

Consumption Pattern of Dietary Fat in the Egyptian Population: A Comprehensive Analysis

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ABSTRACT

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With their substantial effects on populations and healthcare systems, non-commutable diseases have emerged as illnesses of public health concern. Approximately 71% of deaths worldwide occur each year. Eighty percent of, non-commutable diseases NCD mortality occurs in low- and middle-income nations, making this mostly invisible disease more problematic there. The primary goal of this work is to ascertain the consumption pattern of fat, fat subtypes, and trans-fat. **Methodology:** The research plan Studies using descriptive cross-section surveys Egyptian population samples are drawn from Egypt's main regions, The mother from each family will be interviewed for quantitative and qualitative data on food consumption. Findings Remark Energy consumption per capita was 2202 kcal/day on average. Protein made up 13 % of the total energy, fat made up 25%, and carbs made up 62.0%. Free sugar made up 12% of the total energy obtained from the meal that was ingested. The Egyptians' dietary energy pattern fell within the WHO's recommended range, the amount of dietary energy obtained from trans-fat content in food consumed was 0.6% of total energy, or less than 1%. Intake of fat overall was sufficient, but intake of saturated fat was nearly beyond the recommended upper limit. Hydrogenated oils, processed meat, chicken, baked goods, biscuits, fast food, chips, and sweets. These are the main dietary sources of trans fat This is alarming because it emphasizes the need for continual nutritional education on the correct pattern of consuming healthy fat to prevent the risk of non-communicable diseases.

Keywords: Fat consumption pattern – Dietary – Egyptian

INTRODUCTION

Non-communicable diseases (NCDs) represent a significant public health challenge globally, surpassing infectious diseases in mortality rates, with approximately 71% of deaths attributed to NCDs annually (**WHO, 2022**). This burden is particularly pronounced in low- and middle-income countries, where 80% of NCD-related deaths occur, highlighting the disproportionate impact on these populations (**Loyd-Sherlock, 2017**). Central to discussions on NCD prevention are dietary factors, including the consumption of fats, which play a crucial role in human nutrition by providing energy and aiding in the absorption of essential vitamins (**U.S. Department of Agriculture, 2022**).

Recent research underscores the distinction between beneficial unsaturated fats and harmful saturated and trans fats, emphasizing the critical importance of dietary fat quality over total fat reduction (**Mozaffarian et al., 2010**). Understanding global and regional trends in fat consumption is essential, given the profound

health implications associated with dietary shifts occurring worldwide (**Kearney, 2010**). Rapid urbanization, globalization of food markets, and policy changes such as trade liberalization have accelerated these dietary transitions, contributing to rising rates of obesity and chronic diseases like cardiovascular disorders and cancer (**Satterthwaite, et al., 2010**). Like many developing nations, Egypt is experiencing significant changes in dietary habits characterized by increased calorie-dense food consumption alongside challenges such as fluctuating food prices and limited access to diverse, nutrient-rich foods (**Hassan, 2005**). These shifts have profound implications for public health, necessitating a comprehensive understanding of fat consumption patterns and their health implications within the Egyptian context (**Ibrahim, 2002; WHO, 2005**).

Globally, national dietary patterns exhibit considerable variability, with saturated fat intake ranging from 2.3% to 27% of total energy intake across different countries (**Mica, 2014**). Recomm-

endations advocate for limiting saturated fat intake to less than 10% of daily calories to reduce cardiovascular risk while promoting the consumption of healthier fats like mono-unsaturated and polyunsaturated fats (U.S. Department of Agriculture, 2022; Mozaffarian et al., 2010).

Given the scarcity of recent data on fat consumption among Egyptians, there is a critical need for updated research to establish baseline information on dietary intakes, total fat consumption, and fat subtypes among the Egyptian population. Such insights are essential for informing targeted interventions and policy measures aimed at promoting healthier dietary behaviors and reducing the burden of NCDs in Egypt and similar contexts worldwide (Hassan, 2005; Mendos, 2004).

This study aims to address these knowledge gaps by examining current fat consumption patterns in Egypt and utilizing nationally representative data to elucidate trends, disparities, and potential health implications. By doing so, this research seeks to

contribute to evidence-based strategies that enhance nutritional outcomes and support public health initiatives tailored to the needs of the Egyptian population.

Aim of the work:

Studying the consumption patterns of dietary fat in the Egyptian population is crucial for understanding the nation's nutritional habits, health outcomes, and potential areas for intervention. Overall, this comprehensive analysis aims to provide insights into the current consumption pattern of dietary fat in the Egyptian population and inform strategies to improve dietary habits and promote public health."

The hypothesis:

Cultural Dietary Practices: Traditional Egyptian cuisine often includes deep-fried dishes and sweets made with rich, saturated fats like ghee and palm oil. These cultural preferences may contribute to a high consumption of saturated fats.

2. Economic Factors: Availability and affordability may influence

fat consumption patterns. Cheaper, less healthy cooking oils may be more prevalent in lower-income households, exacerbating the intake of less healthy fats.

3. Urbanization and Westernization: With increasing urbanization and exposure to Western food trends, there may be a shift towards processed and fast foods high in trans fats, further contributing to unhealthy fat consumption patterns.
4. Health Implications: High intake of saturated and trans fats is associated with an increased risk of cardiovascular diseases, obesity, and other chronic health conditions. Understanding the current consumption patterns is crucial for developing targeted interventions to promote healthier dietary habits and reduce the burden of diet-related diseases in the Egyptian population.

A question on the problem of the consumption pattern of dietary fat in the Egyptian population to

answer.

METHODOLOGY:

The study design descriptive cross-section survey study

Subjects and Setting:

The study focused on the Egyptian population, with samples drawn from key geographic regions including Urban, Lower Egypt, Upper Egypt, and Border areas. The primary unit of analysis was the mother, typically the head of the household. The investigation centered on gathering dietary histories and quantitative and qualitative data from individuals aged 18 to 50 years.

A multi-stage sampling methodology was employed for this study. Initially, Egypt was stratified into four main geographic regions: Urban, Alex; Lower Egypt (including Sharkia, Bheira, and Kalubia), Upper Egypt (comprising Souhag and Quina), and Border areas (specifically Matrouh). Provinces were then randomly selected from each region. The subsequent stage involved cluster sampling of households within designated

locations. Each province surveyed was further divided into urban and rural clusters.

The estimated sample size was determined using Epi Info version 3.3 software, accounting for a population correction factor (N) of 1,000,000, an assumed frequency of the phenomenon under study at 40%, a confidence level of 95%, and a margin of error of 2%. A 10% dropout rate was also factored into the calculation. This methodology yielded a required sample size of 2,592 households.

The distribution of the sample was based on the actual demographic proportions of each geographic area: Urban (17.1%), Upper Egypt (34.7%), Lower Egypt (44.4%), and Frontier areas (3.9%), as per recent demographic data from **CAPMAS (2017)**. Consequently, the sample included 442 households from Urban areas, 1,150 from Lower Egypt, 900 from Upper Egypt, and 100 from Border areas, ensuring a representative sample across the main geographical divisions of Egypt.

Exclusion criteria:

Household members with specific chronic diseases (chronic renal diseases, chronic liver diseases., Diabetes) as people with specific chronic diseases has different dietary recommendations than healthy people that cannot generalized to others.

