



Supports the



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COVID-19 AND FOOD CONSUMPTION BEHAVIORS

Since January 2020, the world is facing a pandemic of coronavirus disease 2019 (COVID-19) caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Social distancing and individual isolation have been implemented in different phases and with variable levels of restriction as extreme measures to control, or at least attenuate the spread of the disease. However, by affecting people's behaviors, these measures may also have some negative effects on health. The COVID-19 pandemic, with millions of people affected, combined with the lockdown measures have impacted the lifestyle and health behavior of the population, including their food consumption behavior. This issue of The Global Fruit & Veg Newsletter is dedicated to health behaviors during COVID-19 pandemic.

The first article based on the publication of C. de Faria Coelho-Ravagnani *et al.* summarizes dietary recommendations that were published in official documents from nutrition associations and societies, national governments and health organizations. Fruit and vegetable consumption was recommended by 70% of the documents retrieved. The second article written by MB. Ruiz-Roso *et al.* shows the changes in dietary and activity habits among adolescents during the COVID-19 pandemic. An increase in legumes,

fruit and vegetable consumption was noted, with a high percentage of physical inactivity. Finally, L Laguna *et al.* studied the impact of COVID-19 lockdown on food behaviors. Findings show an increase in Internet searches related to food consumption and food shopping. Also, consumers increased their purchase of raw products, probably because more cooking and eating took place at home rather than in the hospitality sectors due to closure during long periods of coffees, bar, pubs and restaurants.

It is at present uncertain whether the current period of lockdowns will be the last one before population vaccination programmes succeed in controlling the epidemic and preventing new dramatic waves of serious COVID-19 cases. However, it is likely that during the foreseeable future, the world will have to learn "living with the virus", and that may also include improving the health of the population in terms of body weight, physical activity and diet composition. The combined evidence available on diet and health support the recommendation of following diets rich in fruit and vegetables.

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Dietary recommendations during COVID-19 pandemic

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During the current sanitary crisis of the COVID-19 pandemic, social isolation has been widely adopted as the most effective preventive measure to control and slow down the spread of the pandemic¹ while waiting for the discovery of effective vaccines and the implementation of population vaccination programmes. However, various forms of lockdown are quite extreme measures that may have negative effects on health with psychological and emotional symptoms, altered sleep and eating patterns and worsening chronic health conditions and weight gain^{2,3}. An optimal nutrition may mitigate some of these health consequences by helping to prevent or control some of the most common chronic diseases such as diabetes, hypertension and overweight/obesity⁴.

This article is based on the recent narrative review of Christianne de Faria Coelho-Ravagnani *et al.* It aims to summarize dietary recommendations during COVID-19 pandemic published in official documents from nutrition associations and societies, national governments (Australia, Brazil, Canada, Italy, Spain, USA), and health organizations (FAO, WHO, United Nations Children's Fund, European Food Information Council).

Fruit and vegetable consumption recommended by 70% of the documents retrieved

Due to their low energy content and high nutritional value, fruit and vegetables are highly recommended during COVID-19 pandemic: 70% of the documents retrieved encourage their consumption. Fruit and vegetables are important sources of water, some vitamins, antioxidants and fiber which have been shown to contribute to the prevention and control of diabetes, hypertension and weight gain. These have been reported as important risk factors for COVID-19

complications⁵.

Diets rich in fruit and vegetables contain certain vitamins and pro-vitamins (e.g. vitamin C, some B vitamins, beta- and alpha carotene which are converted in retinol, therefore are pro-vit A) and minerals (zinc and selenium) which may contribute to strengthen the immune system through various pathways.

Importance of an adequate hydration

The importance of maintaining an adequate hydration was reported due to the essential role of water for cellular homeostasis, kidney function, body temperature control, mood regulation, cognitive function, heart function, etc⁶. Water intake is mostly provided by beverages (75 %) and fresh foods such as fruit and vegetables (25 %).

What about food hygiene recommendations and breastfeeding?

There is currently non convincing evidence about the transmission of COVID-19 via food or food packaging. However, all the documents highlight the importance of adequate personal hygiene when handling food (e.g. frequent handwashing with soap and water or alcohol-based sanitizers).

It is generally recommended that breastfeeding should be maintained even if the mother test positive and is diagnosed with mild form of the disease because breast milk contains antibodies that are important to the child's immune system⁷. However, good hygiene practice should be respected.

Clearly, if COVID-19 evolves into more clinically serious forms, medical advice must be based on a case by case evaluation.



Based on: Christianne de Faria Coelho-Ravagnani, et al. Dietary recommendations during the COVID-19 pandemic. Nutrition Reviews 2020.

