



Revisión

A review of graphical representations used in the dietary guidelines of selected countries in the Americas, Europe and Asia

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Abstract

Introduction: Food-Based Dietary Guidelines (FBDGs) are an initiative by the United Nations Food and Agriculture Organization (FAO) and the World Health Organization (WHO) designed to help countries establish their own nutrition education principles. Such principles should be expressed through clear and specific messages that provide guidance and promote good health among populations. Many of these guidelines contain graphical representations (GRs) as visual aids for dietary guidance.

Objectives: to analyze the characteristics of GRs used in various countries on four continents to identify international trends in these graphical messages and assess their usefulness as educational tools for their target populations.

Methods: a review of GRs used in the FBDGs of countries in the Americas, Europe and Asia for which data were available in Spanish or English.

Results and discussion: the models most used are the food circle and pyramid. The GRs (n=37) depict the following recommendations: food groups (37), physical activity (21), water intake (17), low salt intake (7), family meals (1) and relaxation (1). In addition, 10 quantitative recommendations were detected. The GRs of Greece and the United States do not show images of food. The aspects considered in the GRs vary by the regions, cultures and epidemiological characteristics of each country. A tendency to use the food circle and to include lifestyle recommendations in illustrations was observed in the United States, Spain and Mexico. Quantitative recommendations may help to clarify information provided during the educational process.

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Key words: Dietary guidelines. Dietary habits. Health education.

UNA REVISIÓN DE LAS REPRESENTACIONES GRÁFICAS UTILIZADAS EN LAS GUÍAS ALIMENTARIAS DE PAÍSES SELECCIONADOS DE AMÉRICA, EUROPA Y ASIA

Resumen

Introducción: las Guías Alimentarias Basadas en Alimentos "Food-Based Dietary Guidelines" (FBDG) son una propuesta de la Food and Agriculture Organization of the United Nations (FAO) y la World Health Organization (WHO) para que cada país plantee sus principios de educación nutricional de manera clara y concreta con el fin de orientar y promover la buena salud en la población. Muchas de estas guías incluyen una representación gráfica (GR) como ayuda visual en el proceso de orientación alimentaria.

Objetivos: analizar las características de las GR de países de tres continentes, para conocer las tendencias internacionales de los mensajes gráficos y para facilitar su transmisión durante el proceso educativo a la población a la que van dirigidos.

Métodos: revisión de las GR de las FBDG de países de América, Europa y Asia, cuya información estuviera accesible, en español o en inglés.

Resultados y discusión: las figuras más utilizadas son el círculo y la pirámide. Las GR ilustran las siguientes recomendaciones: todas (n=37) grupos de alimentos, 21 actividad física, 17 consumo de agua, 7 restricción de sal, 1 convivencia familiar, 1 relajación y 10 recomendaciones cuantitativas. Las GR de Grecia y Estados Unidos no muestran imágenes de alimentos. Los aspectos considerados en las GR dependen de la región, la cultura y algunas características epidemiológicas de cada país. Se observa una tendencia al uso de la figura del círculo en países como Estados Unidos, España y México, además de incluir recomendaciones sobre el estilo de vida en la ilustración. Las recomendaciones cuantitativas pueden clarificar la información en el proceso educativo.

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Palabras clave: Guías alimentarias. Hábitos alimentarios. Educación en salud.

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Abbreviations

CINDI: Countrywide Integrated Noncommunicable Disease Intervention program

DG: Dietary guidelines

EUFIC: European Food Information Council

FAO: Food and Agricultural Organization of the United Nations

FBDGs: Food-Based Dietary Guidelines

GR: Graphical representation

USDA: United States Department of Agriculture

WHO: World Health Organization

Introduction

This technology-driven era has seen huge advancements in the dissemination of knowledge, including knowledge related to food and health issues from a wide range of sources. A Google search for “healthy eating” conducted by our research staff generated 84,800,000 hits. A search for the same term on Google Scholar, a more specialized search engine, yielded 1,670,000 hits (Searches carried out on March 5, 2015).

Such an informal experiment demonstrates the extent of data available to people who wish to learn more about nutrition. However, not all such data come from reliable sources, a fact which highlights the need to make nutritional information readily available to the public in a way that is understandable, while also ensuring its quality and accuracy.

With a view to evidence on the role of diet in the prevention and treatment of chronic degenerative diseases, in 1992 the United Nations Food and Agricultural Organization (FAO) and the World Health Organization (WHO) identified strategies and actions that could improve nutritional outcomes worldwide. They likewise encouraged countries participating in their programs to promote healthy diets and lifestyles through dietary guidance initiatives. To further such initiatives, the FAO recently issued a series of publications designed to help individual countries develop their own dietary guidelines¹.

These Dietary Guidelines (DGs), or Food-Based Dietary Guidelines (FBDGs), are an expression of the principles of food-based approaches to nutrition education aimed at educating the public and guiding national policies as well as the food industry in regards to food and nutrition. That is, they establish nutritional goals for populations and transmit practical messages—taking into account social, economic and cultural factors, as well as physical and biological environments—that are focused more on foods than on nutrients¹⁻².

According to WHO, FBDGs should:

1. Explain the principles of nutrition education using food.

2. Be intended for use by the general population.
3. Avoid technical language regarding nutrition, to the extent possible, when foods are not mentioned.

In order to provide their populations with criteria needed to achieve dietary goals that promote overall health and also aid in the prevention of chronic and degenerative diseases, individual countries have long implemented a range of strategies and policies using FBDGs¹.

Most FBDGs contain a graphical representation (GR) which expresses recommendations in a visual format in order to facilitate understanding. Graphical representations of FBDGs provide the general population with a visual and practical guide for the selection of foods that will best help them maintain a good state of health. In addition, GRs have also been recommended as a means to control specific conditions such as illnesses or allergies, as they may include dietary recommendations adapted to such conditions³. They are also considered as a possible way to influence populations with certain ethnic⁴, age or gender characteristics, or populations with specific physiological situations such as pregnancy⁵. These guidelines help individuals and populations to plan and evaluate their diets as well as to make decisions to acquire healthy foods⁶.