Dietary assessments:

Qualitative dietary assessment:

Food frequency for all the foods commonly used in Egypt. The questionnaire will include several intakes from each food item daily, weekly, monthly, and per year and the mean intake of each item per once was calculated. Special emphasis on food sources of different fat sources (saturated (red meat, butter, chicken, full cream milk) detailed intake of unsaturated fat Monounsaturated fat (olive oil, olive walnut, fatty fish) polyunsaturated fat (tuna, nuts, vegetable oils (sesame trans-fat industry (processed sources (processed meat, bakeries, processed chicken, chips. Processed cheese, plant cheese. hydrogenated oils. bakeries. creamer. Mayonnaise).

Quantitative dietary assessment:

Twenty-four-hour recall for target individuals. Recall the exact food and beverage intake during the previous 24-hour period. Quantities of foods and beverages consumed are to be estimated in household measures and grams for final analysis using the **NNI Food Composition tables (2006)** Adequacy of the diet consumed will be assessed by comparing the macro and micro-nutrient intake with the recommended dietary and nutrient intake (**FAO/ WHO/ UNU (2002, 2004)**)

Anthropometry assessment:

Assessment of weight, height, BMI according to WHO, and growth standard parameters according to age and gender) (**WHO, 2007**)

Statistical Analysis:

The SPSS version 20 program will be used to analyze the data. Data will be expressed in numbers and percentages, and the parentage of co-morbidity, and the mortality rate can be measured, for qualitative nonparametric variables the median percentiles will be used while in quantitative parametric

data, the mean \pm standard deviation (SD) will be used. The Chi-square test also will be used for qualitative variables to determine the p-values and confidence interval (CI), T-test, ANOVA, and the Pearson correlation test will also be used. Significant statistical correlations between different variables will be detected by using the Chi-square test. The statistical significance correlation is reached if the *P*-value is less than 0.05.

Ethical considerations:

The approval of the research ethics committee of the Ministry of Health and Population and (IN000116)

RESULTS:

A concentrated population in urban centers relative to other places is indicated by **Table 1**, which shows that the urban areas comprise (442) households and a percentage of 17.1% of total areas with a considerable but relatively smaller fraction of the total households examined. a sizeable but comparatively smaller fraction

of all the households polled, suggesting a denser population in cities than in other places. Out of all the demographic areas surveyed, Lower Egypt has the highest number of households (1150) and the highest percentage (44.4) of households, indicating a dense population and potentially significant urbanization outside of major cities. A significant portion of homes (900) are in Upper Egypt, suggesting a sizable population spread over this region's rural and semi-urban areas. In comparison to other regions, frontier areas have the fewest number of households (100) and the lowest percentage (3.9), indicating their sparse population. These regions could be less inhabited or more rural. The total (2592) corresponds to the total number of households studied in all Egyptian demographic areas. Reflecting the heterogeneous population topography of the nation, it offers a comprehensive view of household distribution throughout urban, rural, and frontier regions. All things considered, this table provides a clear breakdown of Egypt's household distribution by key

demographic regions, showing the country's various levels of urbanization and population densities.

Table 2 presents a clear picture of how Egyptian homes are distributed across urban and rural areas, providing insight into the distribution of the population and standard of living in various geographic contexts. The bulk of the houses polled are in rural areas, suggesting that a sizeable chunk of Egypt's population lives outside of cities. This implies that these areas are primarily agricultural or have lower population densities. A sizable percentage of the households polled reside in urban regions, highlighting important urbanization tendencies in Egypt. This includes more populous cities and metropolitan areas with higher infrastructure and population densities. This total corresponds to the total number of households in Egypt's urban and rural areas, giving a thorough picture of the distribution of homes throughout the country. It highlights the various living conditions and socioeconomic dynamics across the country by reflecting the dual

population concentration of the country in rural and urban areas.

The prevalence of BMI categories among participating moms in various demographic areas of Egypt is presented in **Table 3**. It highlights important issues around obesity and overweight in both urban and rural areas, with consequences for public health initiatives and policies targeted at improving the health and well-being of mothers. Underweight moms are found in both urban and rural regions, with slightly higher percentages in rural areas (40). The majority of mothers (329) who are normal-weight reside in both urban and rural areas, indicating a well-balanced distribution of this group across demographic categories. The prevalence of overweight mothers is high in Egypt's rural and urban areas, suggesting that this is a national problem. Mothers are significantly more likely to be obese in rural than in metropolitan areas, with the prevalence being higher in the latter. With 2153 moms taking part, there is a sizable sample size in both urban and rural locations, giving a thorough picture

of the distribution of BMI among mothers in Egypt.

The standard error of the mean, which shows the accuracy of the estimations, and typical values are included in this descriptive overview of nutrient consumption per capita in homes. By showing the range of consumption levels across various percentiles of the population examined in **Table 4**, these percentiles shed light on the distribution of nutrient intake. Additionally, data demonstrates that the average daily consumption of energy and macronutrients in households was (2202.8+21.9) kcal, the average daily intake of COH was 341.1+3.9 g, and the mean daily intake of protein was 72.0 g + 0.847 g. A mean daily amount of 61.2 + 0.97 g of fat and 7.7 ± 0.14 g of fiber were consumed.

Table 5: These data offer a thorough understanding of the amount of fat and its subtypes consumed per person in homes, including information on average values and variations across intake percentiles. Each person consumes 61.2 ±0.97g of total fat on average each day. The consumption

distribution over percentiles reveals that it is 34.56 g at the 25th percentile, 51.04 g at the median (50th percentile), and up to 78.03 g at the 75th percentile. Daily intake of SFA is 20.02 ± 0.32 g on average. SFA consumption ranged from 9.88 g (25th percentile) to 26.12 g (75th percentile) at various percentiles. The range of MUFA intake is from 18.0 ± 9.93 g (25th percentile) to 23.83 g (75th percentile) per day. The average daily consumption of PUFA is 21.6 ± 0.51 grams. From 9.64 grams (the 25th percentile) to 26.86 grams (the 75th percentile), consumption ranges. The daily intake of UNSFA ranges from 20.07 grams (25th percentile) to 48.88 grams (75th percentile), with an average of 39.0 ± 0.78 g. The recommended daily consumption of trans fat is 1.6 grams, with a standard error of 0.02 grams. The 25th percentile of consumption is 0.16 grams, and the 75th percentile is 1.11 grams.

Table (6) Descriptive of the mean of the per capita consumption of macronutrients in different demographic areas of Egypt. There was a statistical difference in the energy intake in 4 demographic areas. The highest energy intake was in

upper Egypt and the lowest energy intake was in urban areas. There is a significant difference in protein intake of the 4 demographic areas. The highest protein intake was in upper Egypt and the lowest protein intake was in urban areas. There is a statistical difference in the fat intake in 4 demographic areas the highest fat intake was in upper Egypt and the lowest fat intake was in urban areas. There was a significant difference regarding Fiber intake among the main demographic areas in Egypt the higher fiber intake was reported in lower Egypt and the lowest fiber intake was reported in urban areas.

