income	20	16.0%	0	0.0%	32	25.6%	73	58.4%	125	27.2%	
Educational Status											
illiterate or literate	42	45.2%	29	31.2%	5	5.4%	17	18.3%	93	20.2%	82.59*
below intermediate	50	43.5%	11	9.6%	14	12.2%	40	34.8%	115	25.0%	
intermediate or above	35	25.0%	11	7.9%	41	29.3%	53	37.9%	140	30.4%	
university or Postgraduate.	66	58.9%	12	10.7%	17	15.2%	17	15.2%	112	24.3%	

(*) significance at (0.01), (**) significance at (0.05)

Source: Collected and calculated from sample study data

By conducting a chi-square test (χ^2), it was found that there is a significant difference at (0.01) between categories of the family size, categories education level of the head of the family, and family annual income categories at the level of the study sample regions.

3-1-2- The average number of family members in the study sample

Table (6) shows that the average number of family members was about 5.8, 4.5, 4.9, 4.7 members for each of the regions of East, West, North and South of Cairo, respectively, with an average of about 5.1 members at the level of the study sample.by conducting an analysis of variance test (Anova) it was found that there is a significant difference at the level of significance (0.01). Between the average number of family members, at the regions of East, West, North, and South of Cairo in the study sample.

The average number of family members was about 2.5 members for a small family, 5 members for a medium family, 7.9 members for a large family. The results of the analysis of variance test show that there is a statistically significant difference in the average number of family members at (0.01) between the category of small families and the study regions, as well as a statistically significant difference in the average number of family members at (0.05) between the category of medium families and the study regions, while there is no significant difference between the category of large families and the study regions. As it is clear from the same table that the average number of family members was about 5.6 members for a low family income, 5.1 members

for average family income and 4.7 members for a high family income. The results of the analysis of variance test showed that there is statistically significant difference in the average number of family members at (0.05) between the category of families with low incomes, families with medium incomes and study regions, while there is no significant difference in the average number of family members between families with high incomes and study regions.

The average number of family members was about 5.4 members for heads of families have illiterate or literate, 5.3 members for heads of households have below intermediate education, 5 members for heads of households have intermediate or above intermediate education and 4.9 members for heads of families have university or postgraduate education. By conducting an analysis of variance test (Anova), it was found that there is a significant difference in the average number of family members at (0.01) between the category of illiterate or literate heads of households, category of heads of households with below intermediate education and the study regions. While there is a significant difference in the average number of family members at (0.05) between the category of heads of families with intermediate or above intermediate education, category of heads of families with a university or postgraduate education and the study regions. It is clear from the previous presentation that the level of income and the level of education are among the most important determinants of the average number of family members.

Table (6): Average Number of Family Members According to Family Size, Education Level of The Head of the Family and Household Income Categories in the Study Sample.

Item	Region									Total	
	East Cairo		west Cairo		north Cairo		South Cairo		Anova test		
	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.		Mean	Std.
Total	5.8	2.2	4.5	2.4	4.9	2.3	4.7	2.1	9.03*	5.1	2.3
Family Size											
Small Family	2.7	0.5	2.3	0.5	2.5	0.5	2.4	0.5	5.53*	2.5	0.5
Medium Family	5.5	0.6	4.0	0.0	4.3	0.5	5.3	0.8	53.76*	5.0	0.8
Large Family	7.9	1.1	8.0	1.0	8.0	1.2	7.6	1.2	0.59	7.9	1.1
Family income											
Low income	6.2	2.3	4.5	2.6	5.7	2.9	4.8	2.6	3.44**	5.6	2.6
Average income	5.7	2.1	4.5	2.4	4.5	1.7	3.9	2.0	5.97*	5.1	2.2
High Income	4.8	1.8	0.0	0.0	4.5	1.9	4.7	1.8	1.44	4.7	1.8
Educational Status											
illiterate or literate	5.3	2.4	4.6	2.6	5.2	4.4	7.4	1.6	4.56*	5.4	2.6
below intermediate	6.1	2.0	4.4	2.5	6.1	2.8	4.4	2.2	5.74*	5.3	2.4
intermediate or above	6.9	1.5	5.6	2.3	4.2	1.8	4.1	1.7	20.97**	5.0	2.1
university or Postgraduate.	5.2	2.2	3.4	1.4	5.4	1.5	4.2	1.6	3.64**	4.9	2.0

(*) significance at (0.01), (**) significance at (0.05)
Source: Collected and calculated from sample study data

3-1-3 Types of vegetable oils consumed by the families of the study sample.