This paper reviews GRs from countries in the Americas, Europe and Asia, and also offers analysis and reflection on the most important differences between them.

Objective

The purpose of this paper is to analyze the characteristics of GRs from 35 countries (37 GRs) in the Americas, Europe and Asia in order to identify the visual models used, the food groups they depict, whether recommendations are qualitative or quantitative, and whether they offer any other specific recommendations.

Methods

The study design was the result of an ad hoc process. Our initial intention was to only examine GRs from countries in the Americas, but we subsequently added GRs from Europe and Asia. Turkey was classified as a European country, as the FAO considers it as such owing to its geopolitical situation⁷. African and Oceanian countries were not included. This review is not systematic in nature as it focuses on GRs from the most known and used FBDGs. Specific searches to find FBDGs which had at least one GR were conducted.





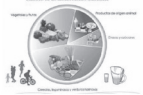







The selection of material available on the websites of government agencies and prominent international

institutions ensured the inclusion of examples with widespread public recognition. Samples collected for our analysis were limited to countries providing information in Spanish or English. The GRs used as input for our study were saved as image files. In cases of GRs with copyright restrictions, the authors/entities responsible for source items were contacted. Data were then collected from each selected GR. The variables analyzed for each GR were: its shape, the food groups depicted,

whether its recommendations were qualitative or quantitative, and whether it offered specific non-food recommendations. Such specific recommendations were in relation to: water/sugar-free liquids, salt intake, alcohol, smoking, physical activity, whether families tend to eat together, relaxation and breastfeeding.

GRs from the United States⁸⁻⁹, Canada¹⁰ and Mexico¹¹ were obtained from websites of government and official agencies. Most GRs from other countries in

Table I
Analysis of graphical representations (GRs) of Food-Based Dietary Guidelines (FBDGs) for the Americas, including the Antilles

Country	Image format	Food groups	Country	Image format	Food groups
Argentina ^{1, 18}	Ellipse/Plate 	1. Cereals 2. Fruits and vegetables 3. Dairy products 4. Meat, poultry and fish 5. Oils and fats 6. Sugar and sweetened products	Honduras ²²	Food Baskets 	1. Cereals, beans and tubers 2. Fruits, green leaves vegetables and vegetables 3. Eggs, milk and dairy products 4. Meat, poultry and fish 5. Sugar and fats
Canada ¹⁰	Rainbow 	1. Vegetables and fruits 2. Grain products 3. Milk and alternatives 4. Meat and alternatives	Mexico ¹¹	Plate 	1. Vegetables and fruits 2. Cereals 3. Legumes and animal source foods
Costa Rica ¹⁶	Circle/Plate 	1. Cereals, legumes and starchy vegetables 2. Fruits and vegetables 3. Animal source foods 4. Fats and sugar	Uruguay ^{1,17}	Plate 	1. Cereals and legumes 2. Vegetables and fruits 3. Milk and cheese 4. Meat, poultry, fish and eggs 5. Fats 6. Sweetened products
Cuba ¹	Seven Plates 	1. Cereals, bananas and tubers 2. Fruits 3. Vegetables 4. Meat, poultry and fish 5. Eggs 6. Oils and fats 7. Sugar	United States Harvard ⁹	Plate 	1. Vegetables 2. Fruits 3. Whole grains 4. Healthy protein 5. Healthy oils
Dominican Republic ²¹	The mortar of food and nutrition 	1. Cereals 2. Beans and legumes 3. Staples 4. Fruits and vegetables 5. Meat, fish, poultry, eggs and dairy 6. Fats, sugar and salt	United States USDA ⁸	Plate 	1. Vegetables 2. Fruits 3. Grains 4. Proteins 5. Dairy
Guatemala ¹⁹	Family cooking pot 	1. Cereals, grains and tubers 2. Vegetables 3. Fruits 4. Meat and fish 5. Milk and eggs 6. Sugar 7. Oils	Venezuela ⁴	Spinning Top 	1. Cereals, legumes, tubers and bananas 2. Vegetables and fruits 3. Dairy, meat, poultry, fish and eggs 4. Fats and vegetables oils 5. Sugar, honey and brown sugar

the Americas were from FBDGs published by the FAO (2014)¹, while those from Europe were mostly those found on the European Food Information Council (EUFIC) website². Some GRs from Asia, the Americas and Europe were retrieved from the FAO website⁷.

This paper presents data about the “food groups” variable of each GR. These data have been sorted into two columns by geographical area and the alphabetical order of countries. Alphabetical order was maintained in table II.

Results and discussion

The GRs appearing in FBDGs visually express messages on healthy eating aimed at general populations. This paper analyzed 37 GRs in 35 countries: 18 in the Americas (7 in the Antilles), 11 in Europe and 6 in Asia. In the cases of the United States and India, more than one GR from national institutions or specialist organizations were identified, in addition to the GR from WHO/CINDI².

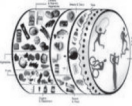






We will first present an analysis of the results by continent and then provide a general analysis of the GRs.

GRs from the Americas

Table I shows GRs from several countries in the Americas, including the Antilles.

