

Some Economic Indicators of The Current Situation of Food Vegetable Oils in Egypt and Its Future Prospects

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ABSTRACT

Vegetable oils are considered daily basic food commodities, and Egypt is considered one of the largest importing countries in general. The food gap of food vegetable oils increases in Egypt due to the population increase, as well as the increase in individual consumption rates of food oils, and the lack of cultivated areas with oil food crops. The research aimed to identify the oil food gap, and the study relied on the method of statistical and quantitative analysis represented in the equations of the general time trend and choosing the best of them according to economic and statistical logic. The research concluded that one of the most important dietary oil crops are crops (soybeans, cottonseeds, sunflower, maize oil, and other oils). By studying the total average production of these crops during the period (2000-2019), it amounted to about 107.2, 44.74, 16.89, 11.47, and 10.58 thousand tons, respectively. 9.01, 38.58 thousand tons, respectively. The research also dealt with the development of the consumption capacity of food vegetable oils during the period (2000-2019), as well as the development of individual consumption of food vegetable oils, the oil food gap, the development of the self-sufficiency rate of food

vegetable oils, and some factors that lead to a reduction of the size of the oily food gap, By studying some indicators of food security for edible oils in Egypt, it became clear that the population of Egypt during the average period amounted to about 79.56 million people, and a statistically significant annual increase is increasing by about 1.77 million people. As for the total average production, it amounted to about 202.3 thousand tons, and it increases annually by about 2.03. thousand tons, while the average imports of edible vegetable oils amounted to about 968 thousand tons, and it increases annually by about 54.51 thousand tons, and this increase is statistically significant. As for the average size of the oil gap, it amounted to about 814.2 thousand tons, and it increases annually by about 32.79 thousand tons. This increase is statistically significant. The average of self-sufficiency rate reached about 23.21%, and the average per capita share of food vegetable oils reached about 14.42 (kg/year), while the development of the average per capita consumption of food vegetable oils (calories / day) at the level of the Republic reached about 324.74 (calories /day) and it is increasing daily by about 8.32 (calories /day). As for the development of the average per capita consumption of food vegetable oil protein (grams/day) in Egypt, it amounted to about 35.20 (grams/day), and it is expected that the average of population, total production, imports, available for consumption, size of the oil gap, self-sufficiency rate, average per capita consumption during the average period (2023-2027) about 108.87 million people, 231.41 thousand tons, 1840.80 thousand tons, 2072.21 thousand tons, 1272.76 thousand tons , 15.75%, 20.07 (kg/year), 453.37 calories, 48.52 grams of fat, respectively.

INTRODUCTION

The crops of soybeans, cottonseeds, peanuts, sunflowers and sesame are considered of the most important oil crops from which food vegetable oils are extracted, which are considered an important food source. Their products enter many different industries, including the manufacture of (paints, dyes, varnishes, and soap). medical preparations and printing ink) and the oil resulting from extraction products that contain a high percentage of protein, and are included in many consumers' favorite foods, which leads to an increase in consumption of them, and this has been helped by the government's continued support of these commodities as they are among the most important basic commodities for the Egyptian consumer, especially those with limited incomes.

In Egypt, it seems clear that the local production of vegetable edible oils is insufficient by covering local consumption, which is reflected in the low self-sufficiency rate of the group of vegetable edible oils.

Among the most important factors affecting the oil gap in Egypt are confined to several factors, including decreasing of local production of vegetable food oils, and thus the decrease in supply, due to the agricultural sector in general and the production of oil crops in particular. Agricultural policy is considered one of the most important internal factors affecting the production of food oils. It includes multiple aspects, the most important of which is pricing policy, support, distribution, marketing policy and other policies, which in turn are reflected in farm incomes that determine the degree of response of farmers to increase production of oil crops. One of the main reasons for importing vegetable food oils is the insufficient production

of oil crops due to the reluctance of farmers to plant them due to the absence of a clear price policy.

Edible vegetable oils are also among the most important basic and necessary food commodities that are indispensable for consumers, both rich and poor alike, and although it is an important commodity, Egypt produces only 2023 thousand tons, which represents about 17.29% of the domestic consumption, which amounts to about 1170.3 thousand. tons during the average period (2000-2019), and the state resorts to filling its needs to fill the deficit between production and consumption of edible oil of all kinds. Also, as a result of imports, edible oil has witnessed large price jumps in the markets, especially in the recent period after the flotation of the Egyptian pound.

RESEARCH PROBLEM

Egypt is considered one of the largest importing countries for food commodities in general, especially for food vegetable oils, and the growing food gap of food vegetable oils in Egypt due to the steady population increase, as well as the increase in individual consumption rates of food vegetable oils, and decreasing of the cultivated crop area in it, which does not exceed only 3% of the total crop area in Egypt, and this may be due to the intense competition between these crops and other strategic crops such as vegetables and fruits, which has become one of the major economic challenges in the agricultural sector, and a decrease in the quantities of local production of them with a successive increase in the quantities of domestic consumption of food vegetable oils and a steady increase in the size of the oil gap with the decline in self-sufficiency rates of food vegetable oils, until the main problem became in how to provide foreign currencies to import food vegetable oils from abroad to meet the needs of local food vegetable oils, until this matter became a pressure on the state's trade balance.

RESEARCH OBJECTIVES

The research aims to achieve the following objectives: -

- Identifying the current situation of vegetable oils and the expected policies in the future.
- Identifying the possibilities available for expanding the production of oil crops, to reduce the oily food gap,
- Identifying the most important oil crops in Egypt and the production of oils from them, in order to discuss the possibility of increasing their production, through expansion horizontal cultivation, lower production costs, and increased yields and reduce its imports to reduce the oil gap, and then reduce the burden on the balance of payments.
- Studying each of the amount of local production of food oil crops, as well as identifying the amount of local consumption of food vegetable oils with identifying the size of the vegetable food gap of food vegetable oils.
- Predicting the production of the most important oil crops in the coming future period for the crops under study.
- Finally reaching from the results of the research to some recommendations that can be guided by when laying the foundations for a correct economic policy, which works to narrow the gap of food vegetable oils, and raise the percentage of self-sufficiency from it.

METHODOLOGY AND SOURCE OF DATA

The research depends on the method of statistical and quantitative analysis represented in general trend functions and choosing the best of them according to economic and statistical logic, estimates of percentages and arithmetic averages, time series, and forecasting by the forecast function in Excel, and it depends on published and unpublished secondary data obtained from the authorities various governmental and non-governmental organizations, such as the Central Agency for Public Mobilization and Statistics, the Ministry of Agriculture and Land Reclamation, and the Food and Agriculture Organization (FAO), in addition to research, conferences, and scientific researches that dealt with the subject of the study, and some interested websites on the Internet.

Introduction

The main reasons for the oil gap are the narrow area cultivated with oil crops and the low yield from them compared to other crops in addition to some marketing problems. The main pests, while providing selected seeds, and increasing the indicative role for the transfer and application of research results in farmers' fields, in addition to encouraging the contract farming system between farmers and companies that manufacture oils, and the policy of the Ministry of Agriculture and Land Reclamation to narrow the oil gap is summarized in the following procedures:

Finding a mechanism for marketing in order to encourage the cultivation of these crops, whether in agricultural cycles in the new lands related to the crop cost system, and try to place these crops within the crop structure, whether in the summer or early winter cycle, especially the new and newly reclaimed lands, and encourage the establishment of agricultural companies with major investments and agricultural associations for oil crops from Through the state's intervention to allocate large areas of land in the new areas, such as Toshka, Owainat, and the Peace Canal, while encouraging investors from the private sector to grow oil crops.

