

Studying the canned fish consumption among female students in AL-Dilam governorate

دراسة استهلاك المعلبات السمكية للطالبات بمنطقة الدلم

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Abstract:

The research aims to identify the nutritional behavior of canned fish consumption for different study stages in Al-Dilam governorate. The research problem is canned fish consumption without knowing its nutritional value and the extent of the pollution to which it is exposed. To achieve the research objectives, the quantitative descriptive method was used to collect data that were collected from the students randomly. The sample size included 305 person. The research results indicate that (67.2%) of the total study sample were consuming tuna and they are the largest group, while (3.9%) were consuming sardines, (41%) of which were eating tuna sandwiches at home breakfast. It turns out that (43.6%) were eating canned tuna twice a week, and (29.8%) were eating canned tuna more than

four times a week. The sandwiches prepared at home were packaged as breakfast at school, it turns out that (41.3%) are through a plastic container, while (48.9%) were wrapping sandwiches in polyethylene (nylon bags). The results indicate that (43.3%) were eating it as breakfast at school, from which (14.8%) were eating the sandwiches prepared at home after 20 minutes and (36.4%) ate it after 2-4 hours. We advise for further studies to look for the nutritional value of canned fish, their content of contaminated materials, the percentage of contamination in canned foods and the extent of these materials' danger to achieve safe food for humans

Keywords: Canned fish, consumption, female students, Al-Dalam,

1. Introduction

Seafood, including sardines, tuna, and mackerel, has been known for its high-quality nutritional value in its content of protein, vitamin B group, and mineral salts such as potassium, iodine, calcium, and magnesium. It is a good source of omega-3 polyunsaturated fatty acids (Hassan et al., 2021). Also, the fat of sardines and mackerel fish contains omega-3 polyunsaturated fatty acids by 33 and 20%, respectively, of the total fatty acids in them (El Tawill et al., 2004; Shahtter et al., 2008).

Several studies indicated the health benefits resulting from consuming fish and its products, as well as foods fortified with omega-3 fatty acids in terms of improving performance behavior and educational attainment of students (Rahmawaty et al., 2013), as well as the role of omega (Eicosapentaenoic Acid, EPA, Docosahexaenoic acid) in the prevention of cardiovascular diseases and cancers (Ahmad et al., 2016; Abuhlega & Hassan, 2017; Mcmanus et al., 2007).

Although there are many types of fish in nature. Some types are preserved in canning, including tuna, sardines, and mackerel (Amal & Hamad, 2012). The amount of

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tuna fish consumed in major countries is estimated at 70% of the total consumption of seafood. These types are characterized by many characteristics in terms of their suitability for use. It is also used in many meals and it is approved by many consumers in addition to its cheap price compared to other seafood (Food and Agriculture Organization of the United Nations, 2018; Kumar et al., 2017; ALRiyam et al., 2016; Madhavi & Kusuma, 2015).

Statistics indicate an increase in the consumption of canned fish during the period 2005-2015, and the average annual per capita consumption in Europe of canned fish was 2.78 kg in 2016 and most of it was tuna, and constituted 11% of the total types of fish and its products consumed during the year (Brian O'Riordan, 2018; Food and Agriculture Organization of the United Nations, 2020). While the consumption of canned fish (tuna, sardine, mackerel) in Libya constituted 50% of the average annual per capita share of fish and was estimated at 6.5 kg /person /year (Abuhelga & Hassan, 2017). The consumption of canned fish in the Kingdom of Saudi Arabia was estimated at 58% of sardines, 47% of tuna, and 37% of mackerel compared to fresh fish products (McManus et al., 2007; Madlavi & Kusuma, 2015; Khun et al., 2018).

Tuna is a large pelagic fish of the Thunnini family. There are six species of tuna in the world. They represent 75% of the world's production, including skipjack tuna, albacore tuna, yellowfin tuna (YFT), and bluefin tuna (*L. Thunnusthynnus* 's tall is about 300cm and weight up to 600 kg) (cited in Bacush, 2019). Tuna fish live in large groups in both warm and cold water at varying depths that may reach 300 meters. The most important of which are warm-water species (such as bluefin tuna) (Al-Kabier et al., 2020; Al-Snousi, 2009).

