

**Faculty of Agriculture & Vet.Med.  
Nutrition and Food Technology Department**

# **Functional Bread**

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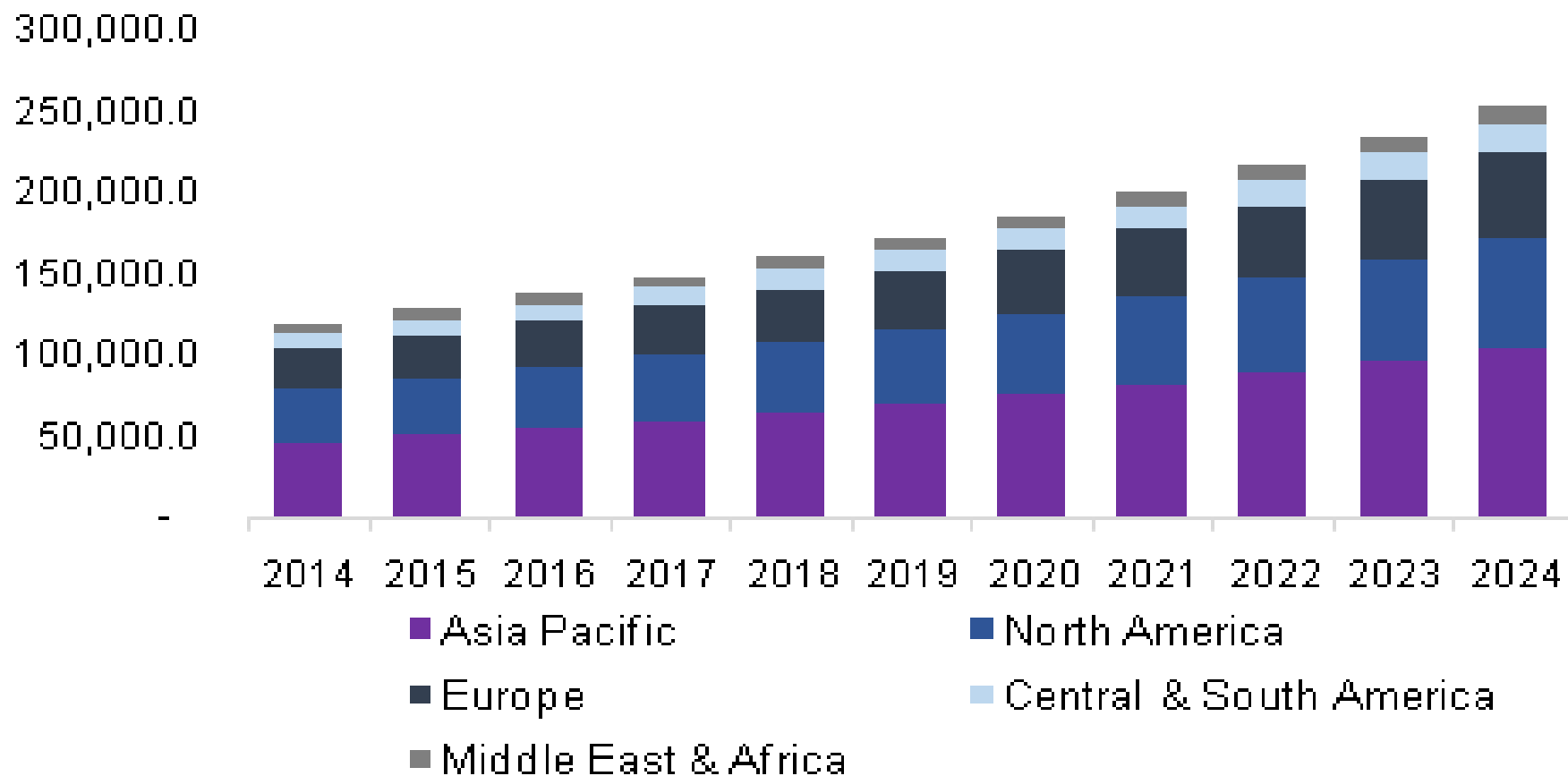


**2018/2019**

# INTRODUCTION

- The global functional foods market size was 129.39 billion in USD in 2015.
- Growing consciousness among consumers regarding their health and proper diet is expected to aid the overall industry over the next eight years.
- Foods are not only intended to satisfy one's hunger but also to eliminate nutrition related diseases. Such a factor is anticipated to affect the global industry demand positively.

# Global functional foods market revenue, by region, 2014 - 2024 (USD Million)



# What's a functional food ?!

- A functional food is a typical food that has specific nutrients added to it, like vitamins or minerals, fiber, or probiotics or prebiotics. In general, this includes anything added for a specific functional purpose.