RESEARCH RESULTS AND DISSCUSION

First- The Current Situation of The Total Production of Edible Vegetable Oils, As One of The Most Important Oil Crops in Egypt During the Period (2000-2019)

Total Soybean Oil Production:

It is evident from data of Table (1) and Figure (1), which deals with the development of the amount of soybean oil production and its relative importance in relation to the total food vegetable oil production at the level of Egypt during the previous period, with an average period of about 102.8 thousand tons, with a minimum of about 19 thousand tons in 2000, and a maximum of about 178 thousand tons in 2018, with a relative importance of an average of 50.27%, with a minimum of about 16.52% in 2000, and a maximum of 73.74% in 2016, of total production of food vegetable oils in Egypt. Equation No. (1) showed that it took a general upward and statistically significant trend at the usual levels of significance, with an annual growth rate of about 6.19%, and the value of (F) about 24.67, which is greater than its tabular counterpart at a significant level of 1%, and the value of the determination coefficient (R^2) was about 0.59, which means that about 59% of the changes in the amount of soybean oil production are due to factors whose effects reflect an element time.

Total Amount of Cottonseed Oil Production:

Table (1) and figure (2) show development the amount of cottonseed oil production and its relative importance in relation to the total production of food vegetable oils in Egypt during the previous period, with an average period of about 44.74 thousand tons with a minimum of about 9 thousand tons in 2017 and a maximum of about 87 thousand tons in 2003, with a relative importance of an average of 26.23% and a minimum of about 4.74% in 2017 and a maximum of 64.44% in 2003 of total production of food vegetable oils in Egypt. Equation No. (2) shows that it took a general statistically significant decreasing trend at the usual levels of significance, with an annual decrease rate of about - 8.56%, and the value of (F) was about 45.62, which is greater than its tabular counterpart at a significant level of 1%, and the value of the coefficient of determination (R^2) was about 0.73, which means that about 73% of the changes in the amount of cottonseed oil production are due to factors whose effects reflect the element of time.

Table (1): Total domestic production of vegetable oils during (2000-2019)
(Production: in thousand tons)

Item Year	Soybean	% from total	Cotton - seed	% from total	Sun- flower	% from total	Maize oil	% from total	Other oils*	% from total	Total production
2000	19	16.52	45	39.13	15	13.04	23	20	10	8.69	115
2001	24	19.83	48	39.67	12	9.92	26	21.49	11	9.09	121
2002	56	33.14	71	42.01	18	10.65	24	14.20	0	0.00	169
2003	25	18.52	87	64.44	10	7.41	13	9.63	0	0.00	135
2004	41	29.08	85	60.28	12	8.51	3	2.13	0	0.00	141
2005	104	50.98	75	36.76	14	6.86	11	5.39	0	0.00	204
2006	102	49.28	75	36.23	9	4.35	21	10.14	0	0.00	207
2007	167	67.34	63	25.40	12	4.84	6	2.42	0	0.00	248
2008	91	52.00	62	35.43	11	6.29	6	3.43	5	2.86	175
2009	116	65.91	36	20.45	8	4.55	6	3.41	10	5.68	176
2010	109	62.64	26	14.94	21	12.07	10	5.75	8	4.60	174
2011	119	59.50	32	16.00	30	15.00	10	5.00	9	4.50	200
2012	84	47.73	39	22.16	32	18.18	8	4.55	13	7.39	176
2013	150	65.79	36	15.79	19	8.33	8	3.51	15	6.58	228
2014	144	72.36	21	10.55	14	7.04	9	4.52	11	5.53	199
2015	105	64.02	28	17.07	16	9.76	9	5.49	6	3.66	164
2016	132	73.74	14	7.82	11	6.15	10	5.59	12	6.70	179
2017	114	60.00	9	4.74	18	9.47	18	9.47	31	16.32	190
2018	178	68.73	16	6.18	25	9.65	10	3.86	30	11.58	259
2019	176	62.41	27	9.57	29	10.28	10	3.55	40	14.18	282
Average	102.8	50.27	44.75	26.23	16.89	9.12	12.05	7.18	10.55	5.36	187.10
Upper lim.	178	73.74	87	64.44	32	18.18	26	21.49	40	16.32	282
Low lim.	19	16.52	9	4.74	8	4.35	3	2.13	0	0	115

* Other oils, including crops (sesame, flax, olives).

The mean of the percentages was calculated as a geometric mean

The mean of the absolute values was calculated as the arithmetic mean

Source: Ministry of Agriculture and Land Reclamation, Economic Affairs Sector, Agricultural Statistics Bulletin, separate issues.

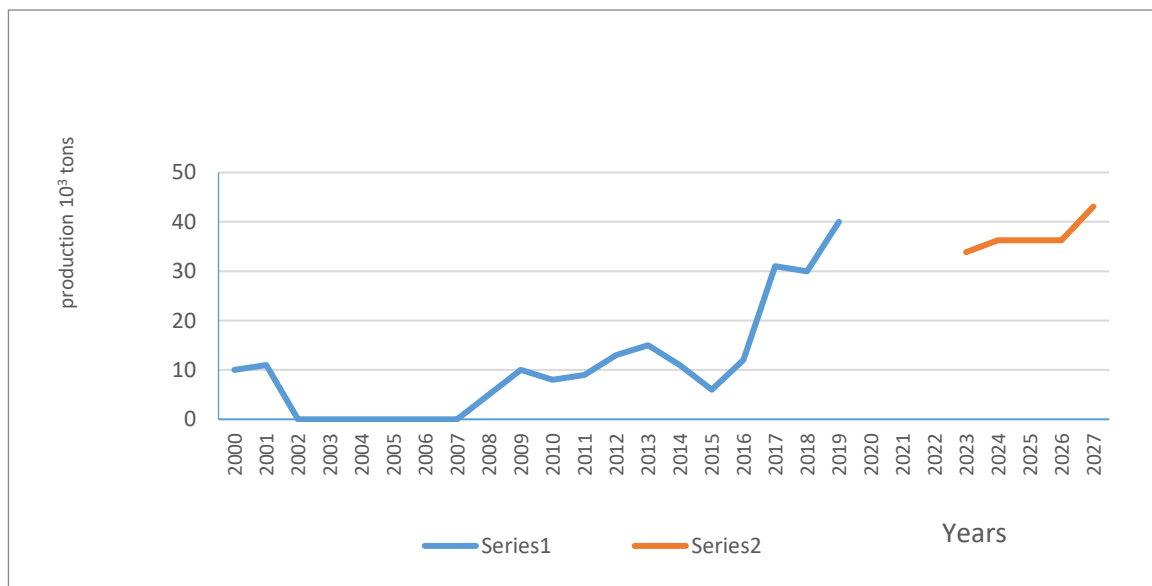
Table (2): The general time trend of development of the total domestic production of vegetable oils during period (2000-2019)

Depend variable	Model No.	Model	R ²	F	Average	Rare Growth %
Soybean	1	$\hat{y}_i = 43.63 + 6.36x_i$ **4.97) * (2.99(	0.59	(24.29) **	102.8	6.19
Cotton seed	2	$\hat{y}_i = 30.83 - 3.83x_i$ **6.75) * (*) 12.84(	0.73	(45.62) **	44.74	8.56–
Sunflower	3	$\hat{y}_i = 10.33 + 0.67x_i$ **3.28) * (2.38(	0.25	(5.65) **	16.89	3.17
Maize	4	$\hat{y}_i = 39.15 - 0.39x_i$ 1.54) * (*) 5.31(	0.12	(2.37)	12.05	3.24–
Other oils	5	$\hat{y}_i = 5.83 + 1.62x_i$ 1.60) * (*) 5.25(	0.62	(27.59) **	10.55	15.35
Oil total production	6	$\hat{y}_i = 4.41 + 146.75x_i$ **8.99) * (3.08(	0.36	(9.50) **	190.89	2.31

Where: $\hat{y}_i$ = the estimated value of the dependent variables in the year e
 x_i = time variable, which e = (1, 2, 3, 0,0,0, 20)

** = significant at 0.01 * = significant at 0.05

Source: Collected and calculated from data of Table (1).