In the United States, food guidelines have been used for 30 years. Since 1980, the year they were first published, they have been revised frequently, about every five years. The main organizations overseeing such revisions are the USDA and the United States Department of Health and Human Services⁸. In addition to these institutions, a group of nutrition researchers at the Harvard School of Public Health and the Harvard University School of Medicine, led by Dr. Walter Willet, established their own recommendations and published *The Healthy Eating Pyramid*⁹ in 2008. These researchers believe that graphical images of USDA dietary guidelines should be used to give the best possible advice to the population on healthy eating, based on evidence and independent of commercial interests. The USA's FBDG from 2010 included updated recommendations as well as a change in the graphical image. The traditional pyramid (*The Food Guide Pyramid, MyPyramid*, 2005) was changed to a visual representation of a plate called *My Plate* (offi-

Table I (cont.)
Analysis of graphical representations (GRs) of Food-Based Dietary Guidelines (FBDGs) for the Americas, including the Antilles

Country	Image format	Food groups	Country	Image format	Food groups
The Antilles ^{1,7}					
Bahamas	Drums 	1. Cereals and starchy vegetables 2. Vegetables 3. Fruits 4. Meats and dairy 5. Fats 6. Beans and peas 7. Sugar and sweeteners	Dominica	Food Basket 	1. Staples 2. Vegetables 3. Fruits 4. Food from animals 5. Peas and beans 6. Fats and oils 7. Sugars
Belize	Food Basket 	1. Foods from animals 2. Vegetables 3. Staples 4. Fruits 5. Legumes 6. Fats and oils 7. Sugar and sweeteners	Saint Kitts and Nevis	Sugar mill 	1. Fruits 2. Vegetables 3. Sugar and sweeteners 4. Fats and oils 5. Food from animals 6. Peas, beans and nuts 7. Starchy foods
Grenada	Nut 	1. Staples 2. Fats and oils 3. Vegetables 4. Fruits 5. Legumes 6. Food from animals 7. Sugar	Saint Lucia	Coal pot 	1. Staples 2. Food from animals 3. Legumes 4. Fruits 5. Vegetables 6. Fats and oils 7. Sugar and sweeteners
Guyana	Cooking pan 	1. Staples 2. Vegetables 3. Fruits 4. Legumes food 5. Animal source foods 6. Fats and oils			

cially published in June 2011)⁸. In response to these changes, researchers from the Harvard School of Public Health developed the *Healthy Eating Plate*⁹ in September 2011. Comparing the two current GRs in the United States (Figure 1), both illustrate four food groups in almost the same proportions. However, the Harvard GR emphasizes that cereals should be whole grain, and that sources of protein should be healthy ones. In addition, instead of recommending dairy products, as does the USDA, it recommends water in addition to healthy oils and physical activity.

The plate icon recently adopted by the United States and other countries around world has been used in Mexico since 1999, when it was introduced as part of a plan to establish official national standards¹². It became the official standard in 2005 and continues as such under the current standards issued in 2012¹¹ (Figure 1).

Mexico has been offering specific nutritional recommendations to its population for more than 40 years. Such recommendations were established and are periodically reviewed by the National Institute of Medical Science and Nutrition Salvador Zubirán (INCMNSZ, by its acronym in Spanish). These recommendations exist for purposes of regulation, evaluation and planning¹³. Mexican recommendations put forth a definition of the “proper diet” as being one that is complete, balanced, safe, sufficient and varied¹¹. The *Plato del Bien Comer* (Figure 1) has become the graphical representation for Mexico’s FBDG. This image presents a summary of general dietary guidance criteria¹⁴. Mexican guidelines aim to offer practical options for a proper diet that are supported by scientific evidence, meet the needs of the population and are readily available and affordable. The GR illustrates the three groups of foods that should be eaten to achieve optimal dietary group combinations and variety. These GRs should be interpreted as facilitating instruments that are not intended to replace personalized dietary guidance.¹⁴⁻¹⁵

Table II shows the GR shapes, the number of food groups, and specific recommendations from all GRs that have been reviewed.

In addition to the United States⁸⁻⁹ and Mexico¹¹, other countries in the Americas that use plates in their GRs are Costa Rica¹⁶, Uruguay^{1,17}, Cuba¹ and Argentina¹⁸. The number of food groups suggested by these countries ranges from four to seven. GRs from Argentina¹⁸, Costa Rica¹⁶ and Uruguay^{1,17} contain recommendations for water intake. Argentina and Costa Rica also contain references to physical activity, while Costa Rica¹⁶ emphasizes families eating together within the category of lifestyle (Tables I and II).

GRs used by other countries in the Americas vary in the number of food groups they illustrate, the visual icons they employ and whether or not they recommend other nutrients and/or lifestyle aspects. For example, the Canadian GR uses a rainbow image to promote four food groups¹⁰ (Tables I and II), while Guatemala’s GR features a traditional cooking pot icon and seven food groups¹⁹. In addition to Guatemala¹⁹, other countries such as Honduras^{1,20}, the Dominican Republic^{1,21}, Venezuela^{1,4} and countries in the Antilles¹ use more traditional icons such as baskets, spinning tops or drums (Table I). Noteworthy is the fact that the Dominican Republic’s GR emphasizes the importance of breastfeeding, proper weaning and infant feeding, in addition to physical activity, water intake and salt intake^{1,21}. GRs from the Dominican Republic²¹ and the 2015 version from Argentina¹⁸ are the only ones in the Americas which feature aspects of physical activity, water intake and salt intake (Tables I and II).

GRs from Europe

Table III shows GRs from a number of European countries. The icons used range from pyramids to plates. Some countries have gone back to using the plate. Spain switched from a “Pirámide de la alimentación saludable”²² to the “Nueva rueda de los alimentos” published in 2005 by the Spanish Society of Dietetics and Food Science (*Sociedad Española de Dietética y Ciencias de la Alimentación*, or *SEDCA*). This icon had previously been used in the 1970s and 1980s²³.