Table (7) There was a significant difference regarding Saturated fat intake among the main demographic areas in Egypt. The higher Saturated fat intake was reported in (upper Egypt and the lowest Fat intake was reported in Urban areas. There was a significant difference in Unsaturated fat intake the highest intake was reported in upper Egypt and the lowest Fat intake was reported in urban areas. There was a significant difference regarding mono Unsaturated fat intake among the main demographic areas in Egypt the higher Mon unsaturated fat intake was reported

in frontier Egypt and the lowest Fat intake was reported in upper areas.

Dietary pattern of the household as obtained by food frequency questionnaire

Table (8) The median intake of cereals consumption per capita was (357.14), Tubers (90.26 g/day), Legumes (43.24 g/day), sugar gram55, all meat products (69.5.5 g /day) milk (142.3 ml /day vegetables (142.80 g/day fruits (94.07g /day) (beverage (80.9 ml /day) and nuts (.5 gm /day Dietary pattern of the studied households as obtained by food frequency method showed cereals, (bread, rice), tubers, legumes, and fruits are the food items that consumed by more than 50% of the total samples.

Figure (1, 2) Results revealed that the dietary energy pattern of Egyptians was within the range of the 3 main 3 parameters compared to the recommendation, set by WHO (year). Although the fat/energy ratio and carbohydrates energy ratio were closer to the upper limits of the recommendations the

protein /energy ratio for the Egyptian diet was close to the lower limit of the WHO recommendations the energy derived from free Sugar was >10% as WHO recommendation The contribution of free sugar to the total energy derived from food consumed was 12%.

Table (9) The mean intake of saturated (20gm) per capita per day Dietary energy derived from saturated fat was 8.1 % which is < 10% which was near the upper limit of saturated fat consumption and may exceed that of the recent recommendation by the American heart association of decrease the upper limit of saturated fat intake < 6% of the total energy. The mean intake from polyunsaturated fat was 21.6 gm. The dietary energy derived from polyunsaturated fatty acids, was 8.8% which was within the recommended intake of 6-10% of the total dietary energy intake, However, the average daily mono-unsaturated fatty 18.0 gm which represents 7.3% of the total energy intake while the recommended is from 6-10% as within the recommendation. The dietary energy derived from trans

was 0.65% of the total energy which is <1% as stated by WHO recommendation.

Figure (3) shows the average daily per capita total fat and fatty acid content of the different food items consumed by the study sample figure (3) results of the survey revealed that the daily average per capita total fat of the food consumed was 61.2 gm./day/per capita, while the average daily per capita saturated fat from food was 20.0 gm./day/per capita which represented 32.7% of the fatty acid content of consumed food. However, the average daily per capita monounsaturated fatty acid content of consumed food was 18.0 gm./day/per capita with a percent of 29.2% of the total fat content of consumed food. The polyunsaturated fatty acids content of consumed food by the studied sample was 21.0 gm./per capita /day with a percent of 35.3% of the total fat content of the consumed food. the average daily per capita trans-fat content of fat consumed was nearly 1.6g / day / per capita representing 2.6% of the total energy intake.

Figure (4): shows that the majority of dietary fat was in the form of Visible fat (vegetable oil, butter, and ghee,) accounting for about 63.7% of total dietary fat, and the rest (36.3%) was hidden fat or invisible fat (in meat products, milk, cheese, bakery products, and chips).

Table (11) and Figure 5 show Saturated (20.0g) dietary fat is furnished by both visible and invisible fat but more invisible fat unsaturated (39.6) gm to visible fat 30.2 gm and 9.2 gm of invisible fat. An unsaturated fatty acid dominates the fat pattern of dietary visible fat, most of it supplied 76.3% while representing 23.7% of invisible fat the reverse is observed for saturated fat which represents 55% of invisible fat and 45% of visible fat sources.

Table (12) and Figure (6) The consumption pattern of the fat groups(oils) The most common oils used for cooking are the blended (mixture oils which are the main items in the subsidy oils in the ration card (18.0±5.8) g. per day followed by the plant margarine in different brands in different brands (14.0±0.9) plant oils and animal fat butter (2.3 and 2.26 g /day

respectively) separated buff low consumed in 1.7 g /day by the household (olive oils, cannula oils, and linseed oil), rarely consumed in very minute amounts, fig. 6 showed the intake of invisible fat in the food consumed by Egyptians is found mainly in poultry dairy products, highly fatty meat, processed cheese bakeries, biscuits, and chips respectively.

Figure (7) dietary sources of invisible fat the mean per capita intake of mixture oil 18.2±00) plant margarine (14.1+00) oil butter (2.3+0.12) separated buffo low fat (1.7+.09) plant oil (1.5+0.12) olive oil 1.4+0.0 05) linseed oils. (0.5+00.004) Analysis of the fat content of the suspected sources of invisible fat in Egyptian food by the food composition tables by the NNI (2006).

Figure (8) The mean per capita intake of mixture oil (18.2+.00) hydrogenated oils (14.1+00) oil (1.5+0.12) butter (2.3+0.12) separated buffo low fat (1.7+.09) olive oil 1.4+0.0 05) linseed oils (0.5+00.004). Analysis of the fat content of the suspected sources of visible fat in

Egyptian food by the food composition tables by the NNI (2006)

Figure (9) The total intake of trans fatty acid was 1.6 gm which equals 0.65% of the total calories < 1% of the total calories according to WHO Recommendations. The trans-fat content of different food sources depends on the 100 g content of the food groups by the food composition tables of The NNI (2006) plant margarine), and biscuits. Bakery, chips, sweets, fast food, processed meat, processed cheese, and mayonnaise. creamer was the most frequent item consumed by the Egyptian population.

Figure (10) sources of saturated fat consumption by Egyptian population Food consumption pattern from food items sources of saturated fats dairy per capita Hydrogenated oils. shortening by different generic names was the most common source of saturated fat among the Egyptian population mixture oils were the second most common source of saturated fat and red meat, milk, butter, and

eggs were the other sources of saturated fat but in less amount as

Figure (11) displays the Food consumption pattern from food item sources of polyunsaturated fats dairy per capita mixture oils, which are the oils in the subsidiary oils in the ration card the most common sources of polyunsaturated fats in Egyptian food plant oils are sunflower, vegetable oils were second most commonly sources of polyunsaturated fat. shortening by different generic names the third source of polyunsaturated fat among the Egyptian population. Baked products and red meat, olive oils were the other sources of polyunsaturated fat but in minute amounts as compared to mixture oils

Figure (12) Food consumption pattern from food items sources of monounsaturated fats daily per capita hydrogenated oils (plant margarine) which are the most common sources of monounsaturated fats in Egyptian food mixture oils, were the second most common sources of polyunsaturated fat. Baked products and red meat olive oils

were the other sources of among the Egyptian population monounsaturated fat but in minute amounts as compared to mixture oils., Tuna fish and olive oils which are the richest sources of monounsaturated fat are used in very minute amounts as compared to the recommended increased intake of the monounsaturated fat sources.