In recent years, as a result of environmental pollution from various sources which affected most of the products, it was necessary to deal with aquatic life with high accuracy of control and follow-up, especially in terms of the toxic metals, the most important part of which is the accumulation of the various parts of the cans. And scientific sources show that among these elements that reach fish are lead (Pb), arsenic (As), tin (Sn), and red copper (Cu) (Zn)(Amal & Hamed, 2012; Reem, 2001; Food and Agriculture Organization of the United Nations, 2018; Ahmad et al., 2016; Park et al., 2010; Silva et al., 2011).

Studies at the University of Babylon in Iraq were conducted to examine concentrations of some heavy elements in canned food indicated health risks to the consumer and as a result of the absence of health and environmental control over what is produced, supplied, and available in the local markets that threatened the safety and security of the consumers food safety (Al-Salman & Jeb Allah, 2011; Jobara & Ratul, 2016).

2. Problem

The American study was conducted on about 9000 people during the period between 2003 and 2010. The subjects answered specific questions, such as what exactly they ate in the previous 24 hours. The scientists then took urine samples and analyzed them to see the results. The results showed that some chemicals related to phthalates were found in abundance in people who ate prepared foods, such as di (2-ethylhexyl) phthalate and Di-isononyl phthalate. This indicates a higher level of phthalates in people who ate ready-to-eat foods, Zotta explained (Ahmed et al., 2016).

While a third chemical was found in abundance in those people who ate fast food. It is a substance (Bisphenol A) that is used in the manufacture of plastics and the composition of the coating material for thermal aluminum foil. Scientist Zota, for his part, advised avoiding eating canned materials of all kinds, quoting the German "Heil Praxis" website.

As well as not eating vegetable preparations and biological milk because these materials are prepared and transported through plastic tubes that may contain the same risks as food cans (Ahmed et al., 2016; A Cope Med, 2000).

What distinguishes sardine cans fish in terms of nutritional value are two things: its fat content, and its calcium content. In a regular-sized can of sardines, we find about 200 calories of calorie energy, about 25 grams of protein, and 13 grams of fat. Of those fats, the omega-3 fats of fish oil make up about two grams. A can of sardines contains less than 0.3 grams of salt.

And due to the lack of studies and research in this field on tuna and other types of canned fish, and due to the multiplicity of daily meals prepared from them, especially in workplaces, colleges, schools, and other locations. To prepare the best meal easily, the necessary precautions must be taken when choosing the best-canned fish products, taking into account the frequency of consumption and the quantities consumed to reduce the accumulation of heavy metals in the body because of their health risks to humans, and through what we discussed previously, we ask the following question: What is the reality of consuming canned fish among female students in Ad Dilam Governorate? Hence the questions of this exploratory study:

What kind of canned fish is consumed?

What are the times for students to eat tuna sandwiches?

How do students eat canned tuna?

What is the source of getting tuna sandwiches for school breakfast?

How are sandwiches prepared at home as breakfast at school?

How long do homemade sandwiches last before eating them at school as breakfast?

3. Objectives of the study

This study aims to determine the consumption behavior of canned fish: the type of canned fish consumed by female students, the times when the students eat the tuna sandwiches, how they eat them, the source of the tuna sandwiches, also the length of time between preparations before eating them for breakfast at school. And how are the sandwiches prepared at home.

4. Importance of the study

The study receives more attention on the consumption of canned fish, adopting a specific method to spread healthy eating behavior to achieve good health and physical and psychological stability, especially for students through educating consumers about canned fish.

It is a necessity to take care of the mental health of individuals in general and students in particular, as well as the danger of consuming canned fish. Detecting such phenomena and avoiding their negative effects.

5. Determinants

5.1. Behavior

It is a term that includes human activity in his interaction with his environment, modifying it so that it becomes more suitable for him, or self-adaptation, with it to achieve for himself the greatest degree of compatibility with it. In this study, behavioral patterns of university students when they consume canned fish.

5.2. Consumer behavior

It is the set of operations and activities that people prepare and reside in for searching, choosing, purchasing and using, and evaluating goods and services until their needs and desires are satisfied (Al Riyami et al, 2016, p.1120). In this study, the students' behavior when exposed to food when consuming canned fish.

5.3. Consumption of canned fish

It is the total score obtained as a result of applying the study questionnaire to a sample of female students residing in the Dulaim region at Prince Sattam University in the Kingdom of Saudi Arabia for the academic season 2021-2022.