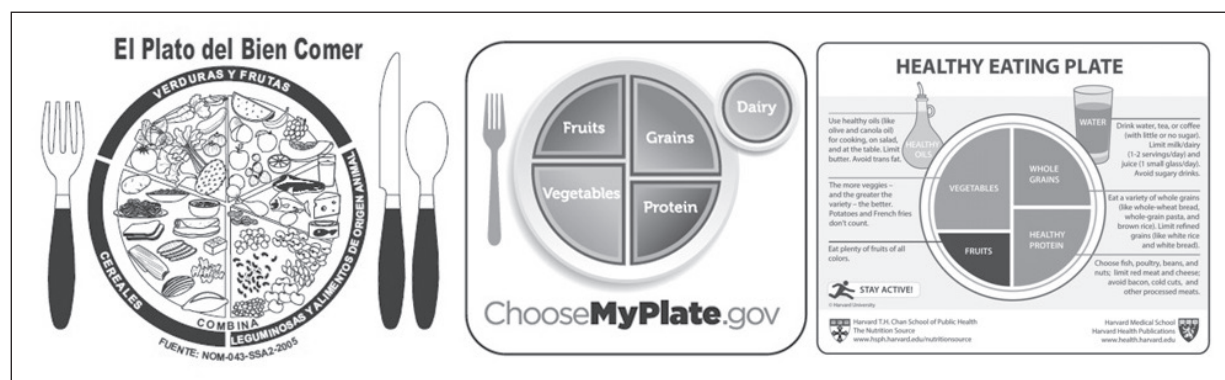


Fig. 1.—Food guides based on foods with a plate shape: *Plato del Bien Comer*^{11,12}, *ChooseMyPlate*⁸, *Healthy Eating Plate*⁹.

Table II
Food and lifestyle descriptions from graphical representations in Food-Based Dietary Guidelines

<i>Continent/Region</i>	<i>Country</i>	<i>Pyramid</i>	<i>Circle-Plate</i>	<i>Food groups</i>	<i>Qualitative</i>	<i>Quantitative</i>	<i>Water/sugar-less liquids</i>	<i>Salt</i>	<i>Alcohol</i>	<i>Smoking</i>	<i>Physical activity</i>	<i>Family meals</i>	<i>Relaxation</i>	<i>Breastfeeding</i>
The Americas	Argentina ^{1,18}		*	6	*		*	*			*			
	Canada ¹⁰			4	*									
	Costa Rica ¹⁶		*	4	*		*				*	*		
	Cuba ¹		*	7	*									
	Dominican Republic ²¹			6	*		*	*			*			*
	Guatemala ¹⁹			7	*		*				*			
	Honduras ²⁰			5	*		*				*			
	Mexico ¹¹		*	3	*									
	Uruguay ^{1,17}		*	6	*		*							
	US Harvard ⁹		*	5	*		*				*			
	US USDA ⁸		*	5	*									
	Venezuela ¹⁶			5	*		*				*			
The Antilles ^{1,7}	Bahamas			7	*						*			
	Belize			7	*						*			
	Grenada			7	*						*			
	Guyana			6	*						*			
	Dominica			7	*						*			
	Saint Kitts and Nevis			7	*						*			
	Saint Lucia			7	*						*			
Europe	Belgium ⁷	*		7	*	*	*				*			
	Germany ²⁴	*	*	7/4	*		*							
	Greece ²	*		12	*	*	*	*	*		*			
	Ireland ²⁵	*		6	*	*		*						
	Netherlands ⁷		*	4	*		*							
	Romania ⁷	*		6	*	*	*				*			
	Spain ²³		*	6	*		*				*			
	Sweden ²⁹		*	7/3	*									
	Switzerland ²⁶	*	*	5/3	*	*	*	*	*		*		*	
	Turkey ³⁰		*	4	*									
	United Kingdom ²⁸		*	5	*									
	WHO/CINDI ²⁷	*		4	*									
Asia	China ⁷			5	*	*	*	*			*			
	India ⁷	*		5	*				*	*	*			
	Japan ³¹			5	*	*	*				*			
	Malaysia ⁷	*		4	*	*		*						
	Sri Lanka ⁷	*		7	*	*								
	Thailand ³²			6	*	*		*						

Noteworthy is the GR used by Germany (Table III), introduced in 1955 by the German Nutrition Society (*Deutsche Gesellschaft für Ernährung e.V., or DGE*), which employs a circular format. This GR had been developed continuously up to its 2005 version, which complemented its circular base with a three-dimensional circular pyramid. The circular base presents recommended proportions for seven food groups and includes fluid intake. The sides of the pyramid display four food groups with food intake recommendations for each group presented in proportion to the width of the pyramid²³.

Other countries that continue to use pyramids as their GR are Belgium⁷, Greece², Ireland²⁵, Romania⁷ and Switzerland²⁶. This shape is also preferred by the World Health Organization's Countrywide Integrated Noncommunicable Disease Intervention program (WHO/CINDI)^{2,27}. European countries that use a circle, plate or wheel as their GR are Spain²³, the Netherlands⁴, the United Kingdom^{7,28}, Sweden²⁹ and Turkey^{7,30}. Switzerland's GR uses a plate icon as a complementary element to represent the optimal distribution of meals⁷ (Tables II and III).

The number of food groups used in European GRs ranges from four (Germany²⁴, Turkey³⁰ and CINDI²⁷) to 12 in the case of Greece's pyramid². Six of the 12 graphics analyzed include the intake of water or other fluids in their GRs, and six also feature physical activity. Of interest are the references to salt intake in the pyramids of Ireland²⁵, Greece² and Switzerland²⁶. The latter of these suggests a low intake of salty snacks and the inclusion of alcohol in small amounts²⁶, while the Greek GR suggests moderate wine consumption² (Table II).

GRs from Asia

In reference to GRs originating in Asia, we analyzed those from six countries: China⁷, India^{5,7}, Japan³¹, Malaysia⁷, Sri Lanka⁷ and Thailand^{7,32} (Table IV). Most of these use a pyramid. Noteworthy are China's GR⁷, which takes the form of a pagoda structure, and that from Japan³¹, shaped like a spinning top. Both feature graphically expressed recommendations for water/fluid intake and physical activity (Tables II and IV). Another original GR is that from Thailand^{7,32}, which displays a triangular flag mounted on a mast in an inverted position.

Salt intake is a component of most of the Asian GRs studied. It appears in GRs from China⁷, Malaysia⁷ and Thailand³² (Table II). Of particular significance is the prohibition of alcohol and smoking within the lifestyle recommendations of India's GR⁷. This country's pyramid icon also has a message about physical activity. FBDGs from India use different GRs for different age and gender categories. Among these is a step pyramid⁵.

