



## Role of eggs consumption in women at different life stages

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### Abstract

Although women need less energy than men, their recommended dietary intakes for some nutrients are similar or even higher. Some physiological situations can highlight those differences, such as growth, pregnancy, lactation and menopause. Nutritional deficiencies may impact on growth, fertility, pregnancy and newborn health, so in this context eggs are a food of great interest because of its essential and highly bioavailable nutrients, while providing few calories. In addition, and bearing in mind that life expectancy for women is generally higher than that of men, the likelihood of suffering chronic diseases and for a longer time is high. In this sense, eggs are very nutritive food, inexpensive and easy to prepare, easy to chew and digest, and are especially suitable for women in old age or more fragile situations. Nutrients and bioactive substances provided by eggs can help prevent chronic diseases and improve the health of women in the last stages of their life.

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Key words: Women. Eggs. Nutritional deficiencies. Nutritional value. Balanced diet.

### PAPEL DEL HUEVO EN LA ALIMENTACIÓN DE LA MUJER EN DISTINTAS ETAPAS DE SU VIDA

#### Resumen

Las mujeres necesitan menos energía que los hombres, pero sus ingestas recomendadas de algunos nutrientes son iguales o incluso superiores. Algunas situaciones fisiológicas pueden aumentar aún más estas diferencias, como ocurre durante el crecimiento, el embarazo, la lactancia o la menopausia. Las deficiencias nutricionales pueden tener consecuencias adversas sobre el crecimiento y desarrollo, la fertilidad, el desarrollo del embarazo y la salud del recién nacido. En este contexto, el huevo es un alimento de gran interés debido a que contiene nutrientes esenciales y altamente biodisponibles, y bajo contenido calórico. Además, teniendo en cuenta que la esperanza de vida para la mujer es mayor que para el hombre, la probabilidad de padecer enfermedades crónicas y durante más tiempo aumenta. Los huevos son alimentos altamente nutritivos, baratos, fáciles de preparar y fáciles de masticar y digerir, y especialmente útiles para la mujer en la ancianidad y en situaciones de mayor fragilidad. Los nutrientes y las sustancias bioactivas del huevo ayudan a prevenir enfermedades crónicas y a mejorar la salud de las mujeres en las últimas etapas de su vida.

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Palabras clave: Mujeres. Huevos. Deficiencias nutricionales. Valor nutricional. Dieta equilibrada.

#### Abbreviations

25(OH)D: 25-Hidroxyvitamin D  
DHA: Docosahexaenoic Acid  
EPA: Eicosapentaenoic Acid  
IoM: Institute of Medicine  
RDI: Recommended Dietary Intakes

#### Introduction

Women have different nutritional needs than men<sup>1</sup>. Their energy needs are often lower, but their recom-

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mended intakes for some nutrients are similar or even higher than those for men of same age. Some physiological situations can highlight those differences, such as growth, pregnancy, lactation and menopause. In this context the egg is a food of great interest because of its essential and highly bioavailable nutrients, while providing few calories. In addition, bearing in mind that life expectancy for women is generally higher than that of men, the likelihood of suffering chronic diseases and for a longer time is high. Eggs are very nutritive food, inexpensive and easy to prepare, easy to chew and digest, especially suitable for women in old age or more fragile situations.

### Nutritional needs of women are different than those for men

Compared with men, women need less daily energy in general<sup>1</sup>. This is mainly due to their smaller body

size and different body composition. However, the needs of the other nutrients are not always smaller, and even can be higher. Table I shows the recommended intakes of energy and nutrients for men and women at different ages<sup>1</sup>. Looking at the 20-40 years old adult group, we can see that women need more calcium and iron than men of same age, and also the same amount of vitamin C, B<sub>12</sub>, folate, pantothenic acid, biotin, phosphorus and iodine. And also, although women need less vitamin B<sub>1</sub>, B<sub>6</sub>, niacin and magnesium, if we consider the recommended energy intake, the nutrient density of these nutrients (nutrient/1000 kcal) in the ideal diet is slightly higher than those for men. Some physiological situations can highlight those differences, such as growth, pregnancy, lactation and menopause. So women need to follow a higher nutrient-dense diet than men in order to maintain their bodyweight and reach their recommended intakes of nutrients. Because of this, women need to choose high nutrient-dense foods for their diets.