# There are several reasons for the spread and growth of functional foods, including:

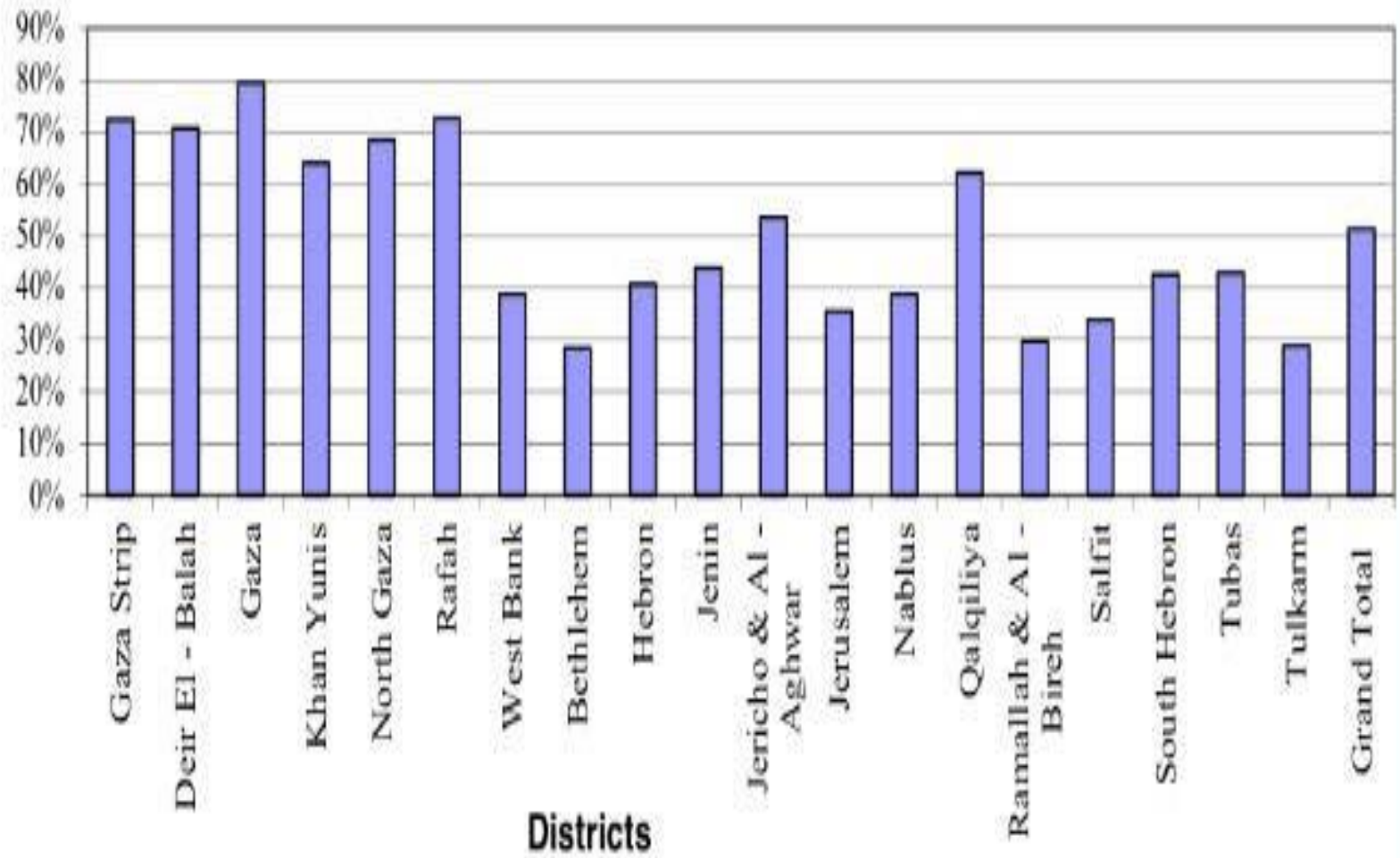
1. Increase food and health awareness and consumer interest in health
2. Scientific research that supports the role of functional foods in the fight against diseases or reducing the emergence of some diseases
3. Belief that these foods are safer and better tasted than traditional foods

- A study carried out by The Maram Project regarding the health of Palestinian families in cooperation with the Ministry of Health on the prevalence of vitamin A deficiency at the household level in the occupied West Bank and Gaza Strip revealed that **22%** of Palestinian children from all regions suffer from vitamin A deficiency in plasma blood to below (200)  $\mu\text{g} / \text{l}$

- The results of the study showed that there is a positive relationship between the prevalence of vitamin A deficiency and anemia; **33.9%** of children with vitamin A deficiency suffer from anemia, so children with vitamin deficiencies are more vulnerable to diffeceancy compared with children who have normal levels of the vitamin.
- There are many statistics issued by the Palestinian Health which confirm the lack and low levels of vitamins and minerals in most Palestinian children.

### Anemia Among Children from 9-15 Months / NNSS 2013

%





- And as **Bread** is one of the highest products consumed by the Palestinian society...
- Average monthly consumption of bread is 9.8 kg per person.