Overall results

Some countries adopt GRs with forms that convey aspects of their national identities or traditions. Such is

the case of Canada¹⁰ (rainbow), countries in the Antilles^{1,7} (drum, basket, nut, cooking pan, sugar mill and coal pot), Guatemala¹⁹ (family cooking pot), Honduras²⁰ (food basket), the Dominican Republic²¹ (mortar and pestle), China⁷ (pagoda), Venezuela⁴ and Japan³¹ (spinning top, both countries). This type of icon is used primarily by countries in Latin America, the Antilles and Asia. Some of them could hinder the identification of the recommended proportions of each food group by people unfamiliar with the culture in question or by those who do not understand the structure of these GRs (Tables I and IV).

The GRs from 13 of the countries analyzed use circles, plates or wheels. This group included the circular GR from Germany²⁴, which has been in use since 1955. More recently, this icon has been complemented by a three-dimensional pyramid. Also using a pyramid is Switzerland²⁶, whose GR also contains a plate. The GR from Cuba¹ has seven plates, one for each food group. The plates vary in size according to the recommended allowances for each group. Argentina is another country using the plate icon, which it published for public consideration in 2015¹⁸. This country's previous GR was an ellipse figure where the six food groups were arranged proportionally in accordance with the width of the ellipse. Its only non-food recommendation was related to water intake¹ (Table II). As previously mentioned, the circle or plate shape has been re-introduced by some countries such as Spain²³. Others, including Germany²⁴, have used it over a considerable period of time because of its practicality and understandability for educational purposes. Other countries like Mexico¹¹ and the United States⁸⁻⁹ have also transitioned from the pyramid to the circle.




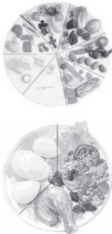








Nine countries use the pyramid icon as their GR, apart from the pyramid used by WHO/CINDI²⁷. Included in this count is Germany's GR²⁴, which uses both the circle and the pyramid. Thailand's GR could be considered to have a pyramid format³², as it depicts a triangular flag hanging from a mast in the form of an inverted pyramid (Table IV). This GR suggests food group intake amounts in proportion to the width of the flag and by specific quantities.

Of significance is the fact that the shapes most used in the analyzed GRs are the circle (14 of 37) and the pyramid (10 of 37).

Within the specific recommendations, the GRs of 17 countries refer to the intake of water or sugarless drinks. In the case of both FBDGs from the United States, this recommendation only appears in that published by the Harvard researchers⁹. Low salt intake is recommended in eight of the GRs analyzed: two from the Americas,^{18,21} three from Europe^{2,25,26} and three from Asia^{7,32}. The prevalence of this recommendation in Europe and Asia is probably because of the epidemiological situations in their countries, where intake levels of this condiment are significant³³.

Physical activity recommendations are present in 22 GRs.^{1,2,4,7,9,16,18-21,23,26,31} Meanwhile, only the GR from

Table III
Analysis of graphical representations (GRs) of Food-Based Dietary Guidelines (FBDGs) from Europe

Country	Image format	Food groups	Country	Image format	Food groups
Belgium ⁷	Pyramid 	1. Cereals, potatoes and legumes 2. Vegetables 3. Fruits 4. Dairy products 5. Meat, fish, eggs and meat alternatives 6. Fats and oils 7. Sweetened products	Spain ²³	Plate 	1. Cereals, potatoes and sugar 2. Fats, oils and butter 3. Meat, fish, eggs, legumes and nuts 4. Dairy 5. Vegetables 6. Fruits
Germany ²⁵	Three dimensional pyramid circle in the base  ©Copyright: Deutsche Gesellschaft für Ernährung e. V., Bonn	1. Plant foods 2. Animal source foods 3. Oils and fats 4. Drinks. Seven groups at plate: 1. Cereals, cereal products and potatoes 2. Vegetables and salads 3. Fruit 4. Milk and milk products 5. Meat, sausages, fish, eggs 6. Fats and oils 7.- Drinks	Sweden ²⁹	Circle and plate 	1. Fruits and berries 2. Vegetables 3. Potatoes and tubers 4. Cereals, breads, pasta and rice 5. Fats and oils 6. Milk and cheese 7. Meat, fish, and eggs At plate: potatoes and cereals, vegetables and protein sources
Greece ²	Pyramid 	1. Cereals and whole grains 2. Fruits 3. Vegetables 4. Olive oil 5. Dairy products 6. Fish 7. Poultry 8. Olives, pulses and nuts 9. Potatoes 10. Eggs 11. Sweets 12. Red meat	Switzerland ²⁶	Pyramid and plate 	1. Vegetables and fruits 2. Cereals, potatoes and legumes 3. Dairy, meats, fish, eggs and tofu 4. Nuts, oils and fats 5. Sugars, salted snacks and alcohol At plate 3: vegetables and fruits, starchy foods and protein sources
Ireland ²⁵	Pyramid 	1. Breads, cereals, potatoes, pasta and rice 2. Fruits and vegetables 3. Milk, yogurt and cheese 4. Meat, poultry, fish, eggs, beans and nuts 5. Spreads and oils 6. Foods and drinks high in fats, sugars and salt	Turkey ³⁰	Circle 	1. Vegetables and fruits 2. Meat, fish, poultry and eggs 3. Cereals 4. Dairy
Netherlands ⁷	Wheel 	1. Vegetables and fruits 2. Cereals, potatoes and legumes 3. Fish, meat, dairy and tofu 4. Oils and fats	United Kingdom ²⁸	Circle 	1. Fruits and vegetables 2. Bread, rice, potatoes, pasta 3. Milk and milk products 4. Foods and drinks high in fat and/or sugar 5. Meat, fish, eggs, beans
Romania ⁷	Pyramid 	1. Cereals 2. Vegetables 3. Fruits 4. Dairy products 5. Meat, fish and eggs 6. Foods high in saturated fats and sugars	WHO/CINDI ²⁷	Pyramid 	1. Cereals, potatoes, vegetables and fruits 2. Milk 3. Meat and poultry 4. Oils and sweets/energy-dense foods




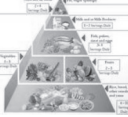


Costa Rica¹⁶ depicts families having meals together, and only Switzerland's²⁵ represents relaxation. We find the figures from these latter two categories remarkable, given that both are important aspects of a healthy lifestyle. In reference to specific foods, alcohol appears in the pyramids from Greece², Switzerland²⁶ and India^{5,7}. The first two countries recommend moderation, while the latter prohibits it along with smoking. Regarding breastfeeding, the Dominican Republic's GR offers very specific recommendations²¹ and highlights its importance (Table II).