6. Materials and Methods

6.1. Design

Based on the scope of this study and the nature of the questions and objectives that the study seeks to achieve, the researcher relied in his study on the descriptive approach, which is defined as a set of research procedures carried out by the researcher in an integrated manner to describe the researched phenomenon based on collecting facts and data, classifying them, treating them and analyzing them carefully to extract their significance and reach the results. Or generalizations about the phenomenon or the subject under research (Manthey-Karl et al., 2014). Descriptive research may go beyond

description to interpretation within the limits of the methodological procedures followed, and the researcher's ability to organize scientific interpretation to describe a specific phenomenon and depict it quantitatively through collecting data and information codified about the phenomenon.

6.2. Participants

The study population is all individuals who are the subject of the study problem. In light of this, the study community consists of education students at the academic levels in the Kingdom of Saudi Arabia, where the study population reached 338 students.

Table 1 Distribution of the study sample according to the educational stage variable

The educational stage	Frequency	Ratio %
Primary	33	10.8
Preparatory	29	9.5
Secondary	106	34.8
University	117	38.4
Others	20	6.6
Total	305	100

The table shows the distribution of the study sample members according to the educational stage variable, as it was found that (10.8%) of the total study sample were in the primary educational stage, while (9.5%) were in the middle educational stage, and (34.8%) were in the secondary stage, and that (38.4%) were in the university, and they are the largest group in the study sample. Finally, it was found that (6.6%) were in another educational stage (institute).

6.3. Instruments

We focused on the most appropriate tool to activate the objectives of this study, which is the questionnaire more than the rest of the tools, due to the lack of basic information related to the topic in addition to the difficulty in obtaining it. Fisheries, where the main objective was to be comprehensive of the various pillars of theoretical research to give a realistic picture of the practices associated with the subject of the study.

In this study, we relied on a questionnaire containing a set of questions to collect the necessary data and this is to response to answer the questions asked and help in evaluating the nutritional behavior and consumption of canned fish. The questionnaire included the following:

- Questionnaire subject: which is clarified in the introduction to the questionnaire.
- The purpose of the questionnaire: This is also explained by the introduction included in it.
- Explanation of the answer method: by placing the mark (X), in the appropriate box for the answer.
- Type of Questions: In the questionnaire, we relied on questions of the closed type, where the questions included several options that are differentiated and chosen

between them. Components of the questionnaire: We divided the questionnaire into two parts as follows:

- Part One: It includes the personal data of the study sample, namely: gender and educational level.
- The second part: consists of (8 sentences), through which we wanted to reveal the nutritional behavior and consumption of canned fish.

Validity and stability tests: internal consistency and reliability of the study tool has been tested by calculating the Pearson correlation coefficient to find out the internal validity of the scale, where the correlation coefficient was calculated between the degrees of each items of the scale with the total score. The validity and the stability of the questionnaire are shown in the following table.

Table 2 Correlation coefficient of items with the total score of the tool

Item number	Correlation coefficient
1	0.569**
2	0.593**
3	0.605**
4	0.657**
5	0.682**
6	0.643**
7	0.555**
8	0.559**

Alpha Cronbach stability coefficient = 0.888
 Fragmentation stability coefficient = 0.917

**Significance at 0.01

It is clear from Table2 that all the components of the tool increase the domain stability by 0.888 which is high. This indicates that the domain has a high degree of stability. It is also clear from the table that all the correlation coefficients between the tool items and the total score as well as the total emitted from it the positive and statistically significant item degree at the significance level of 0.01 or less which indicates that all the domain items have a high degree of validity.

6.4. Data analysis

To achieve the objectives of the study and analyze the data collected through the study tool from the field side, many appropriate statistical methods were used using the statistical package for the social sciences program SPSS.

- Frequencies and percentages were used to find out the responses of the study sample about the study axes.

- Cronbach Alpha coefficient and Pearson correlation coefficient were calculate to test the validity and the stability of the study tool.

7. Results and Discussion

We discuss the results that were reached through the statistical methods used in processing the data derived from the responses of the study sample and accordingly, the results are presented according to the questions posed in the problem of the study.

7.1. Results

7.1.1. What kind of canned fish is consumed?

Table 3 Type of consumed canned fish

	Frequency	Ratio %
Tuna	205	67.2
Sardines	12	3.9
Others	88	28.9
Total	305	100

The table shows the distribution of the study sample members according to type of consumed canned fish. It was found that (67.2%) of the total study sample were consuming tuna and they are the largest group in the study sample. While (3.9%) were consuming sardines, and that (28.9%) were using other canned fish.