**Figure (1) Other oil production during the period (2000-2019) and the predicted values until 2027**

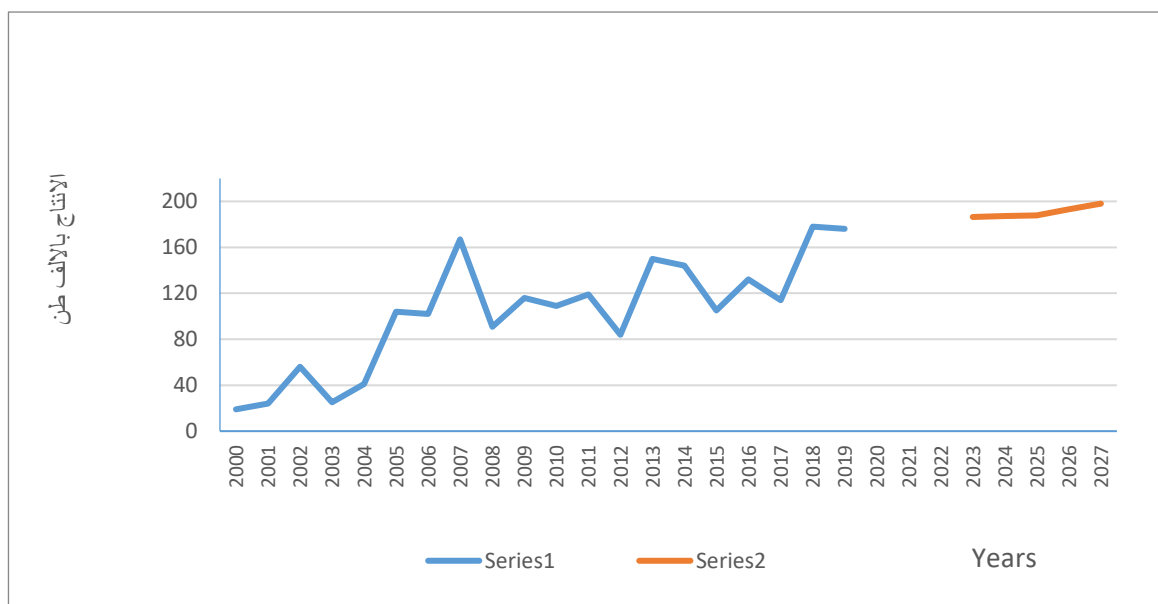


Figure (1) Soybean oil production during the period (2000-2019) and the predicted values until 2027

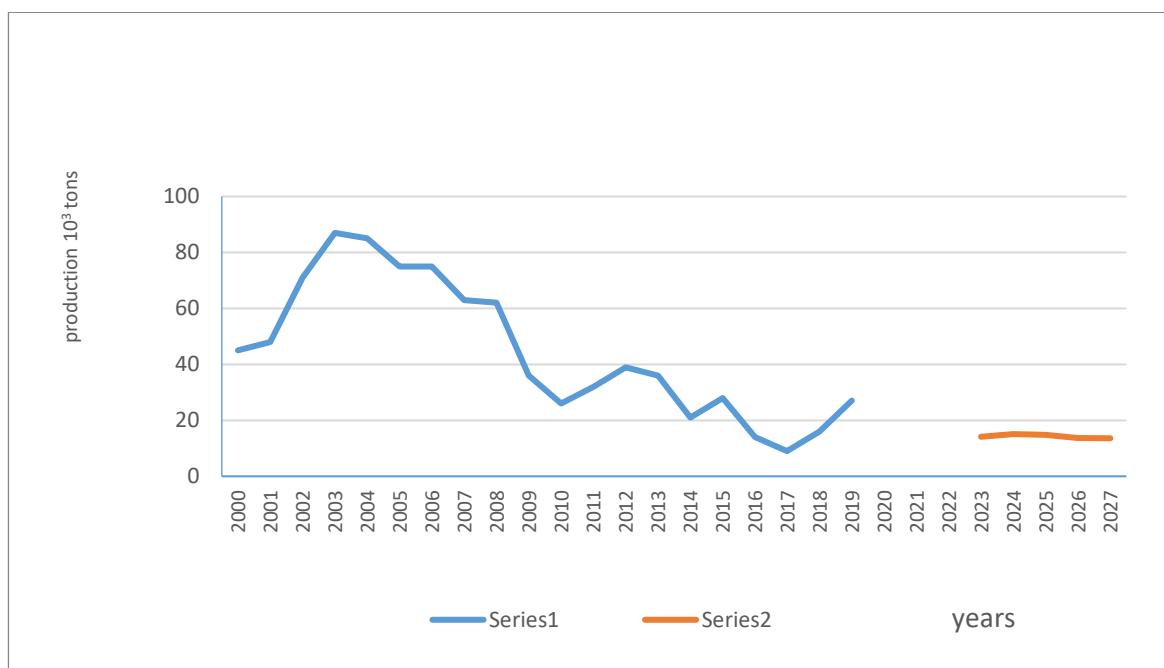


Figure (2) Cottonseed oil production during the period (2000-2019) and the predicted values until 2027

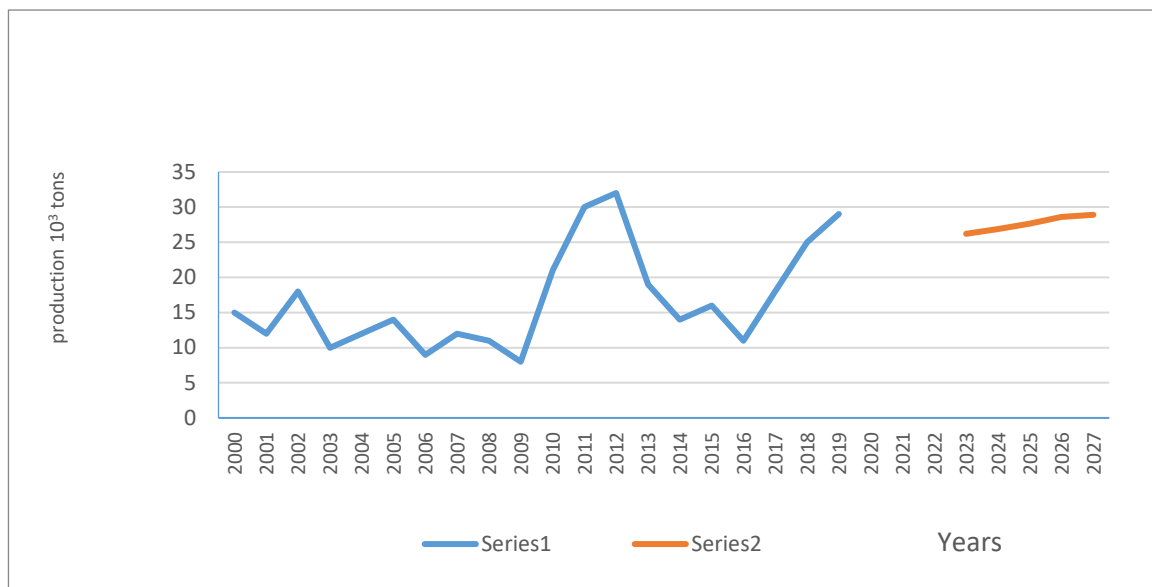


Figure (3) Sunflower oil production during the period (2000-2019) and the predicted values until 2027