The number of suggested food groups range from a minimum of three in Mexico's *Plato del bien comer*^{11,15} to a maximum of 12 in the pyramid from Greece². Differences with respect to the number of groups are related to whether food categories such as fruits and/or vegetables, animal products and cereals are counted together or separately. Also noteworthy is the inclusion of the following foods or groups: olive oil (United States⁹, Greece²), olives (Greece²), oilseeds (Saint Kitts and Nevis¹, Switzerland²⁶, Sri Lanka⁷), bananas (Cuba¹, Venezuela⁴, Saint Lucia^{1,7}), energy foods (Dominican Republic²¹), among others. We also observed that most GRs present illustrations of foods from each of the food groups (depending on the country), with the exception of both GRs from the United States^{8,9} (Table I) and that from Greece² (Table III). These GRs only present food groups in a proportional manner and without illustrations.

Of the 37 GRs analyzed, all include qualitative recommendations. That is, the proportion shown for each food group corresponds to that which should be consumed. Only 10 GRs (those from Belgium⁷, Greece², Ireland²⁵, Romania⁷, Switzerland²⁶, China⁷, Japan³¹, Malaysia⁷, Sri Lanka⁷ and Thailand³³) contain quantitative recommendations stating the number of suggested servings from each food group. None of the countries in the Americas offer quantitative recommendations within their GRs. However, the one from Honduras²⁰ contains the weekly frequency with which each food group should be consumed.

Other studies of FBDGs include the review of Latin America and the Antilles undertaken by the FAO¹, the technical report on Latin America by Verónica Molina³⁴, the report on European FBDGs prepared by Michael Gibney of WHO³⁵, the review by the EUFIC². However, these documents only contain comparative references to recommendations in the food guidelines, relating to their production process and participant/responsible agencies and to their functions and use in their respective countries, without going into a comparative analysis of the GRs themselves. There is also a study from Chile which analyzes the barriers and motivations affecting whether children and their mothers adopt the recommendations conveyed by FBDGs. No comparison of GRs is carried out in this study, but researchers hope the results obtained will be used to improve the way the concepts in these guides are communicated³⁶.

Table IV
Analysis of graphical representations (GRs) of Food-Based Dietary Guidelines (FBDGs) from Asia

Country	Image format	Food groups	Country	Image format	Food groups
China ⁷	Pagoda 	1. Cereals 2. Vegetables and fruits 3. Meat, poultry, fish, shrimp and eggs 4. Dairy and legumes 5. Fats, oils and salt	Malaysia ⁷	Pyramid 	1. Rice, cereals, noodles and tubers 2. Vegetables and fruits 3. Animal source foods and legumes 4. Fats, sugars and salt
India ⁷	Different figures: once as Pyramid 	1. Cereals and legumes 2. Vegetables and fruits 3. Oils 4. Animal source foods 5. Highly processed food high in sugar and fat	Sri Lanka ⁷	Pyramid 	1. Rice, bread, cereals and tubers 2. Vegetables 3. Fruits 4. Fish, legumes, meats and eggs 5. Dairy products 6. Nuts and oils 7. Fats and sugary products
Japan ³¹	Spinning top 	1. Grain dishes 2. Vegetables dishes 3. Fish and meat dishes 4. Milk 5. Fruits	Thailand ³²	Triangular Flag 	1. Rice, rice products, other grains and starchy foods 2. Vegetables 3. Fruits 4. Meat, legumes and eggs 5. Milk 6. Oil, sugar and salt

To our knowledge, only two papers from Mexico compare the GRs from seven countries^{6,37}. A 2002 study presented the GRs from Canada, Chile, Guatemala, Mexico, India, Thailand and Japan as an analysis to support the development of Mexico's GR³⁷. Another paper published in 2003 presented a comparison of GRs from the United States, Chile, Guatemala, Mexico, Costa Rica, Canada and India. It contained a discussion about the food groups and nutrients that they suggested, as well as the proportions, colors and shapes they used⁶, possibly as support for a national proposal. An analysis of the differences between these GRs compared with current ones shows that although Canada^{6,10,37} and Guatemala^{6,19,37} have maintained the same icons, these icons have been stylized. Canada now prioritizes the intake of fruit¹⁰ instead of cereals,^{6,37} while Guatemala places fats and sugars in separate groups^{6,37} and also includes physical activity and water intake in its recent GR¹⁹. The GR from the United States was changed to a plate that places greater emphasis on the intake of vegetables and fruit yet does not contain images for recommended foods and portions.^{6,8,9} Another change is observed in the DG from Chile, whose GR was a pyramid^{6,37}. However, this country's 2013 publication no longer had a GR, which is why it was not included in this paper's analysis³⁸. While the GR from Costa Rica maintains the same shape and food groups^{6,16}, it deals with colors and food images in a clearer way and also mentions fluid intake, physical activity and exercise¹⁶. Thailand's 2001 pagoda icon³⁷ was changed to a flag³², with food groups presented in a more explicit way. In addition, quantitative recommendations and a recommendation regarding salt intake were also present³². In 2005, the "G"³⁷ shape of Japan's GR was changed to that of a spinning top³¹. It also contained recommendations for water/tea and physical activity. Finally, in reference to the GR from India^{6,37}, in both reviews it consisted of a step pyramid featuring four food groups. It continues to be used for adults, but now features seven food groups⁵.