The results (Tables 1 and 3) indicated that the most eaten canned fish among the learners is tuna cans, with a percentage of about 67.2%. You eat canned fish, which can be said that most of the sample who eat canned tuna is from the university education level category, and this is because this group of society finds that they have educational preoccupations that make them tend to eat fast foods due to lack of time and the fact that they are in universities far from their place of residence, which makes them obliged to eat fast foods, including canned fish, and among these types are tuna cans, unlike other stages of learning such as primary education, as well as intermediate and secondary education. This category can eat these foods at separate times because most of them focus on eating home food, unlike university students, which may make this group at risk of malnutrition. Several studies have shown that canned foods in general can cause health problems. If there are harmful substances added to it when canning, as factors that contribute to preserving canned foods as long as possible, but if they are not harmful substances, eating foods is not likely to cause health damage. Canned sardines, tuna, or salmon are partially cooked before canning, then canned, and then cooked again after canning for sterilization purposes. Repeated cooking and heating increase the chances of transferring some chemicals from the components of the metal can and its plastic lining to pieces of fish. Sardines, tuna, or salmon in the presence of oils, but in good quality and manufactured in areas that adhere to food industry safety standards, are low risk as indicated by many medical sources, unlike those produced in areas with less compliance with food safety standards. There are not many medical studies that were conducted in the United States and Europe and looked at determining the number of substances resulting from the interaction of heat and oils with the plastic lining of fish cans, and in the results of some of them, the researchers mentioned that canned fish become contaminated with it, and in

others of those studies the researchers did not notice that. Therefore, it is difficult to say for sure the harms of eating those canned fish. However, what distinguishes sardine fish in terms of nutritional value are two things: its fat content, and its calcium content. In a regular-sized can of sardines, we find about 200 calories of calorie energy, about 25 grams of protein, and 13 grams of fat. Of those fats, the omega-3 fats of fish oil make up about two grams. A can of sardines contains less than 0.3 grams of salt.

7.1.2. What are the times for students to eat tuna sandwiches?

Table 4 Distribution of the study sample according to the times of eating tuna sandwiches by the students

	Frequency	Ratio %
Breakfast at home	125	41
Breakfast at school	46	15.1
Lunch	24	7.9
Snacks	62	20.3
Dinner	48	15.7
Total	305	100

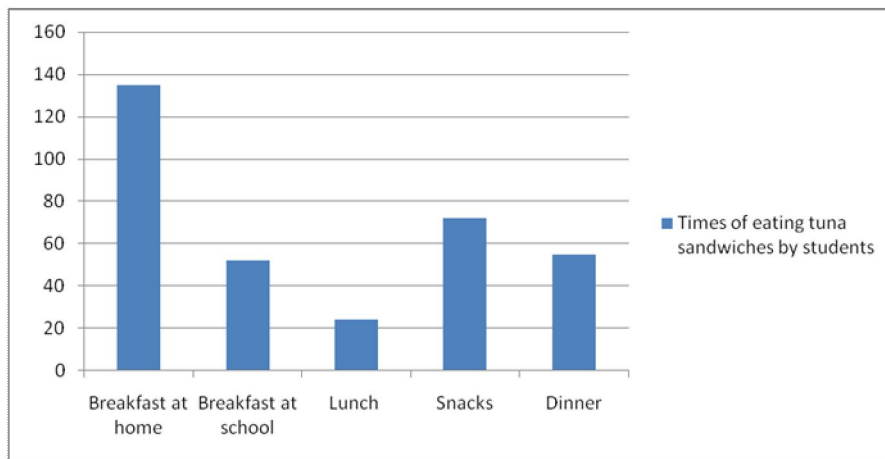


Figure 1 Distribution of the study sample according to the relationship between the times of eating tuna sandwiches for students and the educational stage

The table shows the distribution of the study sample members according to the relationship between the times of eating tuna sandwiches by students and the educational stage. It was found that (39.9%) were eating tuna sandwiches at-home breakfast, while (15.4%) were eating tuna sandwiches at school for breakfast, while (7.1%) were eating tuna sandwiches at lunch, and (21.3%) were eating tuna sandwiches as a snack, and finally, it was found that (16.3%) were eating tuna sandwiches at dinner.