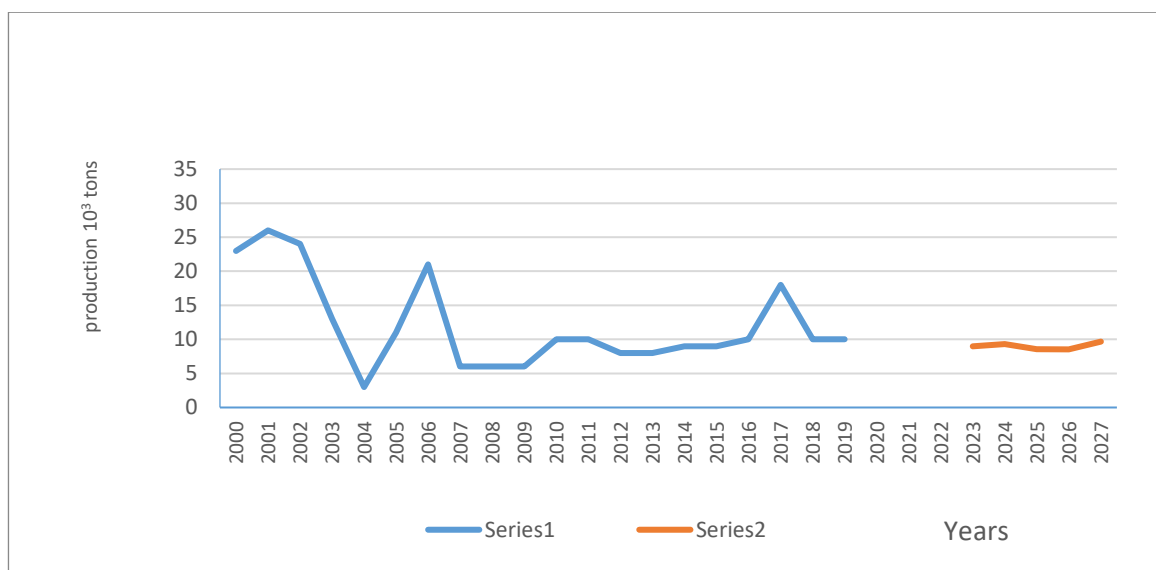


Figure (4) maize oil production during the period (2000-2019) and the predicted values until 2027

Source: Drawn from table data (1,3).

Total Amount of Sunflower Oil Production:

Table (1) and figure (3) show development the amount of sunflower oil production and its relative importance in relation to the total production of food vegetable oils in Egypt during the previous period, with an average period of about 16.89 thousand tons with a minimum of about 8 thousand tons in 2009 and a maximum of about 32 thousand tons in 2012, with a relative importance of an average of 9.12% and a minimum of about 4.35% in 2009 and a maximum of 18.18% in 2012 of the total production of food vegetable oils in Egypt. Through the equation of the temporal trend of development of the amount of sunflower oil production during the same period as in Table No. (2) Equation No. (3) it was found that it took a general upward trend statistically significant at the usual significant levels, with an annual growth rate of about 3.97

%, and the value of (F) was about 5.65, which is greater than its tabular counterpart at a significant level of 5%, and the value of the coefficient of determination (R^2) was about 0.25, which means that about 25% of the changes in the amount of sunflower oil production are due to factors whose effects reflect the element of time.

Total Amount of Maize Oil Production:

Table (1) and figure (4) show development the amount of corn oil production and its relative importance in relation to the total production of food vegetable oils in Egypt during the previous period, with an average period of about 12.05 thousand tons with a minimum reached about 3 thousand tons in 2004 and a maximum amount of about 26 thousand tons in 2001, with a relative importance of an average of 7.18% and a minimum of about 2.13% in 2004 and a maximum of 21.49% in 2001 of the total production of edible vegetable oils in Egypt. Through the equation of the temporal trend of the development of the amount of corn oil production during the same period as in Table No. (2) Equation No. (4) it was found that it not statistically significant at any significant levels, as a result of the instability of maize production data during the study period (2000-2019).

The Amount of Oil Production of Other Crops (Sesame, Flax, Olive)

Table (1) and figure (5) show development the amount of oil production from other crops and its relative importance in the total production of food vegetable oils in Egypt during the previous period, with an average period of about 10.58 thousand tons, with a minimum of about 0 thousand tons in 2002, and a maximum of about 40 thousand tons in 2019, with a relative importance of an average of 5.19%, with a minimum of about 0% in 2002, and a maximum of 16.32% in 2017 of the total production of food vegetable in Egypt. Through the equation of the temporal trend of development of the amount of oil production from other crops during the same period as in table No. (2) Equation No. (5) it was found that it not statistically significant at any significant levels, as a result of the instability of other crops production data during the study period (2000-2019).

Second- The Future Situation of The Total Food Vegetable Oil Production in Egypt During the Period (2023-2027)

Total food vegetable oil production include soybean, cottonseed, sunflower, corn, other oils (sesame, flaxseed, olive).

The Future Situation of Soybean Oil Production:

Table (3) and figure (6) show the future situation of soybean oil production during the previous period. About 269.55 thousand tons in that year, and its production is expected to reach about 198.02 thousand tons in 2027, which represents about 67.51% of the total oil production in that year, amounting to about 293.30 thousand tons, an increase of about 4.95 thousand tons over the previous year, which represents about 2.60% of the average of about 190.49 thousand tons during the same period.

Table (3): The future situation of the total domestic production of vegetable oils during (2023-2027)(Production 10³ ton)

Item Year	Soybean	% from total	Cotto n- seed	% from total	Sun- flower	% from total	Corn oil	% from total	Other oils*	% from total	Total production
2023	186.42	69.16	14.08	5.22	26.20	9.72	8.99	3.33	33.86	12.56	269.55
2024	187.30	68.15	15.08	5.49	26.87	9.78	9.30	3.38	36.30	13.21	274.84
2025	187.66	67.67	14.76	5.32	27.65	9.97	8.57	3.09	36.30	13.95	277.32
2026	193.07	67.79	13.67	4.80	28.58	10.03	8.53	2.99	36.30	14.39	284.82
2027	198.02	67.51	13.6	4.64	28.90	9.85	9.67	3.30	43.11	14.70	293.30
Average	190.49	68.05	14.24	5.08	27.64	9.87	9.01	3.21	38.58	3.21	279.97

Source: Predicted values using the Forecast function in Excel program and calculated from data of table (1).

Development of the Future Situation of Cottonseed Oil Production:

Table No. (3) and figure No. (7) show the future situation of cottonseed oil production during the previous period. It is expected that its production will reach about 14.08 thousand tons in 2023, which represents about 5.22% of the total oil production. amounting to about 269.55 thousand tons in that year, and it is expected that its production will reach about 13.6 thousand tons in 2027, which represents about 4.64% of the total oil production in that year, amounting to about 293.30 thousand tons, with a decrease of 0.07 thousand tons from the previous year, which represents about 0.49% of the average of about 14.24 thousand tons during the same period.

The Future Development of Sunflower Oil Production:

Table (3) and figure (8) show the future development of sunflower oil production during the previous period. It is expected that its production will reach about 26.20 thousand tons in 2023H, which represents about 9.72% of the total production oils, amounting to about 269.55 thousand tons in that year, and it is expected that its production will reach about 28.90 thousand tons in 2027, which represents about 9.85% of the total oil production in that year, amounting to about 293.30 thousand tons, with an increase of 0.32 thousand tons from the previous year, which it represents about 1.16% of the average of about 27.64 thousand tons during the same period.

The Development of The Future Situation of Maize Oil Production:

Table (3) and figure (9) show the development of the future situation of maize oil production during the previous period. About 269.55 thousand tons in that year, and its production is expected to reach about 9.67 thousand tons in 2027, which represents about 3.30% of the total oil production in that year, amounting to about 293.30 thousand tons, with an increase of 1.14 thousand tons over the previous year, which represents about 12.65% of the average of about 27.64 thousand tons during the same period.

Development of the Future Situation for The Production of Other Oils:

Table (3) and figure (10) show the development of the future situation for the production of other oils during the previous period. Its production is expected to reach about 33.86 thousand tons in 2023H, which represents about 12.56% of the total production of oils, amounting to About 269.55 thousand tons in that year, and its production is expected to reach about 43.11 thousand tons in 2027, which represents about 14.70% of the total oil production in that year, amounting to about 293.30 thousand tons, with an increase of 2.14 thousand tons over the

previous year, which represents about 5.55% of the average of about 38.58 thousand tons during the same period.