DISCUSSION:

Fat is one of three primary nutrients that the body needs, along with protein and carbs. It helps the body absorb key fat-soluble vitamins from diet and produces energy (**Mozaffarian et al., 2010**). The difference between "good," health-promoting fats and "bad," harmful fats is now recognized to have a bigger influence on health than it did in the past few years (**WHO 2022**). The goal should be to choose more healthy unsaturated fats and limit unhealthy trans and saturated fats, as opposed to cutting back on total fat intake to follow a low-fat diet (**U.S. National Library of Medicine. 2202**). Based on present data, the average daily energy consumption was 2204 kcal. Fat accounted for

25% of the average daily energy intake, protein for 13%, and carbohydrates for 62%. The survey's findings demonstrated that as long as the amounts of all three fat subtypes saturated, unsaturated, and trans were within the WHO recommendation, the average daily per capita intake pattern for total fat and fatty acid subtypes was consistent with the **WHO's 2017** recommendation (**WHO, 2018**). A similar conclusion was drawn from an Indian study carried out in 2016: the average daily intake of trans fat per person was roughly 1.6 grams or 0.65% of total calories (**Mani 2016**). The average consumption of saturated fatty acid (SFA) and fat was low. Similar to what happened in the US ten years ago, countries like Egypt and others are today witnessing a significant increase in the prevalence of obesity despite a decline in fat consumption of fat and saturated fat (**Micha, 2010**). As a result of their proactive approach to the issue, the US Dietary Guideline Advisory Committee removed the upper limit for fat intake in their most recent dietary reference intake (**Lele 2022**) The World Health

Organization suggests that the ideal edible oil has a proportionate ratio of SFA:MUFA: PUFA of 1:1.5:1 (**WHO, 2010**). Based on several decades of research. Regrettably, not all naturally occurring vegetable oils possess this perfect balance; some are more PUFA-rich than others. One method that can enhance one's health is the most effective way to ensure that the "perfect" oil contains the appropriate concentration of MUFA and PUFA blending oils. (**Mani., 2016**). Studies on the effects of consuming a combination of oils on positive synergy in humans have demonstrated statistically significant reductions in plasma lipid fats in Eastern countries and inflammation, which in turn reduce the risk of coronary heart disease. Thankfully, due to their well-established benefits, blended oils have been recommended by the National Institute of Nutrition (**NIN**) for a healthy diet (**Egyptian Food Composition Tables, 2006**). This recommendation made sense given that the majority of oil used in Egyptian cooking is blended oils, the mix that is subsidized on ration

cards. 1.65 grams of trans fat, or 0.65% of total calories, were found in Egyptian food. This proportion includes solid oils processed meat, mayonnaise, creamer, biscuits, chips, and sweets; these items are a result of the consumption of trans fat. It was found that the increased consumption of total fatty acid. TFA in Iran accounted for 4.2% of EI in Lebanon 2.2% to 2.3% in Jordan, the least amount coming from Sudan (**Al-Jawaldeh 2021**). The second most popular type of fat in Egyptian cooking is hydrogenated vegetable oil, with overall consumption being within recommended limits. There is proof that hydrogenated vegetable oil has detrimental effects on blood sugar regulation, heart health, and inflammation. According to an Iranian study, a lot of bread was consumed, which is in line with findings from (**Renata., 2022**). The Iranian people frequently ate baked goods. The most often eaten food items as TFA food sources in Morocco and Pakistan include bakery product shortening, hard margarine, fat spreads, and partly hydrogenated vegetable oil. The TFA's policies are inadequate and

inconsistent with global best practices (**Nasreddine 2006**). Compared to findings from other Eastern nations, Egyptians ingested 8.5% of the total caloric intake in the form of saturated fat. In Tehran, 11% percent, Iran, 8.7%, 13% Lebanon, 11% Morocco, 9% Oman, and 11% Dan KSA 13% Sudan Eight percent of Syria 10% is 9.5% (**Bowman 2017; Roger 2011**). The Dietary Guidelines for Americans 2020–2025 state that (DGA), individuals should limit their daily calorie intake from saturated fat to no more than 10%. According to a US study on fatty acid consumption, total fat makes up 37% of an average person's calories, saturated fat makes up 14.5%, and monounsaturated fat makes up 12% (**Micha, 2014**). The Mediterranean Diet is one nutrient-dense eating plan. Higher levels of adherence to the Med Diet pattern are linked to a reduced death rate, according to epidemiological research, when this eating pattern is also adopted to protect against glycemic management and lower cardiovascular risk, which in turn promotes better control of diabetes (**Capurso, 2017**). Increased

consumption of fruits, vegetables, legumes, seafood, and dietary sources of monounsaturated fat are the cornerstones of the Mediterranean diet. Unfortunately, research from Lebanon, Syria, and the United Kingdom revealed a lower consumption of Mediterranean diet items because less of its constituents were consumed overall (**Sleiman 2015; Scarmeas 2006; Marventano 2018**). People are less strictly adhering to the Med Diet as a result of being forced to move to less-priced but typically higher-calorie products (**Karam, 2022**). The results of the survey show that dietary sources of monounsaturated fat, which are the richest sources, like olive oils and tuna fish, are consumed at lower levels. Furthermore, there was little compliance with the other Med Diet components Combination oils, or the oils in the subsidiary oils on the ration card, were the most popular source of polyunsaturated fats. Plant oils from vegetables and sunflower seeds accounted for the second most prevalent source of polyunsaturated fat in Egyptian cuisine, with hydrogenated oils

also referred to by other names coming in third. Less than 10% of total calories were obtained from polyunsaturated fat, which is in line with the worldwide statistics on fat consumption from Iran. Food consumption patterns in Egypt showed that cereals, bread, rice, sugar, tubers, meat, legumes, vegetables, and fruits were the most frequently consumed foods. There was the average daily consumption of fruits, vegetables, dairy, and seafood. The present results concurred with those of current results agreed with Lebanon's findings for the number of fruits and vegetables reported. The country profile of Iran corroborated our results (**Renata 2022**). A study conducted in Iran found that people were eating less meat and more grains. Meat and poultry items were admitted at a mean of 91.7 g per day, with chicken coming in second at 36.1 g per day. It was shown that very little fish was consumed (19.7 g per day). Milk was the least popular dairy product, consumed in days (**Mohammadi 2021**). Worldwide, the prevalence of overweight and according to epidemiological

research, obesity significantly increases the.) obesity is rising (WHO 2018) risk of developing metabolic syndrome-related cardiovascular diseases, type 2 diabetes mellitus (T2DM), chronic kidney disease, many cancers, and infertility in women (Stevens 2020). According to our data, the majority is overweight (>33%), while the minority is underweight (%0.03). Over half of the sample, or 34.9%, were obese. The typical distribution of weight is 12% in cities and 53% in rural areas. The same result of 32.5 and 39.4% (38.29) for overweight and obese people, respectively, was discovered in Ghana according to the percentages 32.5 and 39.4% (Ofori 2016; Bakuri 2021) for being overweight or obese, respectively. Kuwaitis' increasing rates of obesity and overweight, together with their rising consumption of calories and macronutrients and declining intakes of fiber and micronutrients, are prime examples of the country's nutritional shift (Zaghloul.,2013).

CONCLUSION:

The average daily

consumption of energy per person was 2202 kcal, proteins were 72.0 g/day, and fat was 61.2 g/day. Protein made up 13% of the total energy, fat made up 25%, and carbs made up 62.0%. Free sugar made up 10% of the total energy obtained from the meal that was ingested. The Egyptians' dietary energy pattern fell within the WHO's recommended range. The amount of dietary energy obtained from the trans-fat content of the food ingested was 0.6% of the total energy, which is less than 1% as recommended by the WHO. The overall amount of fat consumed was sufficient, but the amount of saturated fat consumed was nearly twice as much as recommended that is, more than the recent recommendation of the American Heart Association.