Table No. (7) shows the relative distribution of the consuming sample families Soybean oil, mixed oil, sunflower oil, corn oil and other oils, vegetable ghee, where this percentage was about 8.3%, 53.9%, 50.2%, 28.9%, 28.5%, 17.0%, respectively, out of the total study sample of 460 households.

Table (7): Relative distribution of household consumption of various vegetable oils.

Item	Soybean Oil		Mixed Oil		Sunflower Oil		Corn Oil		Other Oils		vegetable ghee		Chi-square test
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%	
Total	38	8.3%	248	53.9%	231	50.2%	133	28.9%	131	28.5%	78	17.0%	
Family Size													
Small Family	9	6.6%	72	52.6%	75	54.7%	45	32.8%	43	31.4%	22	16.1%	
Medium Family	17	9.3%	92	50.3%	91	49.7%	48	26.2%	48	26.2%	43	23.5%	14.14
Large Family	12	8.6%	84	60.0%	65	46.4%	40	28.6%	40	28.6%	13	9.3%	
Family income													

Low income	10	6.9%	79	54.9%	75	52.1%	45	31.3%	45	31.3%	28	19.4%	
Average income	18	9.4%	104	54.5%	88	46.1%	50	26.2%	48	25.1%	30	15.7%	3.13
High Income	10	8.0%	65	52.0%	68	54.4%	38	30.4%	38	30.4%	20	16.0%	
Educational Status													
illiterate or literate	5	5.4%	52	55.9%	53	57.0%	32	34.4%	31	33.3%	25	26.9%	
below intermediate	10	8.7%	69	60.0%	48	41.7%	31	27.0%	31	27.0%	12	10.4%	
intermediate or above	14	10.0%	74	52.9%	70	50.0%	51	36.4%	51	36.4%	19	13.6%	26.6^{**}
university or Postgraduate.	9	8.0%	53	47.3%	60	53.6%	19	17.0%	18	16.1%	22	19.6%	

(*) significance at (0.01), (**) significance at (0.05)
Source: Collected and calculated from sample study data

This shows the preference of the household to consume mixed oil, sunflower oil, corn oil, other oils, vegetable ghee and then soybean oil, according to the size of the family, the family income and the educational level of the head of the household. By conducting a chi-square test (X^2), it was found that there is a significant difference in the consumption of different types of oils at (0.05) between the educational level of the head of the family at the level of the study sample, while there is no significant difference in the consumption of different types of oils among the family size categories. and annual family income categories at the level of the study sample.

3-1-4 The different uses of vegetable oils in the family meals in the study sample

Table (8) shows the family's uses of vegetable oils in preparing meals, as the results of the study sample show that 415 families, representing 90.2% of the study sample, use fresh vegetable oils in preparing meals, and about 458 families, representing 99.6% of the study sample, use oils in frying operations. The number of families that use vegetable oils in the various cooking processes is about 375 families, representing 81.5% of the study sample. By conducting a chi-square test (X^2), it was found that there are no statistically significant differences in the ways of using different oils between the categories of family size, the annual family income categories, and the educational level of the head of the household in the study sample. This indicates the family's dependence on vegetable oils in preparing various meals.

Table (8):Relative distribution of the methods of different uses of oils according to family size, education level of the head of the family and household income categories in the study sample.

Item	fresh		frying		cooking		Chi-square test	Total	
	Count	%	Count	%	Count	%		Count	%
Total	415	90.2%	458	99.6%	375	81.5%		460	100%
Family Size									
Small Family	123	89.8%	137	100.0%	113	82.5%		137	29.8%
Medium Family	165	90.2%	183	100.0%	148	80.9%	0.045	183	39.8%
Large Family	127	90.7%	138	98.6%	114	81.4%		140	30.4%
Family income									
Low income	132	91.7%	143	99.3%	115	79.9%		144	31.3%
Average income	166	86.9%	190	99.5%	155	81.2%	0.29	191	41.5%
High Income	117	93.6%	125	100.0%	105	84.0%		125	27.2%
Educational Status									
illiterate or literate	85	91.4%	93	100.0%	76	81.7%		93	20.2%
below intermediate	102	88.7%	114	99.1%	92	80.0%	0.042	115	25.0%
intermediate or above	127	90.7%	139	99.3%	114	81.4%		140	30.4%
university or Postgraduate.	101	90.2%	112	100.0%	93	83.0%		112	24.3%