# احصائية الجهاز المركزي للإحصاء الفلسطيني

متوسط كميات استهلاك الفرد الشهري من السلع الغذائية في الأراضي الفلسطينية:

- بلغ متوسط كمية الاستهلاك الشهري للفرد من الحبوب ومنتجاتها والخبز ما مقداره 9.8 كغم.
- بلغ متوسط كمية الاستهلاك الشهري للفرد من اللحوم والدواجن ما مقداره 3.7 كغم.
- بلغ متوسط كمية الاستهلاك الشهري للفرد من الأسماك ومنتجات البحر ما مقداره 0.4 كغم.
- بلغ متوسط كمية الاستهلاك الشهري للفرد 0.6 لتر من الحليب، و0.8 لتر من اللبن، و0.2 كغم من الجبنة.
- بلغ متوسط كمية الاستهلاك الشهري للفرد من البيض ما مقداره 0.6 كغم.
- بلغ متوسط كمية الاستهلاك الشهري للفرد 0.3 لتر من زيت الزيتون.
- بلغ متوسط كمية الاستهلاك الشهري للفرد من الفواكه الطازجة ما مقداره 5.1 كغم.
- بلغ متوسط كمية الاستهلاك الشهري للفرد من الخضراوات الطازجة ما مقداره 8.3 كغم.

- Hence we can emphasize the importance of the functional bread project .

# Brief description of the project idea

- The idea of the project is to produce a small-sized colored bread, supported by vitamins and minerals, extracted from fresh natural vegetables. In addition to the increased benefit of this bread, it will also attract the targeted group of children

## Development of functional bread containing nanoencapsulated omega-3 fatty acids

Vural Gökmen <sup>a, b</sup>   ... Eyal Shimoni <sup>d</sup>

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### Abstract

The aim of this study was to develop functional bread enriched with omega-3 fatty acids. High amylose corn starch was used to form nanosized complexes with flax seed oil that was converted to powder of microparticles by spray

# The Evolution of Functional Bread in Japan



**KIYOKO R. KUBOMURA**  
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Tokyo, Japan

Japan's diet in many ways resembles the Mediterranean diet, which includes the notion that good foods should actively promote good health. Cereal crops have long played a huge part in this, both historically and in modern times.

In the sixteenth century, during a period of exploratory sea voyages, many Europeans came to Japan. Marco Polo reported on Japan's striking images of golden fields of ripening wheat and rice. Even then, though at a rudimentary level, the inherent nutritional benefits of grains were recognized.

In recent times, and despite contra dietary trends such as the Atkins and Low Carb diets, cereals are still seen as one of

the most basic food groups vital to a healthy and balanced diet. Nutrition experts typically recommend the consumption of carbohydrates, such as whole grain breads and cereals, legumes, fruits, and vegetables, which all provide essential vitamins, minerals, and fiber. They also provide energy to get you through the day and to help maintain concentration. In Japan, the government has sought to improve eating habits by promoting the consumption of cereals.

Globally, there is a trend to recognize low-glycemic (low-GI) foods as being good for health. The concept of the Glycemic Index, as it applies to carbohydrate-based foods, is that by allocating a low-, medium-, or high-GI value to foods, people can make healthier choices about the food they eat. According to this view, low-GI foods are broken down more slowly in the digestive system, making energy available to the body over a longer period of time and causing people to feel more energetic and satisfied. As such, low-GI foods may contribute quite nicely to optimum health.

Because of its inclusion in diets across most ethnic groups, the bakery sector, and bread in particular, now presents a substantial growth opportunity in the functional foods market. There are two main thrusts to capitalizing on these opportunities, bread enrichment by supplementation and advocating the inherent benefits of natural cereal grain compounds.

In France, the functional bread market has focused not only on a rising obesity rate but also at reducing heart disease and lowering cholesterol. One French bakery, PAUL (La Madeleine, France), incorporated flax oil, famous for its high omega-3 content, into its new "Lin-dispensable" bread. Omega-3 polyunsaturated fatty acids have been the subject of numerous medical and clinical trials that have documented a wide range of health benefits for

consumers, including reduced risks of heart disease and heart attacks, as well as benefit for brain and neuromuscular development, particularly in children. The firm called its bread "Lin-dispensable," a play on the words linseed and indispensable. The bread was ideal for a range of meal occasions, including sandwiches, as toast, or as an accompaniment to a main course.

In this case, France's Lin-dispensable bread sells at a price premium, and the French bakery industry today acknowledges an emerging demand for premium, functional products. Several bakeries have joined the trend by introducing breads with additional functional ingredients, such as dietary fiber and other nutrients.

The bread industry in Japan is highly competitive with very low margins on the standard products. Emphasis on product attributes has been based on perceived consumer needs for texture, freshness, firmness, and the crunchiness of the crust. Now, rising health consciousness and awareness of advances in other food sectors are influencing and driving a large array of nonstandard and even exotic functional bread products. The following is a partial list of some of these products.

## Calcium Bread

Yamazaki Bakery (Tokyo, Japan) sells a calcium-enriched bread that contains the equivalent calcium from 1 bottle of milk (220 mg) in one slice of bread. In this case, the product also contains vitamin D to enhance absorption of the calcium.