Third- Development of The Consumption Capacity of Food Vegetable Oils in Egypt During the Period (2000-2019)

This part deals with knowledge of the development of some food security indicators for edible oils such as population (in million people), total production, imports, oil gap, available for consumption (in thousand tons), self-sufficiency, average per capita (kg/year), (calories/day), (grams/day) of the consumption of dietary vegetable oils during the period (2000-2019) in Egypt.

Population Development:

It is clear from data of table (4), which deals with the development of the population in Egypt during the average of the previous period, it reached about 79.56 million people, and it was shown that it was increasing from 65.34 million people in 2000 to 98.9 million people in 2019, with an increase of about 33.56 million people, representing about 42.8% of the average during the previous period. By studying the general temporal trend of population development as shown in table (5) and equation (1), it was found that the population is increasing statistically at a significant annual rate of 1%, amounting to about 1.77 million people. (F) calculated about 629.68, and the value of the correlation coefficient (R) was about 0.98, and this means that there is a significant correlation between the time factor and the population. The value of the determination coefficient (R^2) shows that the time factor contributes to 97% of the total changes in the population during the study period.

Total Production:

It is evident from data of table (4) and figure (11), which deals with the development of the total production of edible oils in Egypt during the average period (2000-2019), amounting to about 202.3 thousand tons, with a minimum of about 115 thousand tons in 2000 with a maximum of about 290 thousand tons in 2002. By estimating the general time trend for the development of the total production of edible oils in thousand tons in Egypt during the previous period, as in table (5) and equation (2), it was found that it not statistically significant at any significant levels, as a result of the instability of total production of edible oils data during the study period (2000-2019).

Imports:

It is clear from data of table (4) and figure (12) that the total imports of edible oils in Egypt during the average period (2000-2019) amounted to about 968 thousand tons, with a minimum amount of about 348 thousand tons in 2002 and a maximum amount of about 1778 thousand tons in 2018, and by estimating the general time trend for the development of total imports of food oils in thousand tons at the level of the Republic during the previous period, as in table (5) and equation (3), it was found that the total imports of food oils increased annually by about 54.51 thousand tons, representing about 5.63%. This increase is statistically significant at a significant level of 1%. The equation indicates that there is a significant correlation between the time factor and the total imports of food oils, where the calculated (F) value was about 19.82, and the correlation coefficient (R) was about 0.72, and this means that there is a significant correlation between the time factor and the one available for use, and the value of

the determination coefficient (R^2) shows that the time factor contributes to 52% of the total imports of edible oils during the study period.

Table (4): Indicators of Egyptian food security of food vegetable oils during the period (2000-2019)

Item Year	Population 10 ⁶ people	Total production 10 ³ ton	Imports 10 ³ ton	Available for consumption 10 ³ ton	Size of the gap ton	Self- sufficiency rate %	Average per capita		
							Per year	Per day	
							Kg/year	Calorie (unit)	Fat (Gm)
2000	66.98	115	654	769	666	14.72	11.48	300	33.4
2001	65.34	220	464	684	355	38.26	10.47	218	24.2
2002	67.98	290	348	638	206	58.47	9.39	186	20.5
2003	67.97	135	405	540	373	26.57	7.94	186	20.5
2004	69.33	148	876	1024	859	14.70	14.77	359	39.7
2005	70.67	204	1058	1262	1044	16.35	17.86	437	48.5
2006	73.01	207	1196	1403	1182	14.90	19.22	476	52.8
2007	73.65	248	541	789	538	31.55	10.71	263	29.3
2008	75.23	170	680	850	566	23.10	11.30	241	26.8
2009	76.82	266	607	873	448	37.25	11.36	232	25.8
2010	78.73	174	610	784	497	25.93	9.96	211	23.3
2011	80.41	200	1178	1378	1070	15.75	17.14	221	24.6
2012	82.55	175	1180	1355	1032	14.50	16.41	333	23.9
2013	84.63	228	1479	1707	1302	14.90	20.17	446	49.5
2014	86.81	199	1300	1499	1125	15.03	17.27	376	41.6
2015	88.90	164	624	788	517	24.08	8.86	411	42.6
2016	91.02	179	1636	1815	1575	10.82	19.94	393.5	43.6
2017	95.20	182	1613	1795	1491	10.88	18.86	402.3	44.6
2018	97.15	259	1778	2037	883	22.68	20.97	402.3	44.6
2019	98.90	282	1133	1415	555	33.69	14.31	400.1	44.3
Average	79.56	202.3	968	1170.3	814.2	23.21	14.42	324.7	35.2
Upper lim.	98.9	290	1778	2037	1575	58.47	20.97	476.0	52.8
Lower lim.	65.34	115	348	540	206	10.82	7.94	186.0	20.5

Source: Collected and calculated from the data of the Ministry of Agriculture and Land Reclamation - Economic Affairs Sector - Central Administration of Agricultural Economy - Food Balance Bulletins - different issues.

Table (5): Equations of the general time trend of Egyptian food security indicators of food vegetable oils during the period (2000-2019)

Depend variable	Equ. No.	Model	Average	Change rate %	F	R ²	R
Population 10 ⁶ people	1	$\hat{y}_i = 60.94 + 1.77 x_i$ 25.09) ** (**)71.97(	79.56	2.22	629.68*	9700	0.98
total production 10 ³ ton	2	$\hat{y}_i = 180.94 + 2.03 x_i$ 1.08) (**) 8.08(	202.3	1.00	1.18	0.06	0.25
imports 10 ³ ton	3	$\hat{y}_i = 395.66 + 54.51 x_i$ 4.45) ** (*) 2.70(	968	5.63	19.82*	0.52	0.72
available for consumption 10 ³ ton	4	$\hat{y}_i = 576.61 + 56.54 x_i$ 4.67) ** (**) 3.97(	1170.3	4.83	21.76*	0.55	0.74
size of the oil gap 10 ³ ton	5	$\hat{y}_i = 469.94 + 32.79 x_i$ 2.37) * (*) 2.84(	814.2	4.05	5.62*	0.24	0.49
Self-sufficiency rate %	6	$\hat{y}_i = 29.91 + 0.64 x_i$ 1.42) (*) 5.53(	23.21	2.76	2.01	1000	0.32
average per capita (Kg/year)	7	$\hat{y}_i = 10.39 + 0.38 x_i$ 2.62) * (**) 5.91(	14.42	2.58	6.87*	0.28	0.53
average per capita Calorie (unit)/day	8	$\hat{y}_i = 237.41 + 8.32 x_i$ 2.51) ** (**) 5.98(	324.74	2.56	6.30**	0.26	0.51
average per capita Fat (gram/day)	9	$\hat{y}_i = 26.32 + 0.85 x_i$ 2.19) * (**) 5.68(	35.20	2.41	4.78**	0.21	0.46

Where: $\hat{y}_i$ = the estimated value of the dependent variables in the year.

x_i = the time variable, $i = (1, 2, 3, 0, 0, 19)$

** = significant at 0.01, * = significant at 0.05

Source: Calculated from the data of Table No. (11) Using the SPSS .