(*) significance at (0.01), (**) significance at (0.05)
Source: Collected and calculated from sample study data

3-1-5 The number of times the family reuses vegetable oils in the study sample

The results of the study from Table (9) show that the number of 199 families, representing 43.3% of the study sample, uses vegetable oils only once in preparing meals by frying, and this is for health reasons, while the number of families that reuse vegetable oils more than once is about 261 A family represents 56.7% of

the study sample. By conducting a chi-square test (X^2), it was found that there are no statistically significant differences in oil reuse between the categories of family size, the annual family income categories, and the educational level of the head of the household in the study sample.

As for the number of times to reuse vegetable oil for frying more than once, the number of families that reuse vegetable oil for frying once has reached 99 families, representing 21.5% of the total number of families that reuse vegetable oil for frying, which is 261 families, and the number of families that reuse vegetable oil for frying has reached The use of vegetable oils for frying twice was about 133, representing 28.9% of the total number of families that reuse vegetable oils for frying, while the number of families that reuse vegetable oils for frying three times reached about 29 families, representing 6.3% of the total number of families that reuse of vegetable oils for frying. Use of vegetable oils in frying.

As the results of the chi-square test (X^2), it was found that there are no statistically significant differences in number of times of reuse oil between the categories of family size, the annual family income categories, while there is a significant difference in number of times of reuse oil at (0.05) between the educational level of the head of the family at the level of the study sample.

table (9): Relative distribution of oil reuse and number of times of reuse according to family size, education level of the head of the family and household income categories in the study sample.

Item	Reused Oil					The number of times the oil reused						
	No		Yes		Chi-square test	Once		Twice		Three times		Chi-square test
	Count	%	Count	%		Count	%	Count	%	Count	%	
Total	199	43.3%	261	56.7%		99	21.5%	133	28.9%	29	6.3%	
Family Size												
Small Family	60	43.8%	77	56.2%	0.103	27	19.7%	42	30.7%	8	5.8%	1.36
Medium Family	80	43.7%	103	56.3%		40	21.9%	53	29.0%	10	5.5%	
Large Family	59	42.1%	81	57.9%		32	22.9%	38	27.1%	11	7.9%	
Family income												
Low income	57	39.6%	87	60.4%	3.93	36	25.0%	41	28.5%	10	6.9%	1.42
Average income	93	48.7%	98	51.3%		33	17.3%	54	28.3%	11	5.8%	
High Income	49	39.2%	76	60.8%		30	24.0%	38	30.4%	8	6.4%	
Educational Status												
illiterate or literate	41	44.1%	52	55.9%	7.19	17	18.3%	34	36.6%	1	1.1%	23.32*
below intermediate	49	42.6%	66	57.4%		15	13.0%	37	32.2%	14	12.2%	
intermediate or above	71	50.7%	69	49.3%		36	25.7%	27	19.3%	6	4.3%	
university or Postgraduate.	38	33.9%	74	66.1%		31	27.7%	35	31.3%	8	7.1%	

(*) significance at (0.01), (**) significance at (0.05)
Source: Collected and calculated from sample study data

3-1-6 Average annual per capita consumption of vegetable oils in the study sample

Table (10) shows that the Average annual per capita consumption of vegetable oils was about 2.6,1.88,3.29,0.25,0.13,4.53 kg/per capita for each of various vegetable oils Soybean Oil, Mixed Oil, Sunflower Oil, Corn Oil, Other Oils and vegetable ghee respectively, with an Average annual per capita consumption about 12.68 kg/per capita at the level of the study sample.

From the results of the analysis of variance test, it is clear that there are statistically significant differences at (0.01) between the average annual per capita consumption of vegetable oils and the categories of family size. It was also shown that there were statistically significant differences at (0.05) between the average annual per capita consumption of vegetable oils and the categories of family income, while there were no statistically significant differences between the average annual per capita consumption of vegetable oils and the categories of education of the head of the family.