## Twelve Whole-Grain Meal Bread

This Yamazaki Bakery bread contains a variety of cereal grains, including rye, oat, and millet. These are important for their dietary fiber, but they also have additional functional purposes. Millet, for example, is known to improve serum cholesterol levels.

## Unpolished Rice

This concept is aimed at the traditional Japanese taste for rice products. Unpolished rice contains a rich matrix of vitamins and nutrients. This bread, which is quite popular in Japan, is made by soaking unpolished rice in sugar cane juice and black bean vinegar before kneading the mixture into a typical bread dough. The result is an aromatic sourness with a different yeast aroma than standards breads. Another variety is made from natural yeast taken from organic raisins and mixed with wheat and sprouted unpolished rice.

## Soy Milk Bread

Soy milk is a well known ingredient in Japan. It is used in bread to achieve a low caloric value with a high protein content. In general, the use of soy milk replaces the other milk and milk-related ingredients. The resulting bread texture remains quite similar to the original recipes.

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- In order to study to what extent the children will accept the product, we conducted a questionnaire for **male and female children from 4 to 12 years.**
- In which we examined the consumer's acceptance of the product, by submitting the real product to male and female primary schools of different ages, with multiple samples to help the consumer in making decision.



# The questionnaire

- The questionnaire title is “Study of the acceptability of small-sized colored bread”
- And has six questions
- Results shown on upcoming slides

## تقييم منتج

تزامن مدى تقبل الخبز الملون

الجنس

حدد دائرة واحدة فقط.

ذكر

انثى

هل تحب منتج الخبز ؟

حدد دائرة واحدة فقط.

نعم

لا

برأيك من هو المنتج الأكثر جاذبية ؟

حدد دائرة واحدة فقط.

التقليدي

الملون

لو خیرت بین هذين المنتجين لکنت اخترت ؟

حدد دائرة واحدة فقط.

التقليدي

الملون

إذا اخترت الملون ما هو السبب الذي اخترته لاجنه

حدد دائرة واحدة فقط.

لونه

حجمه

تقييم المنتج الملون

حدد دائرة واحدة فقط.

سيء

جيد

جذاب

تقييم المنتج التقليدي

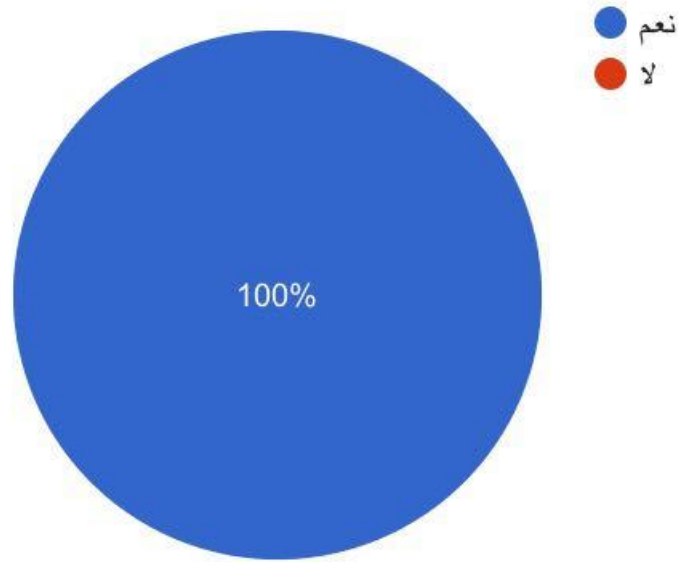
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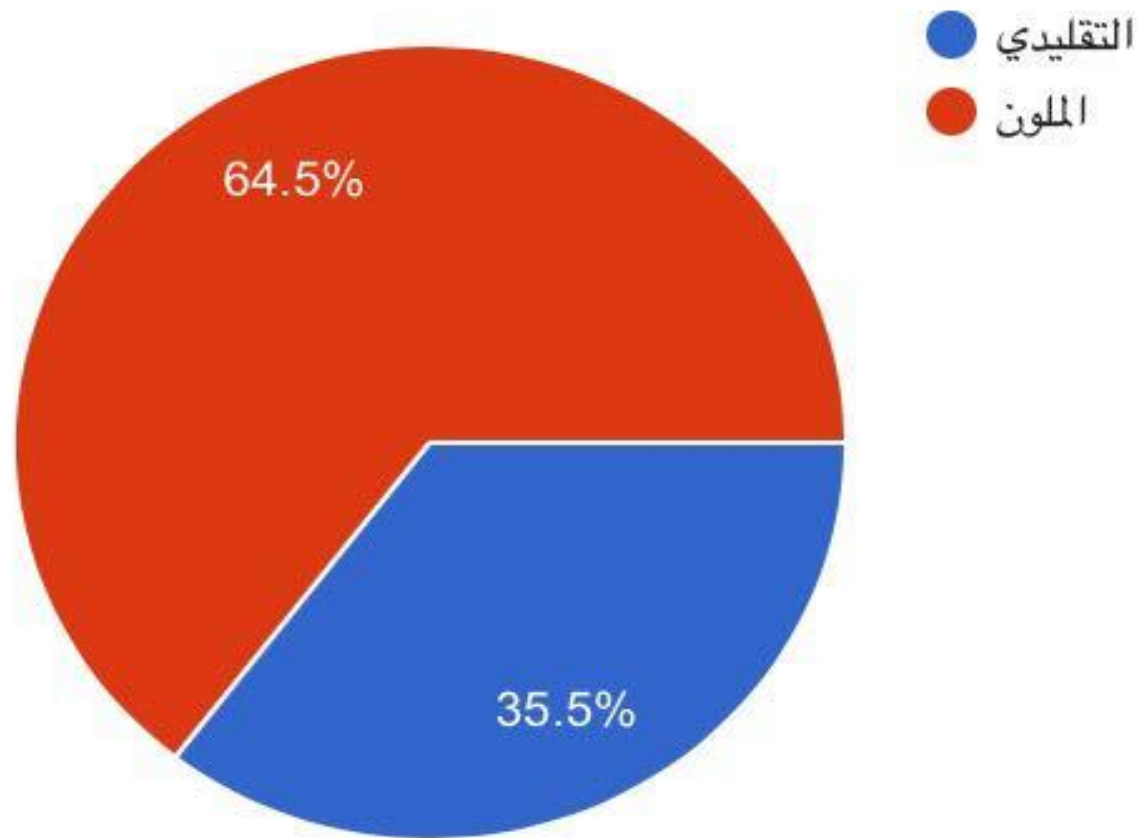
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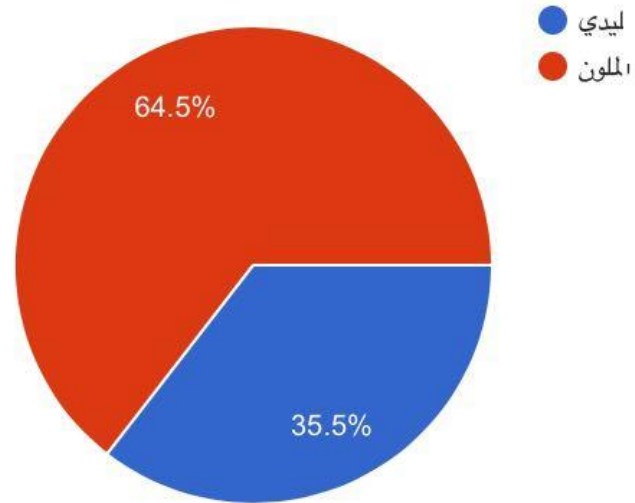