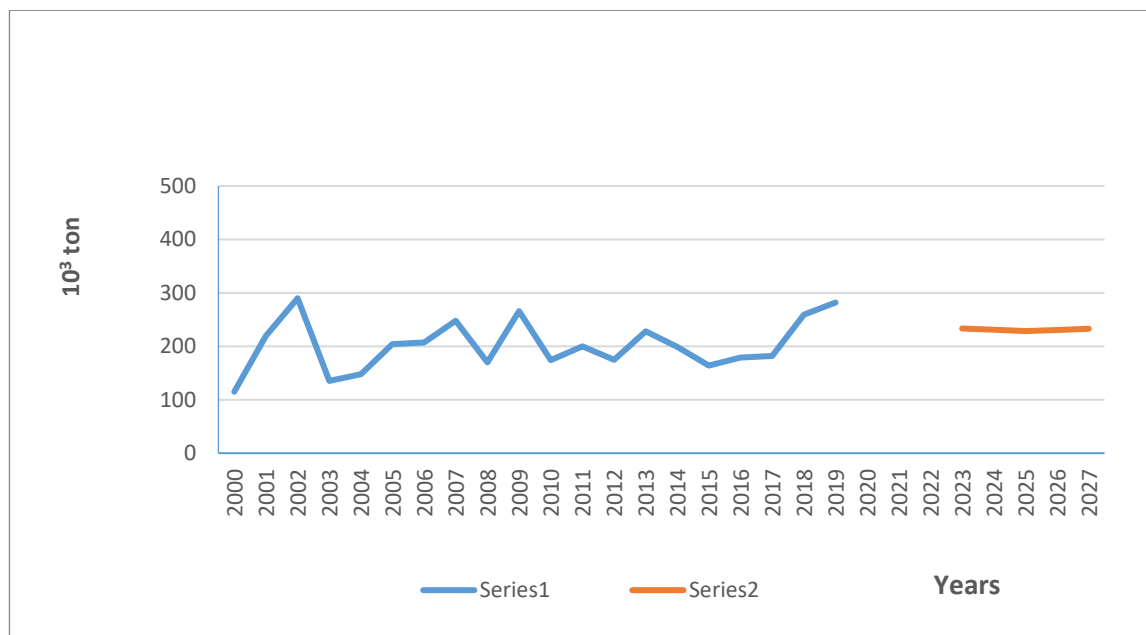


Figure (6) Total vegetable oils during the period (2000-2019) and the predicted values until 2027

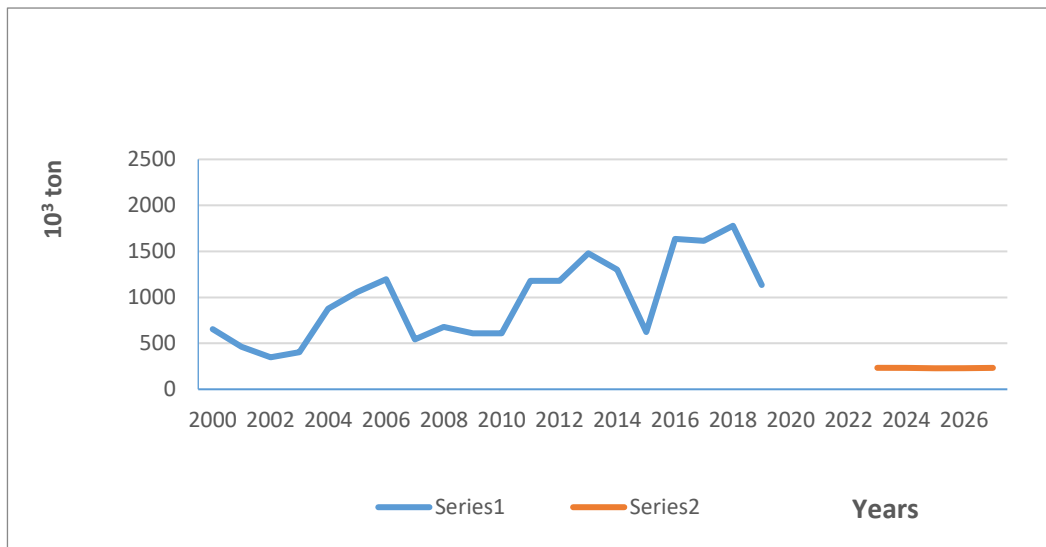


Figure (7) Total imports of vegetable oils during the period (2000-2019) and the predicted values until 2027

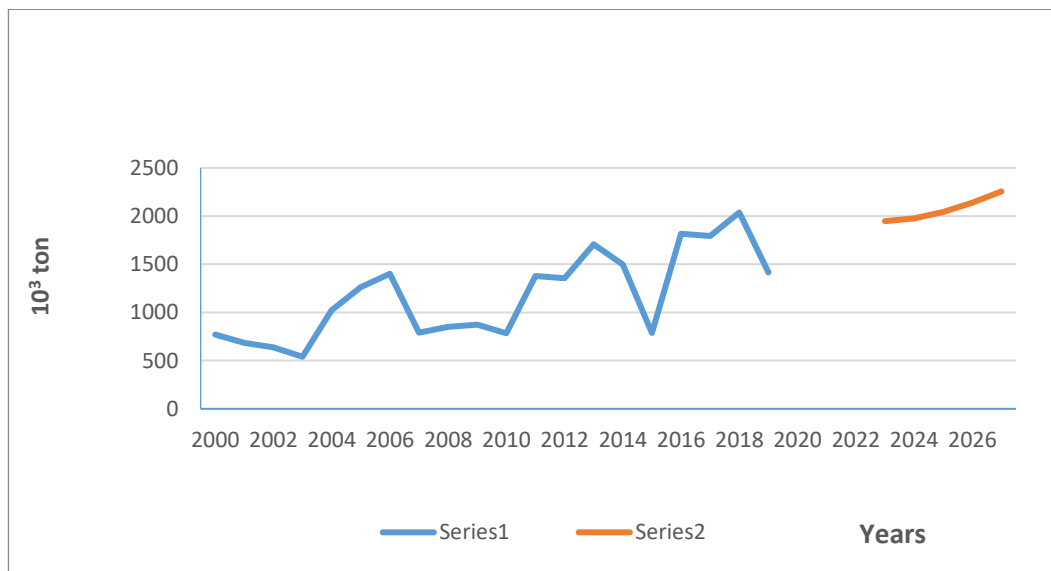


Figure (8) Available for consumption of vegetable oils during the period (2000-2019) and the predicted values until 2027

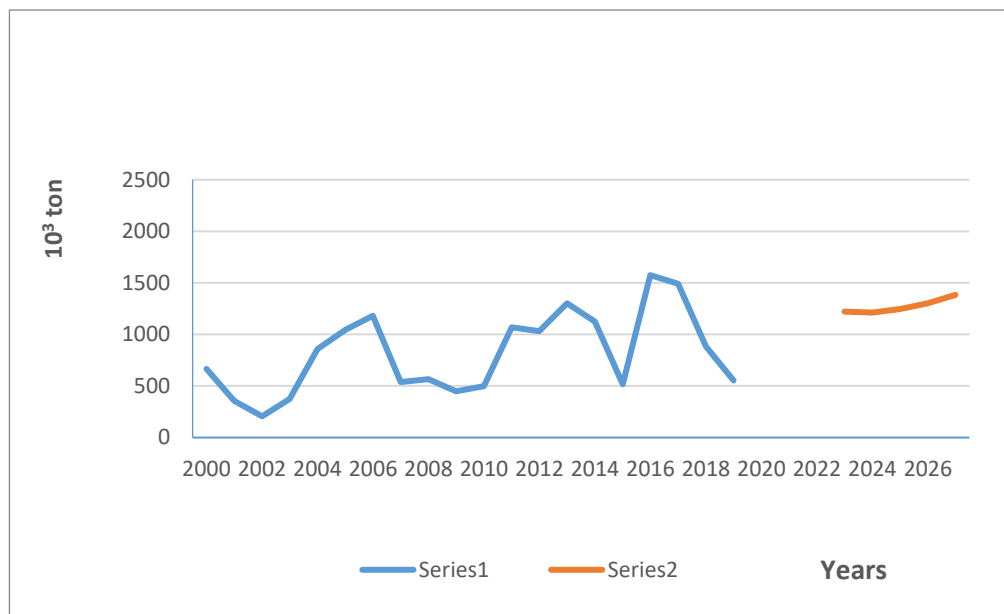


Figure (9) The size of the gap in vegetable oils during the period (2000-2019) and the predicted values until 2027