RECOMMENDATION

- ❖ Dietary diversification for the different target populations is recommended for a healthy diet
- ❖ Measures of regulations of labeling for beverages and processed food for their content of fats
- ❖ More concern to be given to

quality of fat apart from quantity of fat.

- ❖ There is a need to increase the recommendations for MUFA consumption

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Table (1) Descriptive of the Household numbers in demographic areas of Egypt

Demographic areas of Egypt	Number	Percent
Urban	442	17.0
Lower	1150	44.4
Upper	900	34.7
Frontier	100	3.9
Total	2592	100.0

Table (2) Descriptive of the Household numbers in location (urban and rural) of Egypt

Location	Number	percentage
Rural	1368	52.8
Urban	1224	47.2
Total	2592	100.0

Table (3) Distribution of participating mothers according to MBI in demographic areas of Egypt

BMI/ Site	Total				total
	Underweight <18	Normal weight 18.5-24.9	Overweight >25-30	Obese >30	
Urban	36	154	167	649	1006
Rural	40	175	191	741	1147
Total	76	329	358	1390	2153

Table (4) Descriptive of nutrients for household (per capita macronutrient)

Nutrients	Mean \pm SE	25th Percentile	50th Percentile	75th Percentile
Water (ml)	560.8 \pm 26.2	324.62	457.11	652.97
Kcal (Jol)	2202.8 \pm 21.9	1542.6	2008.7	2611.11
CHO (g)	341.1 \pm 3.9	240.56	313.18	409.20
Protein (g)	72.0 \pm 0.85	46.76	65.24	90.90
Fat (g)	61.2 \pm 0.97	34.56	51.04	78.03
Fiber (g)	7.7 \pm 0.14	4.96	6.73	9.07

Table (5) Descriptive of fat and fat subtype (mean \pm SE) for household (per capita household)

Nutrients	Mean \pm SE	25th Percentile	50th Percentile	75th Percentile
Total Fat (g/ day)	61.2 \pm 0.97	34.56	51.04	78.03
SFA (g)	20.02 \pm 0.32	9.88	16.43	26.12
MUFA (g)	18.0 \pm 0.31	9.93	15.82	23.83
PUFA (g)	21.6 \pm 0.51	9.64	16.78	26.86
UNSFA (g)	39.0 \pm 0.78	20.07	32.66	48.88
Trans (g)	1.6 \pm 0.02	0.16	1.06	1.11

SFA= Saturated Fatty Acids, MUFA= Monounsaturated Fatty Acids, PUSFA=Polyunsaturated Fatty Acids, USFA=Unsaturated Fatty Acids, Trans =Trans Fatty Acids

Table (6) Descriptive of the mean of the per capita consumption of macronutrients in different demographic areas of Egypt

Area	LOWER	Upper	URBAN	Frontier	P VALUE
Calories (KCAL)	2187.86	2460.06	1981.029	2021..513	0.012
CHO (g)	341.75	386.710	313.858	307.515	0.0109
Protein (g)	73.274	84.25	64.596	68.377	0.006
Fat (g)	57.64	64.00	55.65	56.784	0.001
Fibe (g)	8.157	7.886	6.706	7.175	0.001

The mean difference is significant at $P < 00.05$

Table (7) Descriptive of the mean of the per capita consumption of fat subtypes in different demographic areas of Egypt

Area/subtype of fat	LOWE R	Upper	URBAN	Frontier	P VALUE
SAT (gm)	15.3	18.48 _±	15.34 _±	17.03	0.002
PUFA (gm)	16.962	17.101	14.555	15.275	0.000
MUFA (gm)	14.586	15.778	13.262	14.592	0.000
UNSAT (gm)	31. 549	32.87	27.8157	29.86.165	0.000

Consumption Pattern of Dietary Fat in the Egyptian Population: A comprehensive analysis

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Table (8) Mean, median, standard deviation, and quartiles of food groups consumption in households (per capita) in Egypt by food frequency questionnaire

food items	Cereals	Tubers	Legumes	meat product	Milk & product	Vegetables	Fruits	Sugars	Fat	beverage	Nuts
Mean	396.64	108.65	46.56	77.34	145.09	159.49	96.66	60.99	39.6	109.48	0.54
Median	357.14	90.266	43.24	69.54	142.26	142.86	94.07	48.94	39	80.8	0
Std. Deviation	7.68	6333.9	1.62	528.50	11.56	3.1	2.74	2.4	3.1	33.33	3.39
Percentiles	25	214.1	57.3199	29.01	5851.69	82.31	71.43	32.32	22	127.8	0
	50	357.1	7092.2	43.24	8339.79	142.26	142.86	94.07	55.94	80.8	0
	75	476.44	10531.3	63.55	11672.8	195.49	214.6	114.59	76.43	48	142.58

Figure 1): Average daily per capita macronutrient intake from total calories of food consumed by the household.

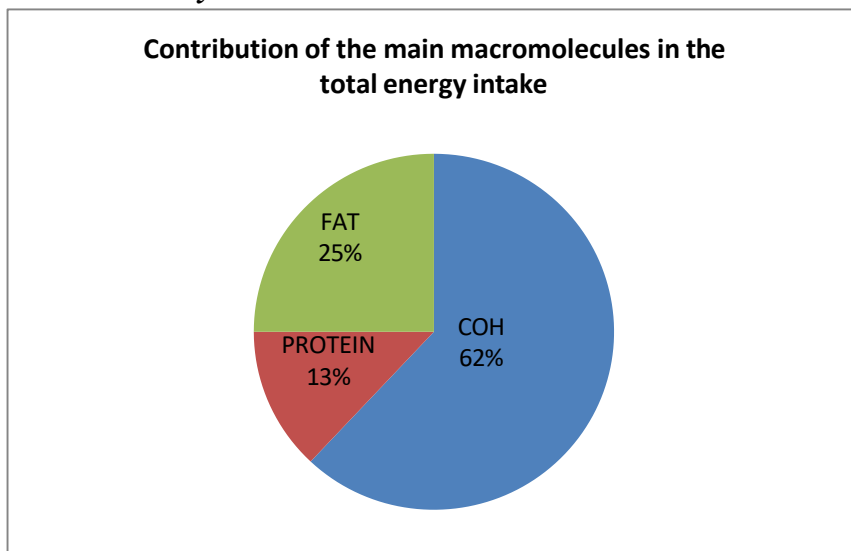
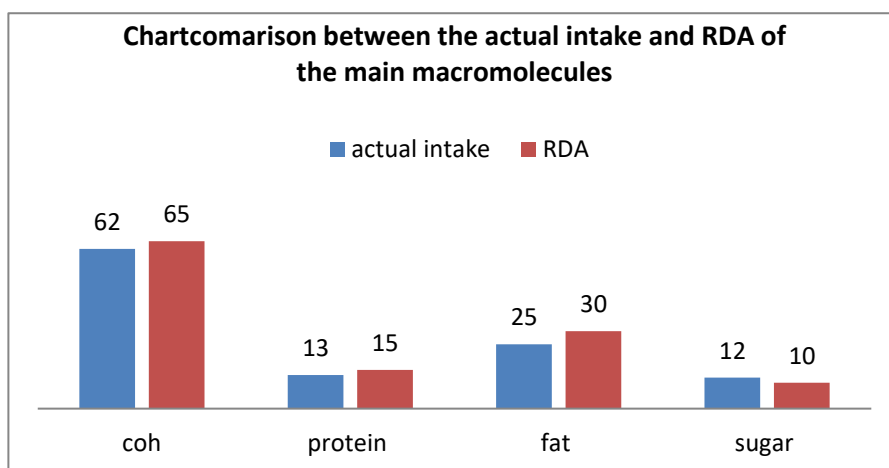