# برايك من هو المنتج الاكثر جاذبية ؟

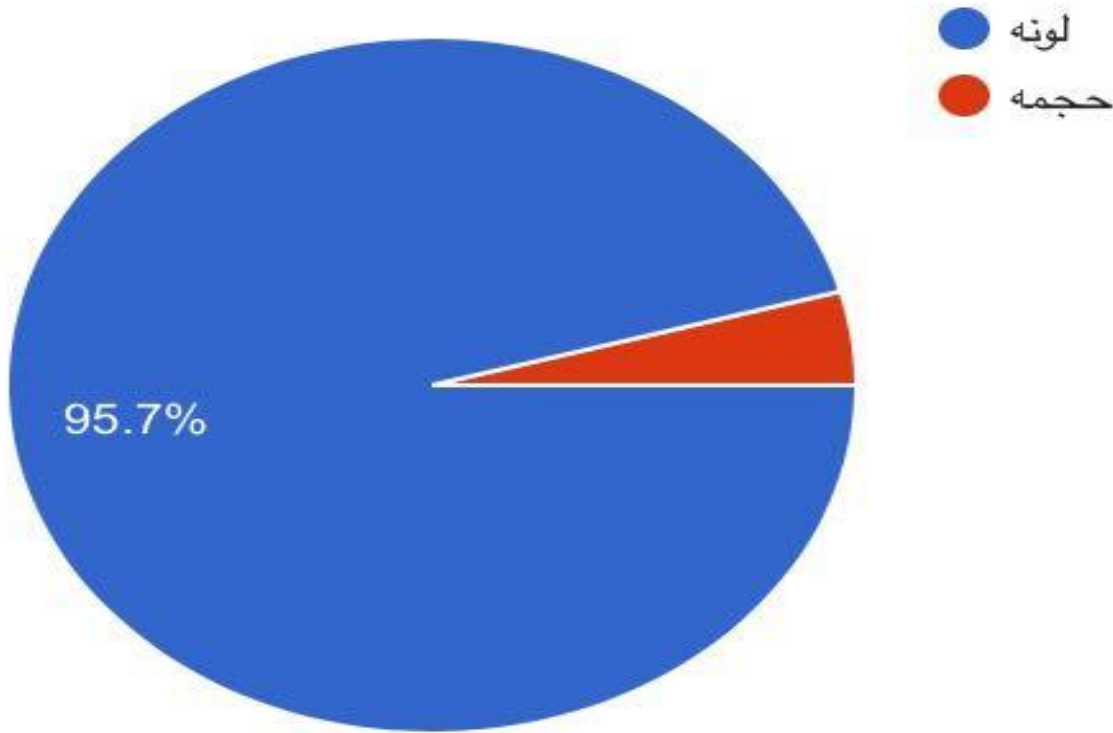


## لو خيرت بين هذين المنتجين لكنت اخترت ؟

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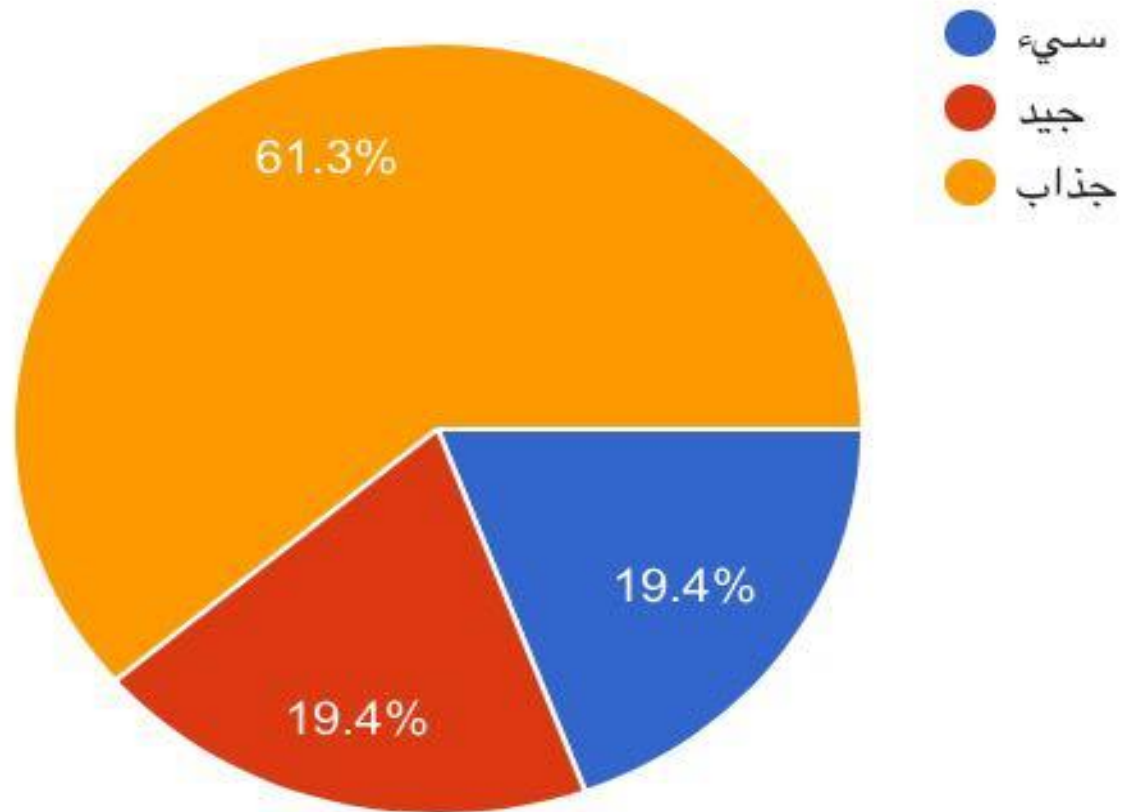


# اذا اخترت الملون ما هو السبب الذي اخترته لاجله





## تقييم المنتج الملون





- Our objective is to improve the health of the society and create an immune generation less susceptible to diseases





- Male and female children aged 6 months and above.
- *Note that it is suitable for all ages.*

**The reason behind the **importance** of the product is the vitamins and minerals it is fortified with, which simulates the real natural vegetables**

- **Prepare building blocks for healthy body. It helps to build the body, prepare and strengthen it. It also fight diseases and work to improve the performance of the organs in the body correctly.**
- **The red paprika contains vitamin **A, E** and **C**, which are considered **antioxidants** and improves eye health, and reduces symptoms of malnutrition.**
- **One of the most common causes of anemia is iron deficiency, the main symptoms of which are weakness and tiredness.**
- **Red pepper is not the only source of iron, vitamin C is also rich of iron, and it **increases the absorption of iron** from the gut.**

- In fact, one medium-sized red pepper may contain 169% of the recommended dietary allowance (RDA) for vitamin C.
- Which may help increase your body's iron stores, cutting the risk of anemia
- Spinach also contains folic acid and iron.

- The added colors to the bread will make it attractive and will draw the attention of anyone sees it
- Restaurant studies have shown that **red colors stimulate appetite**, and this is a main reason red is used by fast food operations.
- It also enhance the marketability of food products
- Food preference, and acceptability

- For example The **Heinz Ketchup Company** developed ketchups in an array of rainbow colors beginning with green, then purple, pink, orange and finally blue.
- Their target market was children.