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Adolescent's Lifestyle Modifications during COVID-19 Lockdown

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COVID-19 lockdown has affected the lifestyle of the population, especially on adolescents who are highly susceptible to acquiring damaging habits which involved potential health consequences¹.

This study evaluated nutritional and physical activity modifications during COVID-19 lockdown in 820 adolescents (10 to 19 years) from several regions of Spain, Italy, Brazil, Colombia, and Chile. Data were collected by an anonymous and standardized online questionnaire (the National School Health Survey-PeNSE² and the International Physical Activity Questionnaire-IPAQ³) during COVID-19 lockdown and the previous period.

An increase of legumes, fruit and vegetable consumption in adolescents during COVID-19

Due to lockdown, it appears that families had more time to cook and improved their eating pattern by increasing legume, fruit, and vegetable weekly intake, even though this, apparently, did not increase the overall diet quality. Adolescents also exhibited higher sugary food consumption, likely due to monotony and stress produced by COVID-19 lockdown (Table 1).

	Average food intake		P value
	COVID19	Before	
Legumes	2.426	2.328	0.0156
Vegetables	4.887	4.593	<0.0001
Fruits	4.206	3.891	<0.0001
Fast food	0.577	0.99	<0.0001
Sugary food	3.526	3.241	0.0002
Fried food	1.918	1.778	0.0041

Table 1. Comparison of average dietary intake among adolescents during COVID-19 lockdown (COVID19) and the previous period (Before). Data are means comparison between groups by paired two-way Student's t-test. N = 820.

Spain and Italy: champions in term of fruit intake

Spain and Italy had the greatest mean consumption of fruits (4–5 times per week), and significantly increased their consumption during COVID-19 lockdown. Almost 45% of European adolescents met the fruit weekly intake recommendations^{4,5} versus the 21.8% of Latin America subjects (Table 2).

	Europe	Latin America
Legumes	28.5%	21.8%
Vegetables	43.3%	40.4%
Fruits	44.7%	24.9%
Fast food	93.9%	83.1%
Sugary food	26.2%	23.5%
Fried food	59.1%	46.7%
Sugar-sweetened beverages	51.6%	50.1%

Table 2. Percentage of adolescents that maintain adequate food intake according to dietary guidelines during COVID-19 lockdown. N = 820.

Spain, Brazil, and Chile: champions in term of vegetable intake

Adolescents from Spain, Brazil, and Chile, but not Italy and Colombia, increased vegetable weekly intake during lockdown. In addition, the Colombian adolescents had a lowest fruit and vegetable total consumption.

Dietary changes influenced by gender, maternal education or watching TV

Moreover, other potential variables that may have influenced this dietary change were identified such as gender, maternal education or watching TV during mealtimes. Girls ate significantly more fruit and vegetables and fewer sugar-sweetened beverages than boys during COVID-19 lockdown. Adolescents whose mothers had education levels higher than secondary school level significantly increased their consumption of fruit and vegetables during lockdown, and were the ones who consumed the most fruit and vegetables during and before compared to adolescents whose mothers had education levels lower than secondary school.

It is important to highlight that TV viewing during mealtimes is related to lower intake of vegetables and fruit during the COVID-19 period and a higher fried food, sugary food, and sugar-sweetened beverages consumption. Further, those adolescents who always watched TV during mealtimes significantly increased their fried and sugary food intake during COVID-19 lockdown versus before. Moreover, those adolescents who never watched TV during mealtimes significantly increased their vegetable and fruit intake, proving that watching TV during mealtimes was associated with poorer dietary quality among adolescents.

On the other hand, a high percentage of physical inactivity was found among adolescents before and during COVID-19 lockdown, which was worsened during the lockdown.

In conclusion, our findings provide a description of how the COVID-19 pandemic has modified dietary trends and activity habits of adolescents from Spain, Italy, Brazil, Colombia, and Chile. These new habits could be acquired and have some later impact on health. Understanding the adolescents' nutrition behaviour during COVID-19 lockdown will help public health authorities reshape future policies on their nutritional recommendations, in preparation for future isolation period.



Based on: Ruiz-Roso MB, de Carvalho Padilha P, Mantilla-Escalante DC, Ulloa N, Brun P, Acevedo-Correa D, et al. Covid-19 Lockdown and Changes of Adolescent's Dietary Trends in Italy, Spain, Chile, Colombia and Brazil. *Nutrients* [Internet] 2020;12(6):1807. and Ruiz-Roso MB, et al. Changes of Physical Activity and Ultra-Processed Food Consumption in Adolescents from Different Countries during Covid-19 Pandemic: An Observational Study. *Nutrients* [Internet] 2020;12(8):2289.

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The impact of the lockdown during COVID-19 crisis on food and consumer behavior

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Recent studies have shown that internet and social networks (Google, YouTube, Facebook, Instagram) can be used as a tool to understand the topics related to diet and health that are widely searched and shared by the population^{1,2,3}.