Through the results obtained, we find that the relationship between the times of eating tuna sandwiches by students and the educational stage, indicated that most of the sample members eat tuna cans in-home breakfast sandwiches, with a percentage of 39.9%, and therefore it can be said that most of those who eat tuna as the main food in their

meals The permanent and continuous are from the category of university students, and then they are followed by school meals with a repeat of 54 because the school student is given snacks in the school between the lessons, which are considered as a meal. Tuna, which can be said that all the young people who represent the university education stage, as well as the children who represent the primary education stage, are in danger because they are the group dealing with canned food, which we all know is not a balanced food, and it is one of the causes of diseases, as we find that most students University students suffer from Irritable Bowel Syndrome, bowel diseases, etc, due to unhealthy food. Several studies have confirmed that fish is among the foods that have an effect. Negative effects on colorectal cancer, where a study was conducted between 1992 and 2010 in several Italian regions, which included a group of 2419 incidents of Aleppo. Hospital controls. The consumption of canned fish was analyzed according to the weekly. New cases of cancer worldwide, where ranked second for men and women in terms of infection and the main cause of death was eating canned fish, including canned fish (Mario Institute, Italy).

Table 5 Distribution of the study sample according to the relationship between the times of eating canned tuna per week

	Frequency	Ratio %
Once a day	28	9.2
Twice/ week	133	43.6
Three times/ week	36	11.8
Four times/week	17	5.6
Others	91	29.8
Total	305	100

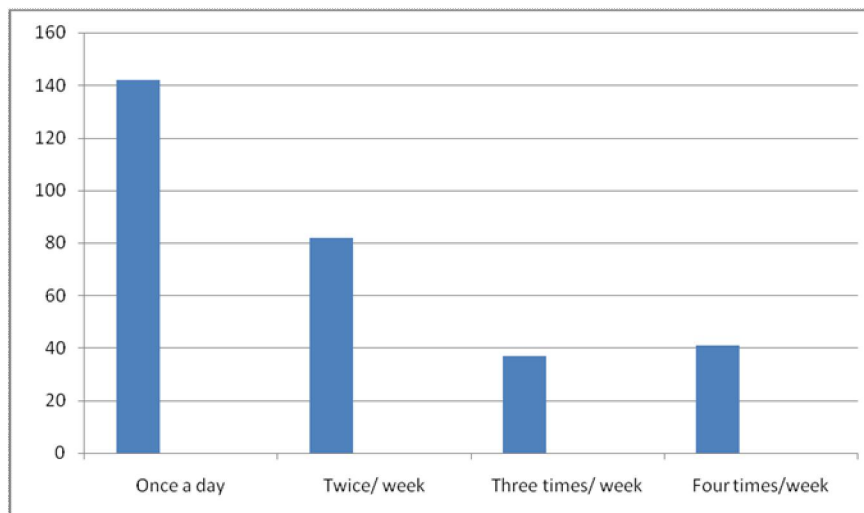


Figure 2 Distribution of the study sample according to the relationship between the times of eating canned tuna per week and between students and the educational stage

The table shows the distribution of the study sample members according to the number of times they ate sandwiches. It was found that (42%) ate sandwiches once a day, while (24.3%) ate sandwiches twice a week, and (10.9%) ate sandwiches 3 times per week, while (12.1%) were eating

sandwiches more than 4 times a week, and finally (10.7%) were eating sandwiches more than 4 times a week.

Through the findings, we find that the number of eating canned fish every day, and therefore eating it is a daily characteristic, which makes the study sample exposed to health risks, especially from university students, as they are the most group that eats canned fish, and then the students come after them, by eating canned food in meals school (Al Lama), and a study has proven that the increase in fish consumption during the Covid 19 period has spread a lot, due to people’s reluctance to eat home food and consider canned fish an easy, ready and affordable process and an alternative to fresh fish.