# **Vitamin C**

Red Pepper Amount: 152 mg

Daily Value: 253%

1

cup

**Nutrition Facts**

For a Serving Size of 1 cup (340g)

<b>Calories</b> 50	Calories from Fat 0 (0%)
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**% Daily  
Value \***

<b>Total Fat</b> 0g	-
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<b>Sodium</b> 620mg	<b>26%</b>
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<b>Carbohydrates</b> 10g	-
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Net carbs 8g	-
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Fiber 2g	<b>9%</b>
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Glucose 6g	
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**Protein** 0g

Vitamins and minerals

Vitamin A 270µg	<b>30%</b>
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Vitamin C 144mg	<b>240%</b>
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Calcium 40mg	<b>5%</b>
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Iron 1mg	<b>12%</b>
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Fatty acids

Amino acids

\* The Percent Daily Values are based on a 2,000 calorie diet, so your values may change depending on your calorie needs.



# Effect Of Heating On Vitamin C Content Of Some Selected Vegetables

N.C. Igwemmar, S.A. Kolawole, I.A. Imran

**ABSTRACT:** The effect of heating on the vitamin C content of five choice vegetables was determined by redox titration with potassium iodate in the presence of potassium iodide. The results obtained in raw vegetables showed that pepper (61.56mg/100ml) has the highest vitamin C content while the least was in carrot (21.72mg/100ml). The vitamin C content of the vegetables analyzed were found to be in the order: Pepper > Green peas > Spinach > Pumpkin > Carrot. It was also observed that the heating time has significant effect on the vitamin C content of all the vegetables, as the heating time increases, the percentage loss of vitamin C increases too. The percentage loss of vitamin C in the vegetables ranged between (9.94-16.57%), (29.94-37.43%) and (49.91- 64.71%) at 5, 15 and 30 mins respectively. Of all the vegetables assayed pepper gave the highest percentage loss of 64.71% at 30 mins. Vitamin C is easily destroyed by excessive heat and water, as well as exposure to air. For retention of vitamin C in cooked foods, it is recommended that foods containing vitamin C be cooked as fast as possible with less heat and small amount of water.

**KEY WORDS:** Ascorbic acid, Human nutrition, Redox titration, Phytochemicals, Spinach, Vegetables, Pumpkin, Antioxidant.

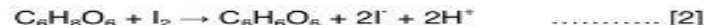
## INTRODUCTION

Vegetables and fruits are rich sources of essential vitamins, minerals, fibers and disease-fighting phytochemicals which the human body needs to maintain good health [1]. Some vegetables can be taken raw but most are commonly cooked before being consumed. Generally, preparations of vegetables at home are based on taste preference and convenience rather than retention of nutrient and health-promoting compounds [2]. Report has shown that consumption of diets rich in vegetables and fruits protect the human body from chronic degenerative diseases [3], [4], [5], [6], [7]. Vitamin C, also known as ascorbic acid, is a water-soluble vitamin found in fruits and vegetables. It is an antioxidant that is very essential for human nutrition and proper functioning of the body [8], [9]. The human body cannot synthesize vitamin C endogenously, so it is an essential dietary component [10]. Vitamin C is instrumental in neutralizing free radicals, which are harmful to the body, assimilation of iron, healing of wounds, helps to build collagen, which aids the skin, defense against bacterial and viral infection [11]. Deficiency of vitamin C in human can lead to a disease known as scurvy, whose symptoms include hemorrhaging especially in gums and skin, loosening of the teeth, joint pains and exhaustion [12], [13]. Many fruits and vegetables contain vitamin C, but excess amount of heat can destroy the vitamin completely. At high temperature, in the presence of sunlight and oxygen in air, vitamin C reacts and it is oxidized [14]. Cooking in high temperature also destroys vitamin C since it easily leaches into the cooking water being a water-soluble vitamin.

The redox titration method was used in this research for the determination of vitamin C ( $C_6H_8O_6$ ) in the vegetable samples, potassium iodate ( $KIO_3$ ) was added to a vegetable solution that contains strong acid and potassium iodide (KI). Potassium iodate reacts with potassium iodide, liberating molecular iodine ( $I_2$ ):



The iodine ( $I_2$ ) produced in equation [1] oxidizes the vitamin C to form dehydroascorbic acid ( $C_6H_6O_6$ ) and iodide ion ( $I^-$ ) equation [2].



The purpose of this work is to determine the effect of heating on the vitamin C content of the selected vegetables.

## MATERIALS AND METHOD

### Sample Collection

Five vegetables commonly consumed in Nigeria were purchased from the Keffi market, Nasarawa State. The vegetable samples are Carrot (*Daucus Carota*), Pumpkin (*Cucurbita Maxima*), Green Peas (*Pisum Sativum*), Pepper (*Capsium Annum*) and Spinach (*Spinacia Oleracea*). Vitamin C tablet used for the analysis was purchased from a pharmaceutical store.

All the apparatus used were properly washed and rinsed with distilled water. Analar grade reagents were used in this study.