Figure (2) Comparison between the actual intake of macromolecules RDA from the total energy intake



**Table (9): Dietary energy pattern of food consumed by Egyptian
Fat consumption pattern by fats subtype (g/capita/day)**

Type of fatty acid	Amount (g)	Energy (Kcal)	Dietary energy (% of total energy)	Recommended energy levels (%)
Saturated fat	20	180	8.17%	7-10%
Polyunsaturated	21.6	194.4	8.8%	6-10%
Monounsaturated	18.0	162	7.3%	6-10%
Trans	1.6	14.4	0.65%	<1%
Total fat g.	61.2	550.8	25.01%	20-30%

Figure (3): Average daily percentage of the dietary fat subtypes from the total fat intake population (g/capita/day).

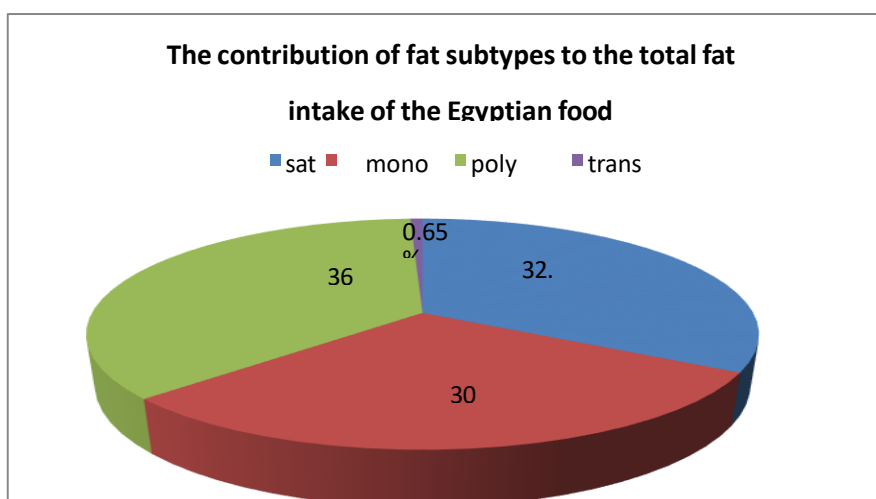


Figure (4): Fat and fatty acid pattern by source of fat (g/capita/day).

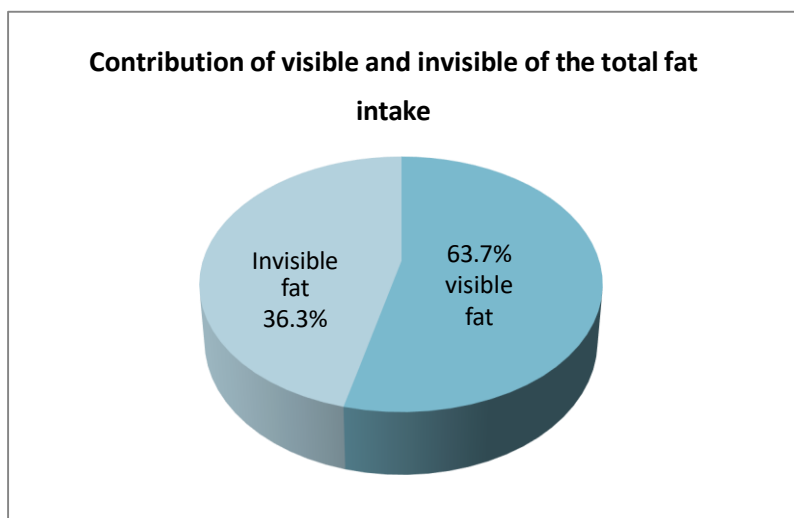


Table (11) percentage distribution of saturated and unsaturated fat from visible and invisible fat sources

Type of fat	Saturated g; (%)	Unsaturated g; (%)	Trans g; (%)	Total fat g; (%)
Total visible fat	9.0 g (45%)	30. 2g (76.3 %)	0.85 g (53%)	40.05 g (65.4%)
Total invisible fat	11.00 g (55%)	9.4 g (23.7%)	0.75 g (47%)	21.08g (34.6%)
Total	20.0 g (100%)	39.6 g (100%)	1. 6 g (100%)	(61.2 g)100%

Figure (5): Fat and fatty acid pattern by the source of fat (g/capita/day)

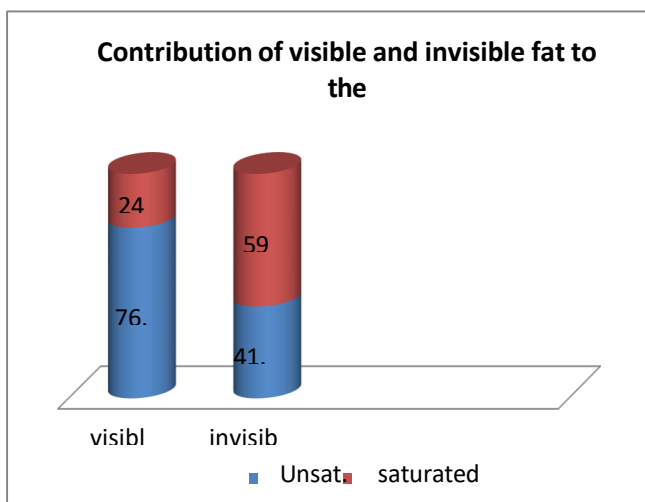


Table (12) Comments oils in consumption pattern of fat groups among the Egyptian population

Type of fat	<i>Mixture oil</i>	<i>Plant margarine</i>	<i>Plant oil</i>	<i>butter</i>	<i>Separated fat</i>	<i>Coconut . Oil</i>
Mean intake of oils / g	18.0	14.00	2.3	2.26	1.7	0.005
Std. Error of Mean	0.9	1.8	0.93	0.31	0.08	0.0001

Figure (6) Comments oils in consumption pattern of fat groups

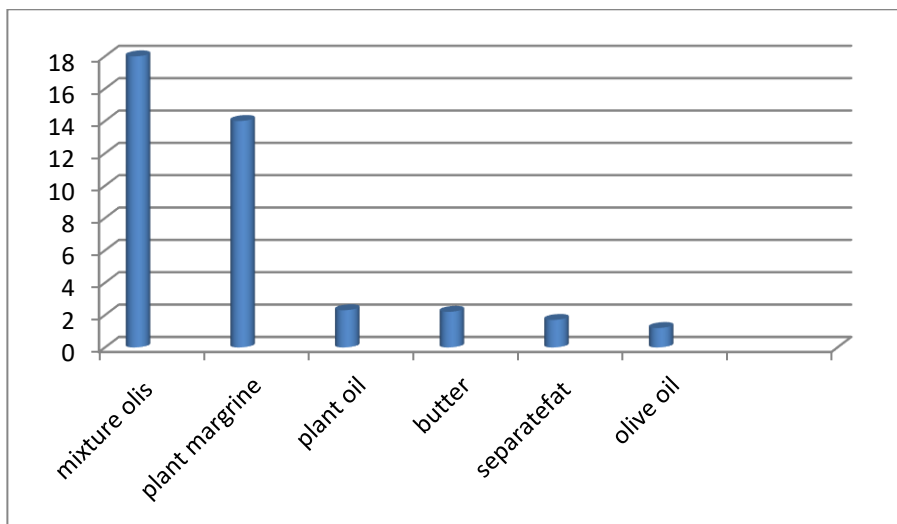


Figure (7) The most frequent sources of invisible fat intake in the Egyptian food consumption population