7.1.3. How do students eat canned tuna?

Table 6 Distribution of the study sample according to how the students eat canned tuna

	Frequency	Ratio %
Sandwich	229	75.1
Pizza	7	2.3
Salad	42	13.8
Others	27	8.9
Total	305	100

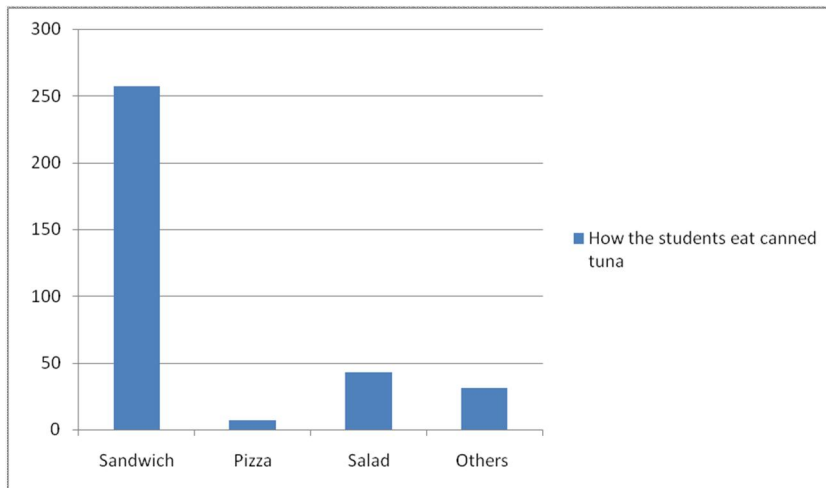


Figure 3 Distribution of the study sample according to how the students eat canned tuna

The table shows the distribution of the study sample members according to the picture in which the students eat canned tuna, as it turns out that (76%) were eating canned tuna in the form of sandwiches, while (2.1%) were eating canned tuna in the form of pizza, and that (12.7%) They were eating canned tuna in the form of salad, and finally it was found that (9.2%) were eating canned tuna in other forms.

Through the results obtained, we find that the picture in which the students eat canned tuna was in the form of sandwiches, which can be said that most of the food, in this case, is limited to tuna as a main meal if it is not mixed or added to other food such as pizza or similar, where the repetition ranged from 257 times repeated, and this is a danger

to the digestive system and also there is an imbalance in the nutritional salary of the human being, which must contain vegetables, fruits, and fresh and live fish, not canned and stored.

7.1.4. What is the source of getting tuna sandwiches for school breakfast?

Table 7 Distribution of the study sample according to the source of obtaining tuna sandwiches as breakfast in the school

	Frequency	Ratio %
Home	241	79
School canteen	24	7.9
cafe or restaurant	25	8.2
Other	15	4.9
Total	305	100

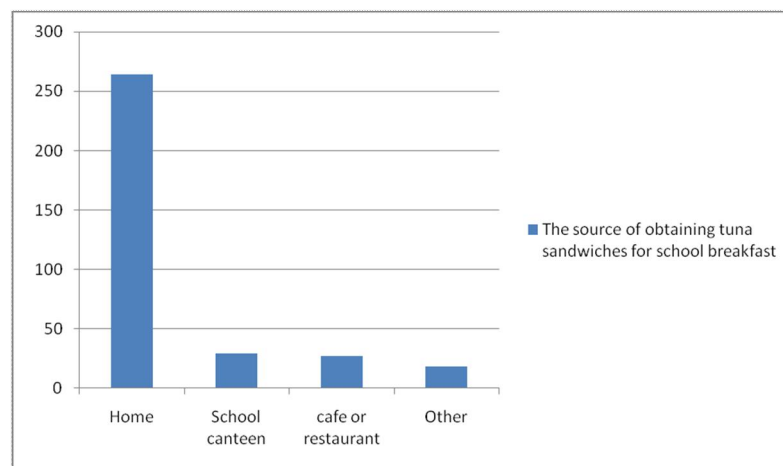


Figure 4 Distribution of the study sample according to the source of obtaining tuna sandwiches as breakfast in the school

The table shows the distribution of the study sample members according to the source of obtaining tuna sandwiches as breakfast in the school, as it turns out that (78.1%) was the source of obtaining tuna sandwiches consumed as breakfast in the school is the residence, while (8.6%) was the source of obtaining tuna sandwiches consumed as breakfast in the school is the school canteen, and that (8%) was the source of obtaining tuna sandwiches consumed as breakfast in the school is a cafe or restaurant, and finally it was found that (5.3%) was the source of obtaining tuna sandwiches consumed as breakfast in the school.

Through the results obtained, we can say the source of obtaining tuna sandwiches consumed as breakfast at school or other options, where the repetition was that eating tuna in the form of sandwiches at home, and looking at the aforementioned results, we find that university education students are the most eating cans of tuna and then come The primary education stage, and therefore the second approach in schools is for the benefit of the students, and this is what makes the results obtained in the previous tables identical with each other, that most university students, whether in their university

residence homes or their homes, eat tuna sandwiches on a daily and main basis, as well as students in the primary stage they eat it as a snack in schools sometimes.