Ours is a limited review which focuses exclusively on GRs used in a small number of countries and geographical regions. However, this study makes a specific comparison of GRs from four continents from both an individual and worldwide perspective, shedding light on current trends and recommendations that could be incorporated into the design of new GRs.

It can be concluded that the most commonly used shapes in GRs are the plate, circle, wheel and pyramid. A number of countries are currently switching to the plate because it facilitates the interpretation of intake proportions normally recommended in the process of nutrition education. Most of these GRs contain photos, diagrams or images of the most representative items from food groups in each country. A common trend is to include aspects related to lifestyle such as physical activity and the intake of water or other fluids with low sugar content. Other recommendations are offered in accordance with economic, epidemiological

and cultural factors prevalent in each country. Among these factors are: families eating together, salt intake, breastfeeding and alcohol intake. Most GRs only present qualitative recommendations in accordance with proportions established for particular food groups, although 10 from Europe and Asia provide quantitative data concerning recommended food portions. As some FBDGs have additional instruments or provide quantitative data as complementary information on their national websites, it is important to consider these data to facilitate the educational process among the target population. This review provides data that may prove useful to government agencies, universities and research centers with FBDGs when making decisions on revisions/updates of their own GRs designed to facilitate nutrition education and counseling initiatives that may lead to the adoption of healthy habits. Such efforts may also contribute to the debate about why some GRs emphasize certain food groups and not others so that these factors may be considered when providing assistance to individuals, the population at large or even migrant groups.

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In memoriam of Alejandro Botello who made a first review of the GR of FBDG in 2005 at CUCS.

Referencias

1. Food and Agriculture Organization of The United Nations (FAO). El Estado de las Guías Alimentarias Basadas en Alimentos en América Latina y el Caribe. División de Nutrición de la Organización de las Naciones Unidas para la Alimentación y la Agricultura (FAO). <http://www.fao.org/3/a-i3677s.pdf> Roma, 2014. E-ISBN 978-92-5-308225-4 [Cited, Dec 2nd, 2014].
2. European Food Information Council (EUFIC). *Food-Based Dietary Guidelines in Europe 2009*. <http://www.eufic.org/article/en/expid/food-based-dietary-guidelines-in-europe/> [Cited, Dec 2nd, 2014].
3. Martín ISM. Herramienta de educación nutricional para alérgicos a huevo y proteína de leche de vaca de edad pediátrica. *Nutr Hosp* 2014;29(n05):1062-9.
4. Instituto Nacional de Nutrición (INN) de Venezuela. El trompo de los alimentos. "Democratizando la cultura alimentaria y nutricional". 2007. <http://www.fao.org/3/a-as878s.pdf> [Cited, Dec 12th, 2014].
5. National Institute of Nutrition. Indian Council of Medical Research. *Dietary Guidelines for Indians - A manual* 2011. <http://>