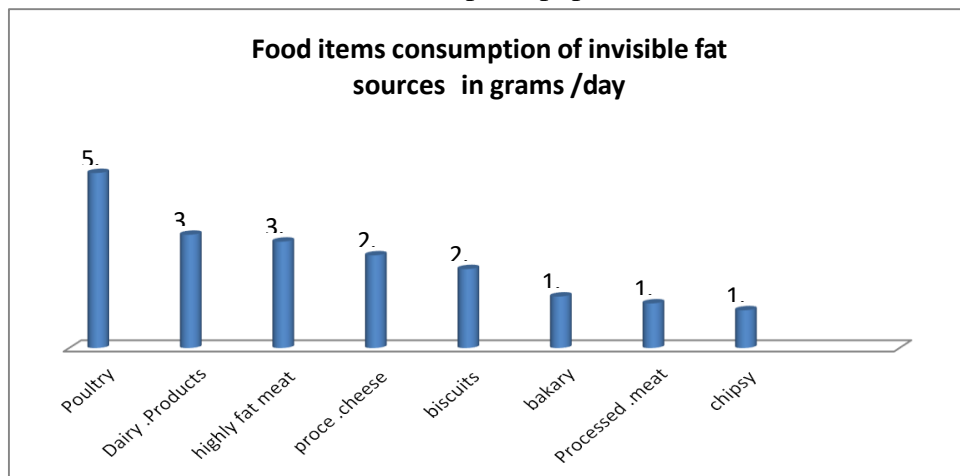


Figure 8: food items consumption of visible fat in grams

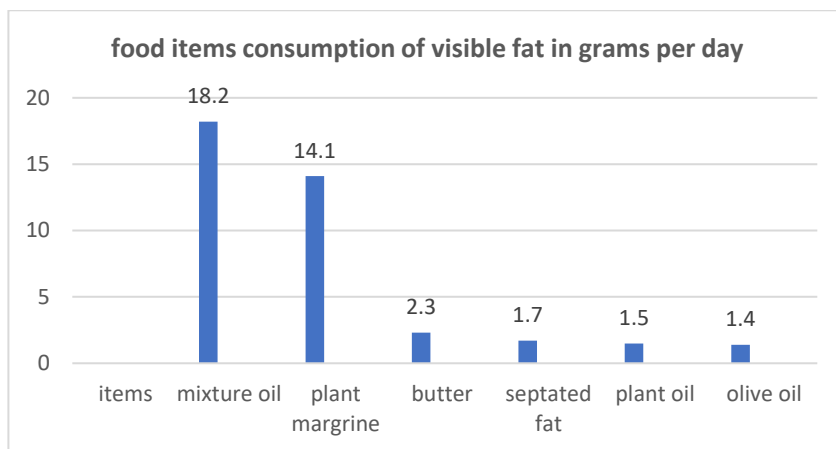


Figure (9) The common food items' sources of trans fat in Egyptian food Fat content of the suspected sources of trans fat in Egyptian food