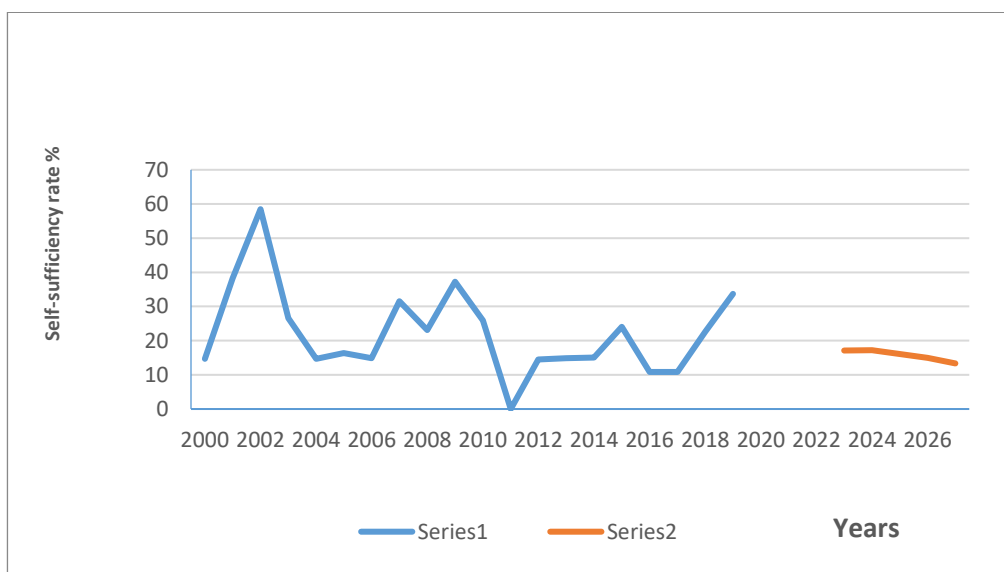


Figure (10) The self-sufficiency rate of vegetable oils during the period (2000-2019) and the predicted values until 2027

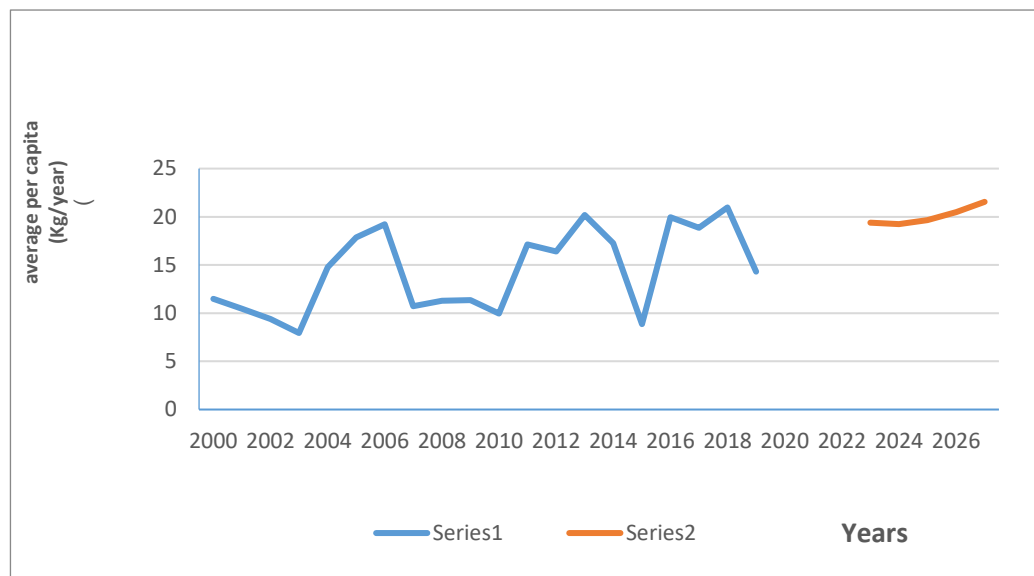


Figure (11) The average per capita share of vegetable oils during the period (2000-2019) and the predicted values until 2027

Source: Drawn from table data (4,6).

Available For Consumption:

It is evident from data of table (4) and figure (8), which deals with the available food oils available for consumption in thousand tons in Egypt, where the average for the period (2000-2019) was about 1170.3 thousand tons, with a minimum of about 540 thousand tons in 2003. and a maximum of about 2037 thousand tons in 2018. By estimating the general time trend for the development of the availability for consumption of food oils in thousand tons in Egypt during the previous period, as in table (5) and equation (4), it was found that the availability for consumption of food oils increased annually by about 56.54 thousand tons, represents about 4.83% of the average, and this increase statistically significant at the level of significance of 1%. The equation indicates that there is a significant correlation between the factor of time available for consumption of food oils in thousand tons, where the calculated (F) value was about 1170.3, and the value of the correlation coefficient (R) was about 0.74, and this means that there is a significant correlation between the time factor and the time factor available for consumption of food oils. The value of the determination coefficient (R^2) shows that the time factor contributes to 55% of the available food oils for consumption during the study period.

Quantity of the Oil Gap:

It is evident from data of table (4) and figure (9), which deals with the evolution of the food gap size of food vegetable oils in thousand tons at the level of the Republic, during the average period (2000-2019) amounted to about 814.2 thousand tons, with a minimum of about 206 thousand tons in 2002, with a maximum of about 1575 thousand tons in 2016. By estimating the general time trend for the development of the food gap size of food vegetable oils in thousand tons in Egypt during the previous period, as in table (5) and equation (5), it was found that the size of the food gap of food vegetable oils increases annually with about 32.79 thousand tons, representing about 4.05% of the average. This increase is statistically significant at a significant level of 1%. The equation indicates that there is a significant correlation between the time factor and the food gap size of food vegetable oils, as the calculated value of (F) was about 5.62, and the value of the correlation coefficient (R) was about 0.49, and this means that

there is significant correlation between the time factor and the total production of the food gap size of food vegetable oils. The value of the coefficient of determination (R^2) shows that the time factor contributes to 24% of the food gap size of food vegetable oils during the study period.

The Rate of Self-Sufficiency

It is clear from data of table (4) and figure (10) that the rate of self-sufficiency of food vegetable oils at the level of the Republic during the average period (2000-2019) amounted to about 23.21% with a minimum of about 10.82% in 2016 and with a minimum the highest amounted to about 58.47% in 2002. By estimating the general time trend of the development of the rate of self-sufficiency of food vegetable oils in Egypt during the previous period, as in table (5) and equation (6), it was found that the rate of self-sufficiency of food vegetable oils increased annually with about 0.64%, it represents about 2.76% of the average, and this increase is statistically insignificant at the usual level of significance during the study period.

Average Per Capita Consumption:

It is clear from data of table (4) and figure (11) that the average per capita consumption of edible vegetable oils (kg/year) in Egypt during the average period (2000-2019) amounted to about 14.42 (kg/year) with a limit lowest limit amounted to about 94.7 (kg/year) in 2003 and the highest limit amounted to about 20.97 (kg/year) in 2018. By estimating the general time trend for the development of the average per capita consumption of edible vegetable oils (kg/year) in Egypt during the previous period, as in table (5) and equation (8), it was found that the average per capita consumption of edible vegetable oils increased annually with about 0.38 (kg/year). It represents about 2.58% of the average, and this increase is statistically significant at a significant level of 1%. The equation indicates that there is a significant correlation between the time factor and the average per capita consumption of edible vegetable oils, as the calculated (F) value was about 6.87, and the correlation coefficient (R) was about 0.53, which means that there is a significant correlation between the time factor and the average per capita portion of dietary vegetable oils, and the value of the determination coefficient (R^2) shows that the time factor contributes to 28% of the total changes in the average per capita portion of dietary vegetable oils during the study period.