### Preparation of Reagents

**1% Starch Indicator Solution:** A starch solution (1%) was prepared by weighing 1g of starch into a 250ml beaker and 100ml of distilled water was added. The mixture was boiled for 5 minutes with stirring until the starch dissolved, the resulting solution was allowed to cool.

**Vitamin C Standard Solution:** 0.4g of vitamin C tablet was weighed and dissolved in 100ml distilled water.

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- Faculty of Science, Department of Chemistry.

**Table 4: % loss in concentration of Vitamin C as heating time varies**

Vegetable samples	% lost in 5 mins	% lost in 15 mins	% lost in 30 mins
Pepper	11.76	35.28	64.71
Green Peas	10.59	33.33	58.28
Spinach	9.94	29.94	60.00
Pumpkin	12.43	37.43	62.43
Carrot	16.57	33.33	49.91

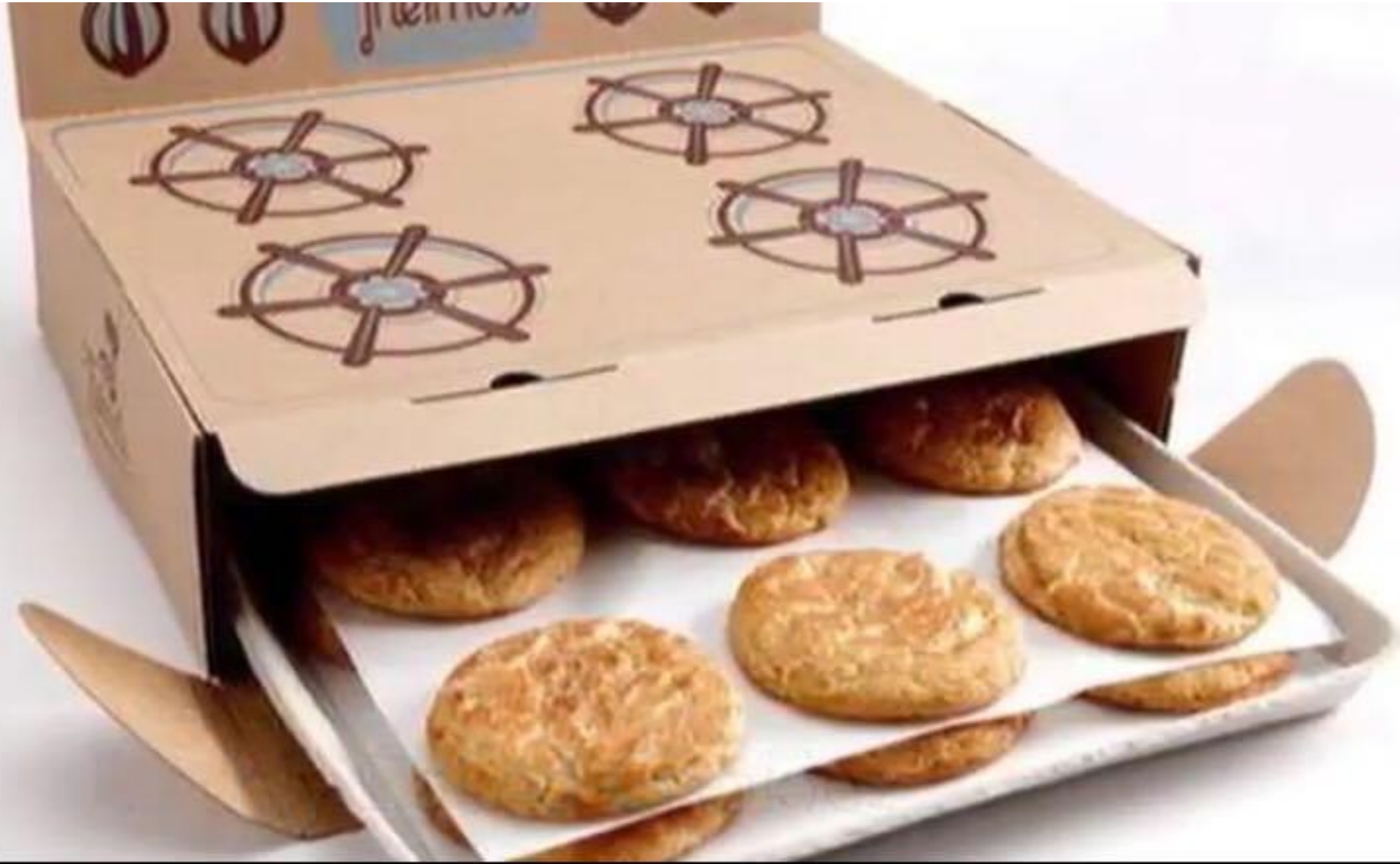
# Future perspective

- Mix whole grain flour with white one
- Made in new and different shape





- Create new packaging design to increase attraction



➤ Made with new colors and nutrients

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Thank you  
for  
listening!



*Handwritten signature in red ink.*