- ninindia.org/DietaryGuidelinesforNINwebsite.pdf [Cited, Jan 6th, 2015].
6. Kaufer-Horwitz M, Valdés-Ramos R, Willet W, Anderson A and Solomons N. Análisis comparativo de los mensajes de las representaciones visuales de siete guías alimentarias nacionales. *Cuadernos de Nutrición* 2003; 26(6):261-68.
 7. Food and Agriculture Organization of the United Nations (FAO). *Food-based dietary guidelines* 2014. <http://www.fao.org/nutrition/education/food-dietary-guidelines/home/en/> [Cited, Dec 29th, 2014].
 8. United States Department of Agriculture (USDA). ChooseMyplate.gov *Dietary Guidelines* 2012. <http://www.choosemyplate.gov/dietary-guidelines.html> [Cited, Oct 10th, 2014].
 9. Harvard School of Public Health. "The Nutrition Source". Food Pyramids and Plates: What Should You Really Eat? 2012. <http://www.hsph.harvard.edu/nutritionsource/what-should-you-eat/pyramid-full-story/index.html> [Cited, Oct 16th, 2014].
 10. Health Canada. Food and Nutrition. *Canada's Food Guide* 2011. <http://www.hc-sc.gc.ca/fn-an/food-guide-aliment/index-eng.php> [Cited, Feb 3rd, 2015].
 11. Diario Oficial de la Federación. Norma Oficial Mexicana NOM-043-SSA2-2012. Servicios básicos de salud. Promoción y educación para la salud en materia alimentaria. *Criterios para brindar orientación* 2013. http://dof.gob.mx/nota_detalle.php?codigo=5285372&fecha=22/01/2013. [Cited, sept 15th, 2014]
 12. Proyecto de Norma Oficial Mexicana PROY-NOM-SSA2-043-1999, Servicios básicos de salud. Promoción y educación para la salud en materia alimentaria. *Criterios para brindar orientación*
 13. Bourges H, Casanueva E and Rosado JL. Prólogo. En: Bourges H, Casanueva E y Rosado JL. Recomendaciones de ingestión de nutrimentos para la población mexicana, tomo II. Instituto Danone Nutrición para la salud. *Editorial Médica Panamericana* 2008; pp XXIX-XXX.
 14. Casanueva E and Pérez-Lizaur AB. De los valores nutrimentales de referencia a El plato del bien comer. En: Bourges H, Casanueva E y Rosado JL. Recomendaciones de ingestión de nutrimentos para la población mexicana, tomo II. Instituto Danone Nutrición para la salud. *Editorial Médica Panamericana* 2008; pp 45-56.
 15. Bourges H, Kaufer-Horwitz M, Casanueva E and Plazas M. Los condimentos de El Plato del Bien Comer. *Cuadernos de Nutrición* 2003; 26(6):269-73.
 16. Ministerio de Salud. Comisión Intersectorial de Guías Alimentarias para Costa Rica. Guías Alimentarias para Costa Rica. San José Costa Rica. CIGA. 2011. http://www.ministeriodesalud.go.cr/gestores_en_salud/guiasalimentarias/guia_alimentarias_2011_completo.pdf [Cited, Feb 3rd, 2015].
 17. Instituto Nacional de Alimentación (INDA) Uruguay. s/f. Educación Nutricional. Finalidad y funciones www.inda.gub.uy [Cited Jan, 7th, 2015].
 18. Ministerio de Salud de la Nación, Argentina. Mensajes y gráfica de las Guías Alimentarias para la población argentina. 2015. <http://www.msal.gov.ar/ent/index.php/informacion-para-ciudadanos/menos-sal--vida/482-mensajes-y-grafica-de-las-guias-alimentarias-para-la-poblacion-argentina> [Cited Feb, 20th, 2015]
 19. Ministerio de Salud Pública y Asistencia Social. Guías Alimentarias para Guatemala. Recomendaciones para una alimentación saludable. Producido en Guatemala. 2012. <http://www.fao.org/3/a-as870s.pdf> [Cited, Jun 30th, 2014].
 20. Comisión Nacional de Guías Alimentarias para Honduras. Guías Alimentarias para Honduras. *Consejos para una alimentación sana* 2013. <http://www.fao.org/3/a-as874s.pdf> [Cited, Feb 3rd, 2015].
 21. Despacho de la primera dama. SESPAS, Nutrición. Guías Alimentarias Basadas en Alimentos de la República Dominicana. Colección de Nutrición. Serie de guías, manuales y protocolos. 2009. <http://www.fao.org/3/a-as866s.pdf> [Cited, Oct 8th, 2014].
 22. Sociedad Española de Nutrición Comunitaria (SENC). Guía de la alimentación saludable. Madrid. 2004. http://www.nutricioncomunitaria.org/BDProtegidos/guia_alimentacion%20SENC_I_1155197988036.pdf [Cited, Feb 3rd, 2015]
 23. Martínez-Alvarez JR, Villarino-Marín A, Iglesias-Rosado C, de Arpe-Muñoz C, Gómez-Candela C and Marrodán-Serrano MD. Recomendaciones de alimentación para la población española. *Nutrición Clínica y Dietética Hospitalaria* 2010; 30(1):4-14. http://www.nutricion.org/publicaciones/revista_2010_01/recomendaciones_de_alimentacion_Martinez.pdf [Cited, Feb 3rd, 2015].
 24. Oberritter H, Schäbethal K, von Ruesten A, Boeing H. The DGE Nutrition Circle – Presentation and Basis of the Food-Related Recommendations from the German Nutrition Society (DGE). *Ernaehrungs Umschau International* 2013; 60(2):24–29.
 25. The Ireland Department of Health and the Health Service Executive. Your Guide to Healthy Eating. Using the Food Pyramid. 2012. http://health.gov.ie/wp-content/uploads/2014/03/YourGuide_HealthyEating_FoodPyramid.pdf [Cited, Jan 13th, 2015].
 26. Swiss Society for Nutrition SSN, Federal Office of Public Health. Swiss Food Pyramid. Balanced plate. 2011. <http://www.sge-ssn.ch/de/ich-und-du/essen-und-trinken/ausgewogen/ausgewogener-teller/> and: http://www.sge-ssn.ch/media/medialibrary/2014/10/_sge_pyramid_basic_E_2014.pdf [Cited, Dec 29th, 2014].
 27. World Health Organization. Countrywide Integrated Non-communicable Disease Intervention program (CINDI) dietary guide. 2000. http://www.euro.who.int/_data/assets/pdf_file/0010/119926/E70041.pdf [Cited, Dec 29th, 2014].
 28. Public Health England. Your guide to the eatwell plate. Helping you eat a healthier diet. 2013. <http://www.fao.org/3/a-as838e.pdf> [Cited, Dec 27th, 2014].
 29. Livsmedelsverket. Food and nutrition. Sweden. Food circle and plate model. 2013. www.slv.se/sv [Cited, Dec 28th, 2014].
 30. The Ministry of Health of Turkey. Dietary Guidelines for Turkey. 2006. <http://www.fao.org/3/a-as697e.pdf> [Cited, Jan 5th, 2015].
 31. Oba S, Nagata C, Nakamura K, Fujii K, Kawachi T, Takatsuka N, *et al.* Diet based on the Japanese Food Guide Spinning Top and subsequent mortality among men and women in a general Japanese population. *Journal of the J Am Diet Assoc* 2009;109(9):1540-7.
 32. Working group on Food-Based Dietary Guidelines for Thai People. *Manual Nutrition Flag Healthy Eating for Thais* 2001. <http://www.fao.org/3/a-as979e.pdf> [Cited, Jan 13th, 2015].
 33. Thuesen BH, Toft U, Buhelt LP, Linneberg A, Friedrich N, Nauck M *et al.* Estimated daily salt intake in relation to blood pressure and blood lipids: the role of obesity. *Eur J Prev Cardiol* 2014; 2047487314553201
 34. Molina V. Guías Alimentarias en América Latina. Informe de la consulta técnica regional de las Guías Alimentarias. *An venez Nutr* 2008;21(1):31-41.
 35. Gibney M and Sandström B. A framework for food-based dietary guidelines in the European Union. *Public Health Nutrition* 2001;4(2a):293-305.
 36. Olivares S, Zaccarias I, González CG. Motivaciones y barreras de los niños chilenos; ¿Amenazas u oportunidades para la implementación de la guías alimentarias 2013? *Nutr Hosp* 2014; 30(2):260-6.
 37. Casanueva E, Duran E, Kaufer M, Plazas M, Polo E, Toussaint G *et al.* Fundamentos de El Plato del Bien Comer. *Cuadernos de Nutrición* 2002; 25(1):21-28.
 38. Instituto de Nutrición y Tecnología de los Alimentos (INTA) de la Universidad de Chile. *Guía de alimentación para una vida más sana* 2013. www.inta.cl [Cited, Feb 5th, 2015].