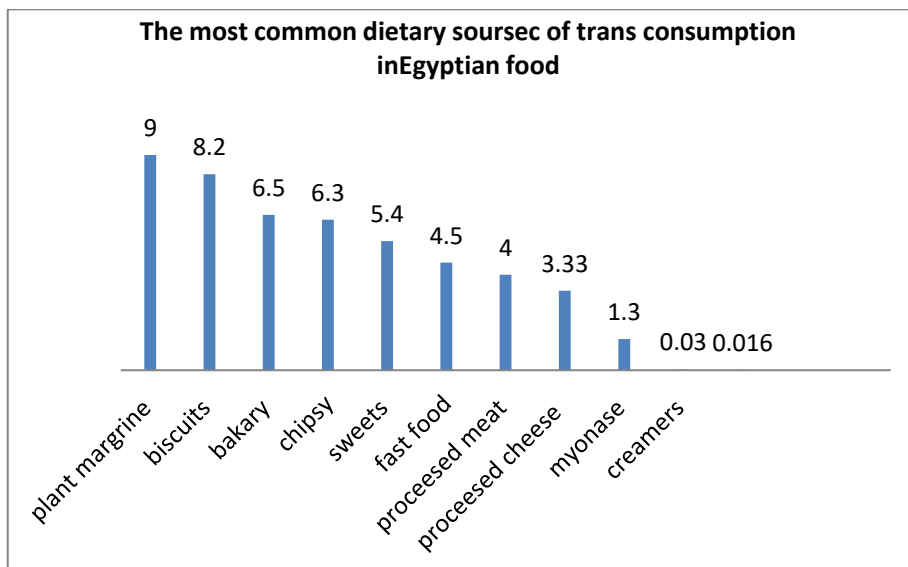


Figure (10) sources of saturated fat consumption by Egypt

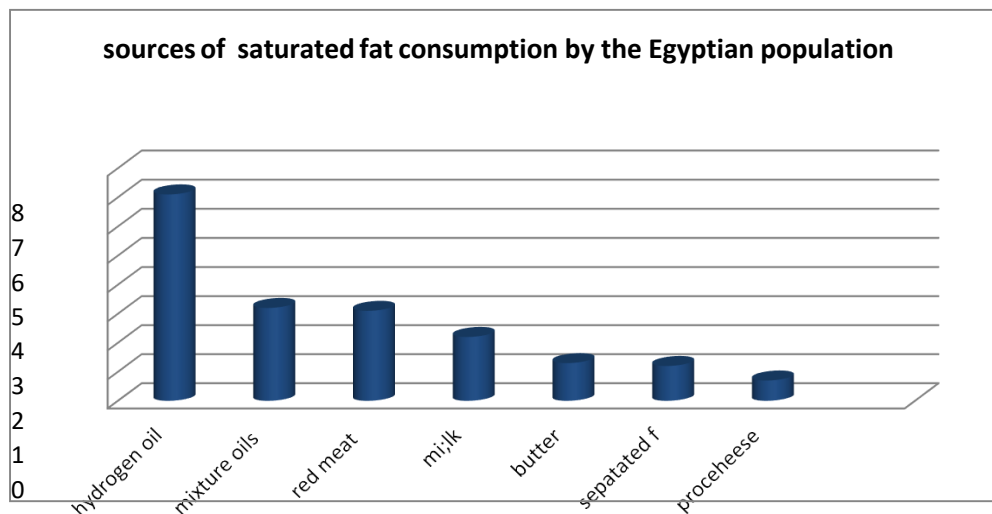


Figure (11) Food sources of polyunsaturated fat in Egypt

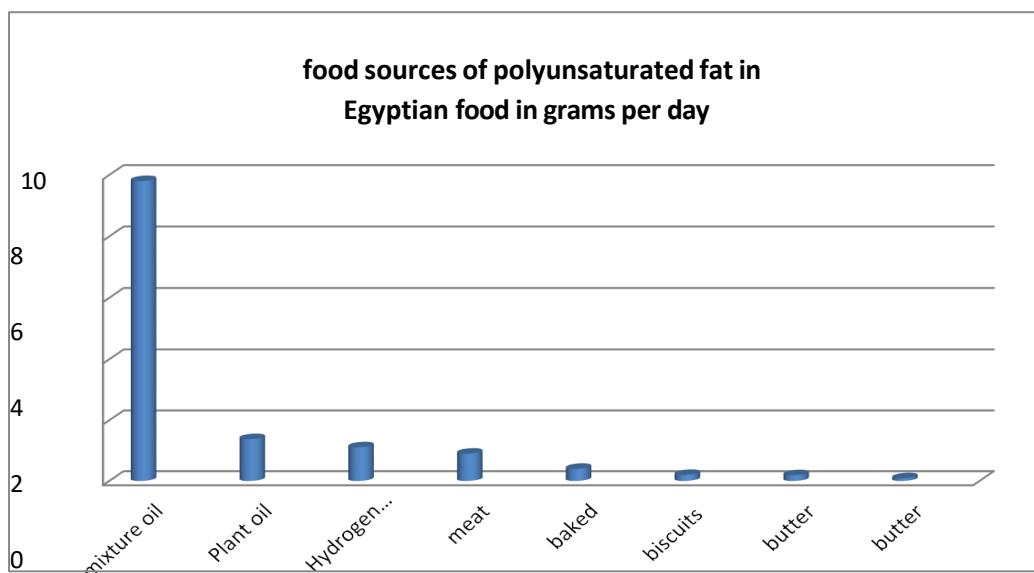
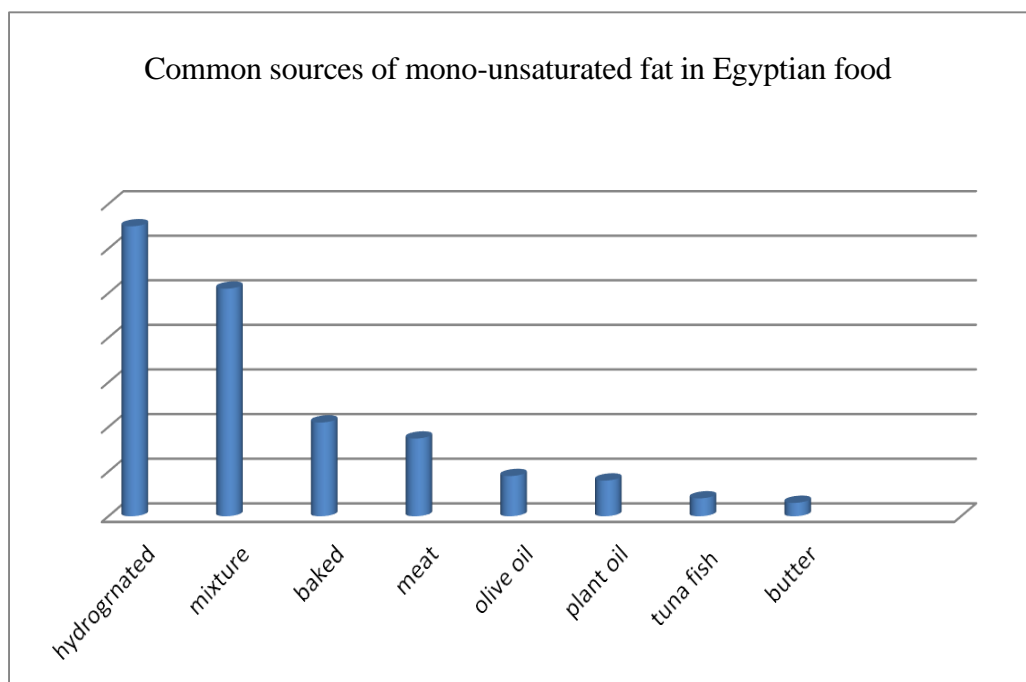


Figure (12) Common sources of mono-unsaturated fat in Egyptian food



نمط استهلاك الدهون الغذائية لدى السكان المصريين: تحليل شامل

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الملخص العربي

تشير الأمراض غير السارية، قلق الصحة العامة بسبب آثارها الكبيرة على السكان وأنظمة الرعاية الصحية، تشير ما يقرب من 71% من الوفيات في جميع أنحاء العالم تحدث بسبب الأمراض غير السارية كل عام. وتحدث 80% من الوفيات الناجمة عن الأمراض غير السارية في الدول المنخفضة والمتوسطة الدخل،. الهدف من البحث دراسة نمط استهلاك الدهون للأطعمة وأنواع الدهون الفرعية وتوفير المعلومات الأساسية المتعلقة بالمدخول الغذائي والمصادر الرئيسية للدهون المتحولة في مصر. المنهجية: المسوحات الوصفية المقطعية لعينات السكان المصريين من المناطق الرئيسية في مصر، بما في ذلك المناطق الحضرية وحدود مصر السهلية والمناطق العليا. سيتم إجراء مقابلة مع الأم من كل عائلة لطرح سؤالين كميين حول استهلاك الغذاء لتحديد كمية الطعام المتناولة، على أن يتراوح عمر الأم من 18 إلى 50 عامًا. سيتم سؤال وحدة العينة والأم وأفراد الأسرة الذين تمت مقابلتهم عن تاريخهم الغذائي الرئيسي، النتائج بلغ نصيب الفرد من استهلاك الطاقة 2022 سعر حراري واستهلاك البروتين 72.0 جم/يوم، واستهلاك الدهون 61.2 سعر حراري/يوم في المتوسط. يشكل البروتين 13.1% من إجمالي الطاقة، والدهون 25%، والكربوهيدرات 62.0%. ويشكل السكر الحر 11% من إجمالي الطاقة التي يتم تناولها. يقع نمط الطاقة الغذائية لدى المصريين ضمن النطاق الموصى به من قبل منظمة الصحة العالمية، وكانت كمية الطاقة الغذائية التي تم الحصول عليها من محتوى الدهون المتحولة في الأغذية المستهلكة 0.6% من إجمالي الطاقة، أو أقل من 1%. وكان تناول الدهون بشكل عام كافيًا، ولكن تناول الدهون المشبعة وكانت الدهون تتجاوز الحد الأعلى الموصى به تقريبًا، بينما تجاوزت أحدث التوصيات الصادرة من جمعية القلب الأمريكية. حول استهلاك الدهون المتحولة في الزيوت المهذجة، واللحوم المصنعة، والدجاج، والمخبوزات، والبسكويت، والوجبات السريعة، ورقائق البطاطس، والحلويات توصية. وهذا أمر مثير للقلق لأنه يؤكد على الحاجة إلى التنقيف الغذائي المستمر حول النمط الصحيح لاستهلاك الدهون الصحية منع الإفراط عن استهلاك الدهون الضارة .

الكلمات المفتاحية: نمط استهلاك الدهون – السكان المصريين – الغذاء