This study aims to measure the impact of COVID-19 health crisis on people's interests, opinions, and behaviours towards food. It was carried out on 2 axes:

1. An exploratory study on the internet and social network regarding food and shopping from different countries
2. An online survey with Spanish consumers on food shopping habits changes and motivations

Exploratory study - Trending searches in relation to food and shopping increased with the official declaration of the pandemic

The exploratory study examined worldwide information from different sources such as internet searches (Google), most watched videos (YouTube), and social media (Twitter) during the virus outbreak affecting European countries, Russia, Turkey and North-America during one month (March 15th – April 15th 2020).

• Google searches containing terms related to COVID-19 and food

The searches of health-related terms like “Symptoms” and “Spread” showed a similar timeline trend to the searches of Coronavirus. Searches on the word food were popular over all the period studied. However, searches for foods like bread, chicken, milk, flour, fruit, and banana increased starting around mid-March. In English and Spanish, the popularity of searches of recipe was four times greater and twice for banana. This could be attributed to the spending of free time due to the lockdown, cooking.

• YouTube videos

The most watched YouTube videos concern the COVID-19 and the spread of the disease. The types of videos watched was mainly News (38%), followed by Advice (34%), and Documentary (28%). The type of informant was mostly influencers, and researchers and scientific sources were less watched

• Frequent words on Twitter

The results show an evolution from shopping concerns to the feeling of uncertainty for the oncoming crisis. We observed three main aspects for consumers: getting and stocking-up food (terms: “Delivery”, “Get”, and “shop”), health aspects (“Medical”), and recommendation for staying at home (“Home”, “Stay”, “Social distance”, and “Work”).

Online survey: consumers have turned more to raw products

An online questionnaire was realized during the Spanish strict lockdown, between March 30th and April 14th, among the Spanish population (n=362). This survey was conducted to study the consumers' motivations for changing (or not) their shopping habits and their perceived reliability of the information sources in relation to COVID-19.

Before the lockdown, consumers mainly purchased their food in Supermarkets (≈97%), Small shop (≈39%), and Online (7%). After the lockdown, no significant changes of location were seen. But the

frequency of going to the shop, caused by the restrictions, was lower. Products purchased with higher frequency were mainly raw products like eggs, milk, fresh vegetables, bread and pasta (cf. Figure 1). Pasta and vegetables are bought for health motivations. Others products like nuts or cheese were purchased more as they thought to improve their mood.

% of participants buying more quantity

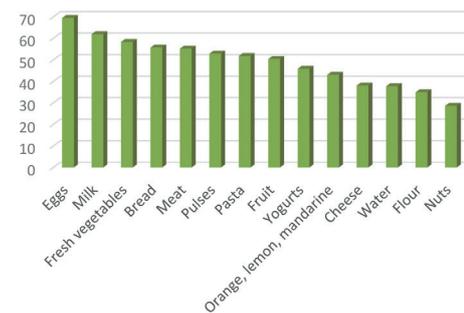


Figure 1: Ranking of the main foods most purchased in quantity by Spanish consumer during the lockdown (perceived changes)

Products purchased with less frequency are shown in figure 2. Fish and seafood were cited because of their short shelf-life. Others products like sugary bakery were also less purchased: participants consider these foods like unhealthy and contribute to weight gain.

% of participants buying less quantity

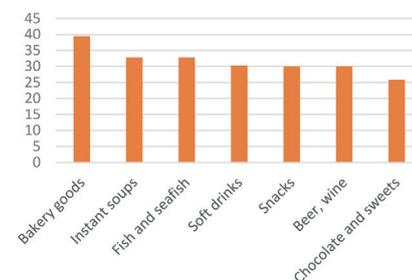


Figure 2: Ranking of the main foods less purchased in quantity by Spanish consumer during the lockdown (perceived changes)

The reliable sources for most participants (95%) were Researchers and Scientists. Sources of information showed on TV was the most frequently used (72%) followed by Journals (48%) and Social media (37%).

Contribution of the present preliminary study provides initial insights into the behavioural changes in a pandemic situation, an event that has not occurred before in social media times. For the scientific community, it is beneficial to know that people declare scientists and experts as one of the most reliable sources of information. However, when searching and watching videos, scientists are not the most popular source. Therefore, efforts should be made to design more effective information communication channels, avoiding that the population follow non-scientific (hoax/fake-news) advice.

Based on: Laguna L, Fizman S, Puerta P, Chaya C, Tárrega A. The impact of COVID-19 lockdown on food priorities. Results from a preliminary study using social media and an online survey with Spanish consumers. *Food Qual Prefer.* 2020;86:104028.

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