Development of The Average Per Capita Consumption of Dietary Vegetable Oils (Calories /Day):

It is clear from data of table (4) that the average per capita consumption of edible vegetable oils (calories/day) in Egypt during the average period (2000-2019) reached about 324.74 calories/day, with a minimum of about 186 calories/day in 2002, and a maximum of about 476 calories/day in 2016. By estimating the general time trend for the development of the average per capita consumption of dietary vegetable oils in Egypt during the previous period as in table (5) and equation (8), it was found that the average per capita consumption of dietary vegetable oils increases daily by about 8.32 (calories/day) represents about 2.56% of the average, and this increase is statistically significant at the level of significance of 5%. The equation indicates that there is a significant correlation between the time factor and the average per capita consumption of dietary vegetable oils (calories/day), as the value of (F) calculated value is about 6.30, and the correlation coefficient (R) is about 0.51, This means that there is a significant correlation between the time factor and the average per capita consumption of dietary vegetable oils. The value of the determination coefficient (R^2) shows that the time factor

contributes to 26% of the total changes in the available average per capita consumption of dietary vegetable oils (calorie/day) during the study period.

Development of The Average Per Capita Consumption of Dietary Vegetable Oil Protein (Grams/Day):

It is clear from data of table (4) that the average per capita consumption of dietary vegetable oil protein (grams/day) in Egypt during the average period (2019- 2000) about 35.20 (grams/day), with a minimum of about 20.50 (grams/ day) in 2002, and a maximum of about 52.80 (grams/day) in 2006. By estimating the general time trend of the development of the average per capita consumption of dietary vegetable oil protein (grams/day) on Egypt during the previous period, as shown in table (5) and equation (9) shows that the average per capita consumption of dietary vegetable oil protein (grams/day) increases daily with about 0.85 (grams/day), representing about 2.41% of the average and this increase is statistically significant at the 1% level of significance. The equation indicates that there is a significant correlation between the time factor and the average per capita consumption of dietary vegetable oil protein (grams/day), as the calculated (F) value was about 4.78, and the correlation coefficient (R) was about 0.46, and this means that there is a correlation significant between the time factor and the average per capita consumption of dietary vegetable oil protein (grams/day), and the value of the determination coefficient (R^2) shows that the time factor contributes to 0.21% of the total changes in the available average per capita consumption of dietary vegetable oil protein (grams/day) during the study period.

Fourth The Future Situation of the Population in Egypt

Table No. (6) shows the future situation of the population in Egypt during the previous period. It is expected to reach about 104.69 million people in 2023, and it is also expected that it is about 113.09 million people in 2027, an increase of about 2.15 million people over the previous year, which represents about 1.97% of the average of about 108.87 million people during the previous period.

Table (6): The future status of Egyptian food security indicators of food vegetable oils in Egypt during the period (2023-2027)

Item Year	Population 10 ⁶ people	total production 10 ³ ton	imports 10 ³ ton	available for consumption 10 ³ ton	size of the oil gap 10 ³ ton	Self- sufficiency rate %	average per capita		
							Per year	Per day	
							Kg/ year	Calorie (unit)	Fat (Gm)
2023	104.69	233.41	1713.81	1947.22	1219.53	17.10	19.40	433.38	46.31
2024	106.78	231.27	1744.58	1975.85	1212.09	17.21	19.24	430.10	45.91
2025	108.87	228.65	1815.39	2044.04	1246.07	16.13	19.67	442.28	47.26
2026	110.94	230.67	1907.71	2138.38	1302.69	14.96	20.47	464.81	49.79
2027	113.09	233.05	2022.52	2255.58	1383.42	13.34	21.55	496.27	53.34
Average	108.87	231.41	1840.80	2072.21	1272.76	15.75	20.07	453.37	48.52

Source: Predicted values from data of Table (4).

The Future Situation of The Total Production of Vegetable Oils:

Table No. (6) and figure No. (6) show the future situation of the total production of vegetable oils in Egypt during the previous period, as it is expected that its production will reach about 233.41 thousand tons in 2023, its production is expected to reach about 233.05 thousand tons in 2027, an increase of about 2.37 thousand tons over the previous year, which represents about 1.03% of the average of about 231.41 thousand tons during the same period.

The Future Situation of Total Vegetable Oil Imports:

Table No. (6) and figure No. (7) show the future situation of total vegetable oil imports in Egypt during the previous period, as it is expected to reach about 1713.81 thousand tons in 2023 It is also expected to reach about 2022.52 thousand tons in 2027, an increase of about 114.81 thousand tons over the previous year, which represents about 6.24% of the average of about 1840.80 thousand tons during the same period.

The Future Situation of The Availability for Consumption:

Table No. (6) and figure No. (8) show the future situation of the availability of vegetable oils available for consumption in Egypt during the previous period, as it is expected to reach about 1947.22 thousand tons in in 2023, it is also expected to reach about 2255.58 thousand tons in 2027, an increase of about 117.2 thousand tons over the previous year, which represents about 5.65% of the average of about 2072.21 thousand tons during the same period.

The Future Situation of The Oil Gap Volume:

Table No. (6) and figure No. (9) show the future situation of the oil gap volume of vegetable oils in Egypt during the previous period, as it is expected to reach about 1219.53 thousand tons in 2023, and it is expected to reach about 1383.42 thousand tons in 2027, an increase of about 80.73 thousand tons over the previous year, which represents about 6.34% of the average of about 1272.76 thousand tons during the same period.

The Future Situation of The Self-Sufficiency Rate:

Table No. (6) and figure No. (10) show the future situation of the self-sufficiency rate of vegetable oils in Egypt during the previous period, as it is expected to reach about 17.10% in 2023. It is also expected to reach about 13.34% in 2027, a decrease of about 1.62% from the previous year, which represents about 10.28% from the average of about 15.75% during the same period.

The Future Situation of The Average Per Capita Share:

Table No. (6) and figure No. (11) show the future situation of the average per capita share of vegetable in Egypt during the previous period, as it is expected to reach about 19.40 (kg/year) in 2023, and it is expected to reach about 21.55 (kg/year) in 2027, an increase of about 1.08 (kg/year) over the previous year, which represents about 5.38% of the average of about 20.07 (kg /year) during the same period.

The Future Situation of The Average Per Capita Consumption of Edible Vegetable Oils:

Table No. (6) shows the future status of the average per capita consumption of edible vegetable oils in Egypt during the previous period, as it is expected to reach about 433.38 (Calorie /day) in 2023, and it is expected to reach about 496.27 (Calorie /day) in 2027, an increase of about

31.46 (Calorie/day) over the previous year, which represents about 6.94% of the average of about 453.37 (Calorie/day) over the same period.

The Future Situation of The Average Daily Per Capita Consumption of Edible Vegetable Oils:

Table No. (6) shows the future situation of the average per capita daily consumption of edible vegetable oils during the previous period, as it is expected to reach about 46.31 fat (grams) in 2023, and it is expected to reach about 53.34 fat (grams) in 2027, an increase of about 3.55 fat (grams) over the previous year, which represents about 7.32% of the average of about 48.52 fat (grams) during the same period. Period.

RECOMMENDATIONS

To reduce the import of large quantities of edible oils, action should be taken to:

1. Taking all means and methods that would increase the local production of edible vegetable oils by encouraging farmers to expand the cultivation of oil crops, in addition to the need to set appropriate guarantee prices by the government to ensure achieving an appropriate profit margin in accordance with international prices.
2. The horizontal expansion should be done by planting oil crops in the newly reclaimed lands.
3. The need for vertical expansion to take place by developing high-yielding varieties to increase the yield per unit area, while motivating farmers to plant oil crops by purchasing these crops at remunerative prices.
4. The need to pay attention to oil crops in general, especially sesame, flax and olive crops, as they contribute only 5.19% of the total oil production during the research period.
5. The need to educate consumers about the need to rationalize consumption of food vegetable oils.
6. Increasing allocations for research and development in the agricultural field, and paying attention to agricultural research, especially in the field of improving varieties and developing new strains, and the industrial field, by raising the efficiency of extracting oils from oilseeds.

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