7.1.5. How are sandwiches prepared at home as breakfast at school?

Table 8 Distribution of the study sample according to how prepared sandwiches at home are wrapped as breakfast at school

	Frequency	Ratio %
plastic case	126	41.3
Polyethylene (nylon bags)	149	48.9
aluminum foil (tin)	30	9.8
the total	305	100

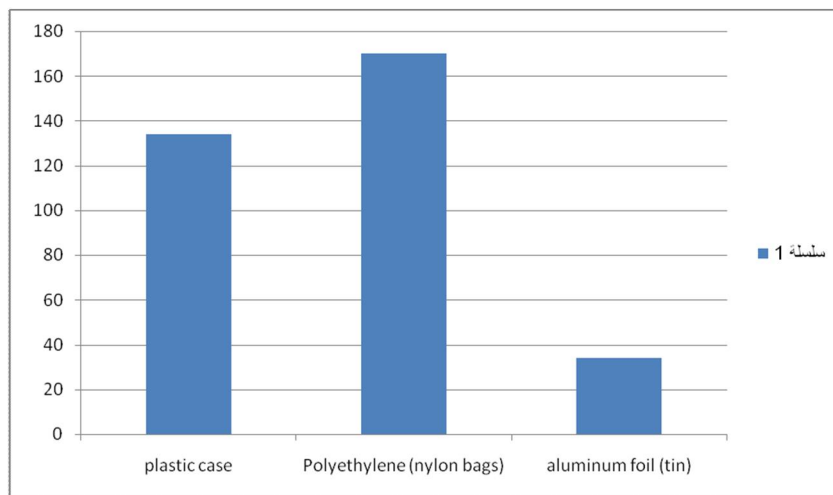


Figure 5 Distribution of the study sample according to how prepared sandwiches at home are wrapped as breakfast at school

The table shows the distribution of the study sample members according to the method by which sandwiches prepared at home are packaged as school breakfast, as it turns out that (39.6%) were packing sandwiches prepared at home as breakfast at school through a plastic container, while (85.5%) were packing prepared sandwiches at home as breakfast at school, they used polyethylene (nylon bags), and that (6%) were wrapping sandwiches prepared at home as breakfast at school using aluminum foil (tin).

Through the results obtained, we find that the method of preserving canned food was more limited by polyethylene (nylon bags), which makes the method of preservation unhealthy and exposes its owner to serious diseases such as colon cancer, where she emphasized the contribution of canned fish to the nutrition of basic and intermediate education students/students. Libya. The study aimed to explore the pattern of its intake in a random sample of 355 basic and intermediate education students in the Tajoura and Al-Qarbouh region - of Libya. Descriptive statistical analysis and Chi-square test were used to analyze the results. Canned tuna recorded the highest percentage of consumption by students of sexes, males (53%) and females (46%). The K-square test showed that there was a significant relationship ($P < 0.05$) between gender and the type of canned fish

eaten. 42% of males and 38% of females eat tuna sandwiches as breakfast at home. Statistical analysis confirmed that there was an effect of gender on the times of eating tuna sandwiches ($P < 0.05$). The ratio of students/students who ate tuna sandwiches once a day was highest for males (75%) and females (76%). And 54% of males and 40% of females eat tuna sandwiches as a daily meal. 58% of males and 68% of females eat homemade tuna sandwiches. The statistical analysis showed that there was an effect of the educational stage ($P < 0.01$) on the source of obtaining the sandwich as breakfast in the school. Most of the students/students eat tuna sandwiches prepared at home and take with them to school within a period not exceeding 30 minutes from the moment they are prepared. Statistical analysis confirmed a significant relationship between gender and sandwich eating time ($P = 0.03$). The study recommends paying attention to raising nutritional awareness for this category of students to increase their demand for consuming canned fish, especially sardines and mackerel, due to their high nutritional value and local availability (Hassan et al., 2021).