The Average annual per capita consumption of total vegetable oils was about 12.63 kg/per capita for a small family, 12.68 kg/per capita for a medium family, 12.71 kg/per capita for members for a large family, by conducting an analysis of variance test (Anova) it was found that there is a significant difference at (0.01). Between the average annual per capita consumption of Soybean Oil, Mixed Oil, Sunflower Oil, Corn Oil,

Vegetable ghee and the categories of family size, It was also shown that there were significant differences at (0.05) between the average annual per capita consumption of Other oils and the categories of family size.

Table (10):Average Annual Per Capita Consumption of Oils According to Family Size, Education Level of the Head of the Family and Household Income Categories in the Study Sample.

Item	Soybean Oil		Mixed Oil		Sunflower Oil		Corn Oil		Other Oils		vegetable ghee		Total	
	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.
Total	2.60	0.52	1.88	0.34	3.29	0.83	0.25	0.06	0.13	0.03	4.53	1.14	12.68	3.18
Family Size														
Small Family	2.80	0.11	1.94	0.07	3.29	0.18	0.18	0.01	0.09	0.01	4.33	0.24	12.63	0.67
Medium Family	2.60	0.20	1.87	0.13	3.32	0.32	0.24	0.02	0.13	0.01	4.52	0.44	12.68	1.22
Large Family	2.41	0.27	1.83	0.17	3.25	0.42	0.33	0.03	0.16	0.02	4.73	0.58	12.71	1.63
Anova test	83.9*		784.7*		642.2*		409.2*		397*		186.7*		1281*	
Family income														
Low income	2.71	0.59	1.97	0.38	3.44	0.94	0.26	0.07	0.14	0.04	4.71	1.30	13.23	3.62
Average income	2.57	0.51	1.91	0.33	3.27	0.82	0.25	0.06	0.13	0.03	4.53	1.13	12.66	3.16
High Income	2.52	0.42	1.74	0.27	3.16	0.67	0.24	0.05	0.11	0.03	4.35	0.92	12.12	2.56
Anova test	0.75		3.79**		0.482		0.76		0.69		0.41		3.34**	
Educational Status														
illiterate or literate	2.67	0.60	2.01	0.39	3.34	0.96	0.27	0.07	0.14	0.04	4.63	1.33	13.06	3.70
below intermediate	2.63	0.54	1.91	0.35	3.34	0.86	0.25	0.07	0.13	0.03	4.58	1.18	12.84	3.30
intermediate or above	2.56	0.48	1.82	0.31	3.29	0.77	0.24	0.06	0.13	0.03	4.53	1.05	12.57	2.94
university or Postgraduate.	2.54	0.47	1.76	0.30	3.19	0.75	0.22	0.06	0.12	0.03	4.39	1.03	12.22	2.87
Anova test	0.33		0.149		1.81		1.3		1.7		1.84		0.88	

(*) significance at (0.01), (**) significance at (0.05)
Source: Collected and calculated from sample study data

As it is clear from the same table that the Average annual per capita consumption of vegetable oils was about 13.23 kg/per capita for a low family income, 12.66 kg/per capita for average family income and 12.12 kg/per capita for a high family income. by conducting an analysis of variance test (Anova) it was found that there is a significant difference at (0.05). Between the average annual per capita consumption of Mixed Oil, and the categories of family income, while there were no significant differences between the average annual per capita consumption of Soybean Oil, Sunflower Oil, Corn Oil, Other oils, Vegetable ghee and the categories of family income.

The Average annual per capita consumption of vegetable oils was about 13.06 kg/per capita for heads of families have illiterate or literate, 12.84 kg/per capita for heads of households have below intermediate education, 12.57 kg/per capita for heads of households have intermediate or above intermediate education and 12.22 kg/per capita for heads of families have university or postgraduate education.by conducting an analysis of variance test (Anova) it was found that there were no significant differences between the average annual per capita consumption of Soybean Oil, Mixed Oil, Sunflower Oil, Corn Oil, Other oils, Vegetable ghee and the categories of education of the head of the family.

Which confirms that the most important factors affecting the average annual per capita consumption of vegetable oils are the size of the family and the level of family income

Recommendations:

1- Encouraging farmers to increase the areas of oil crops by setting a pricing policy that guarantees the farmer a profit margin compared to other crops.
2- Activating the role of contract farming and increasing farmers' incentives.
3- Encouraging investments in the production and processing of vegetable oils.
4- Working to change the family's food pattern.

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