7.1.6. How long do homemade sandwiches last before eating them at school as breakfast?

Table 9 Distribution of the study sample according to the duration of keeping the prepared sandwiches at home before eating them at school as breakfast

	Frequency	Ratio %
Immediately	132	43.3
After 20 minutes	45	14.8
2-4 hours	111	36.4
More than 4 hours	17	5.6
The total	305	100

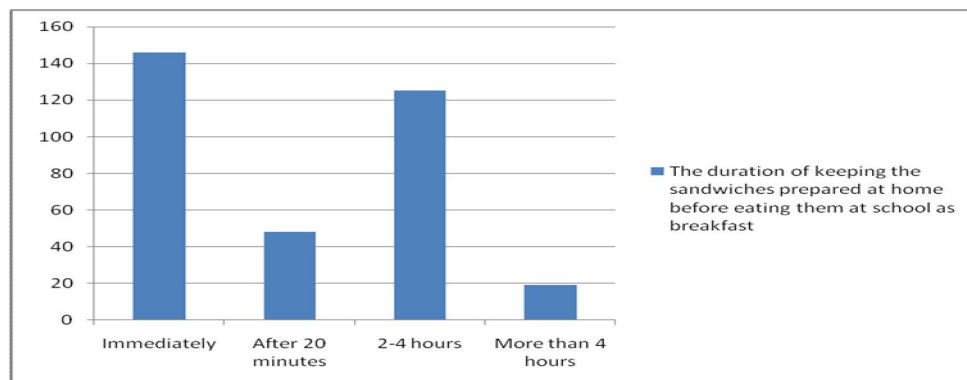


Figure 6 Distribution of the study sample according to the duration of keeping the prepared sandwiches at home before eating them at school as breakfast

The table shows the distribution of the study sample members according to the variable of the duration of keeping sandwiches prepared at home before eating them at school as breakfast. stomach at home before eating it at school as breakfast after 20 minutes, and that (37%) were eating sandwiches prepared at home before eating them at school as breakfast after 2-4 hours, and finally, it was found that (5.6%) were eating sandwiches prepared at home before eating it at school as breakfast after more than 4 hours.

Through the results obtained, we find that most of the sample members eat canned fish immediately after purchasing it, and this may be due to them that these cans should be eaten at the time they are purchased, because they are considered fast food that does not require preparation, and most of them know that these cans last for a long time and short shelf life.

7.2. Discussion

The study results indicate that (67.2%) were consuming tuna which is the largest group of the study sample and (3.9%) were consuming sardines. It was found that (41%) were eating tuna sandwiches at-home breakfast, while (15.1%) were eating tuna sandwiches at school breakfast.

It was found that (9.2%) were eating canned tuna daily, while (43.6%) were eating it twice a week, and (11.8%) were eating it three times a week, while (5.6%) were eating it four times a week. Finally, (29.8%) were eating it more than four times a week.

It turns out that (41.3%) their way to wrap sandwiches prepared at home as breakfast in the school was using the school's plastic bag, while (48.9%) were wrapping sandwiches with polyethylene (nylon bags), and that (9.8%) were wrapping sandwiches using aluminum foil (tin), it turns out that (43.3%) did not save the sandwiches, but rather eat them directly, while (14.8%) were eating as breakfast 20 minutes after its preparation, and (36.4%) were eating sandwiches after 2-4 hours, and finally (5.6%) were eating sandwiches after more than 4 hours.

Because of the consumption of canned tuna in large quantities, especially among school students of various stages, for ease of preparation, whether obtained from the school or prepared at home may affect the students' academic achievement as proven in the study (Hassan et al., 2021) and the consumption of canned foods without knowing the nutritional value of what these cans contain and the food spoilage it is exposed to during preservation operations, especially consumption after a long period, in addition to the lack of preparation (Madlavi and Kusuma, 2015) and tin and the extent of the dangers to which humans are exposed from serious diseases and the lack of safe food for humans (Cohen et al., 2001; Ahmed et al., 2016; World Health Organization, 2018; Manthey- Karl et al., 2013; Khan et al., 2018).

8. Conclusion

This study reveals the nutritional behavior and consumption of canned fish among students, of all grade levels, as well as the ways and times between the preparation of the sandwiches and the consumption. The study is limited by the results which concern only the sample studied.

This study concluded with necessity of: Conducting more laboratory research to identify the extent of consumption of canned fish. It is necessary to analyze the components of canned fish to estimate the content of heavy elements or their absence.

Awareness of the consumer about the polluting materials that may be present such as mercury and other heavy metals in these cans and the extent of the damages and risks that they may be exposed to.

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