**Table I**  
*Recommended Dietary Intakes for men and women at different life stages<sup>1</sup>*

	14-19 y		20-40 y		≥70 y		pregnancy	lactation
	men	women	men	women	men	women		
Energy (kcal)	2800	2250	2700	2200	2100	1700	2500	2700
Proteins (g)	56	43	54	41	54	41	56	66
Vitamin B <sub>1</sub> (mg)	1,2	1	1,2	1,1	1,2	1,1	1,3	1,5
Vitamin B <sub>2</sub> (mg)	1,7	1,4	1,6	1,2	1,3	1,3	1,5	1,6
Vitamin B <sub>6</sub> (mg)	1,5	1,3	1,5	1,3	1,9	1,7	1,9	2
Vitamin B <sub>12</sub> (μg)	2,4	2,4	2,4	2,4	3	3	2,6	2,8
Niacin (mg Eq)	19	15	18	15	15	15	18	19
Folate (μg)	400	400	400	400	400	400	600	500
Vitamin C (mg)	60	60	60	60	60	70	80	90
Panhotenic acid (mg)	5	5	5	5	5	5	6	7
Biotin (μg)	25	25	30	30	30	30	30	35
Vitamin A (μg RE)	1000	800	1000	800	900	700	800	1300
Vitamin D (μg)	15	15	15	15	20	20	15	15
Vitamin E (mg)	10	8	10	8	12	10	10	12
Vitamin K (μg)	75	75	120	90	120	90	90	90
Choline (mg)	550	400	550	425	600	475	500	550
Calcium (mg)	1300	1300	1000	1200	1300	1300	1400	1500
Phosphorus (mg)	1200	1200	700	700	700	700	1200	1300
Magnesium (mg)	400	375	400	350	420	350	400	400
Iron (mg)	12	15	10	15	10	10	25	15
Zinc (mg)	15	12	15	12	15	12	15	20
Iodine (μg)	150	150	150	150	150	150	175	200
Selenium (μg)	50	50	70	55	70	55	65	75

## Nutritional value of eggs

Eggs are highly nutritious foods. Two medium eggs provide about 30% of recommended intakes of protein for women between 20 and 50 years of age<sup>1-3</sup> (Figure 1). About half of this protein is in the egg white. Egg protein contains all the essential amino acids, and in a higher amount than those proposed by the Institute of Medicine (IoM) in the amino acid scoring pattern<sup>4</sup>.

Fat is found mainly in yolk, and more than half is polyunsaturated fat. It is true that eggs have cholesterol (about 200 mg in one medium size egg)<sup>2,3</sup>, and because of this it has been recommended restricting their consumption for many years<sup>5</sup>. Nevertheless the scientific research shows that dietary cholesterol has only a small effect on blood cholesterol, and other dietary factors (saturated and trans fats, oxidant/antioxidant nutrients...) as well as lifestyle have more influence on cardiovascular risk<sup>6</sup>. In this sense, the type of fat founded on eggs is favourable from a cardiovascular point of view (high proportion of unsaturated fatty acids, and no trans fats). Eggs enriched in omega-3 fatty acids have shown to decrease plasma triglyceride concentration, lower systolic and diastolic blood pressure and platelet aggregation, and total plasma cholesterol level<sup>7</sup>. Moreover, the consumption of eggs has no detectable effect on heart disease risk in healthy people. Recent meta-analysis suggests that egg consumption is not associated with the risk of CVD and cardiac mortality in the general population<sup>8</sup>, and that a high consumption of eggs (up to one egg per day) is not associated with increased risk of coronary heart disease or stroke<sup>9</sup>, even in adults with coronary artery disease<sup>10</sup>.

Also eggs are a good source of iron, zinc, selenium, riboflavin, niacin, pantothenic acid, biotin, and vita-

mins B<sub>12</sub>, A, D, and E. The iron in egg yolk is highly bioavailable, so eggs may be very valuable in the diets of women. An egg's contribution of vitamin D is noteworthy because the egg is one of the very few foods that supply this nutrient. The only nutrient not found in an egg is vitamin C<sup>3,4</sup>.

Eggs are nutrient-dense foods because they provide a relatively high amount of essential nutrients while supplying only a small proportion of the daily need for calories. For good nutrition, most of a person's daily food intake should consist of foods of high nutrient density. And this is especially important for women, since they generally need lower energy than men but the same or higher amount of nutrients<sup>1</sup> (Table I).

## Eggs's nutrients of interest for women

### Protein

Besides their high biological value, egg protein is highly digestible since more than 95% of egg protein is digested and is available to meet the different needs of the organism<sup>11</sup>. This egg high-quality protein is especially important during times of greatest growth (infancy, childhood, adolescence) and in pregnancy. Only one medium-size egg provide enough protein to cover about 15-18% of the protein recommended intakes for women from childhood to old age, 11% in pregnancy and 9% in lactation, while only provides 71 kcal<sup>1-3</sup>.

Protein intake is also important for elderly women. Sarcopenia is defined as an age-related decrease in muscle mass and performance. Because of its protein content, eggs consumption could be useful in order to prevent or slow down muscle loss with ageing. Ingestion of approximately 25-30 g of protein per meal

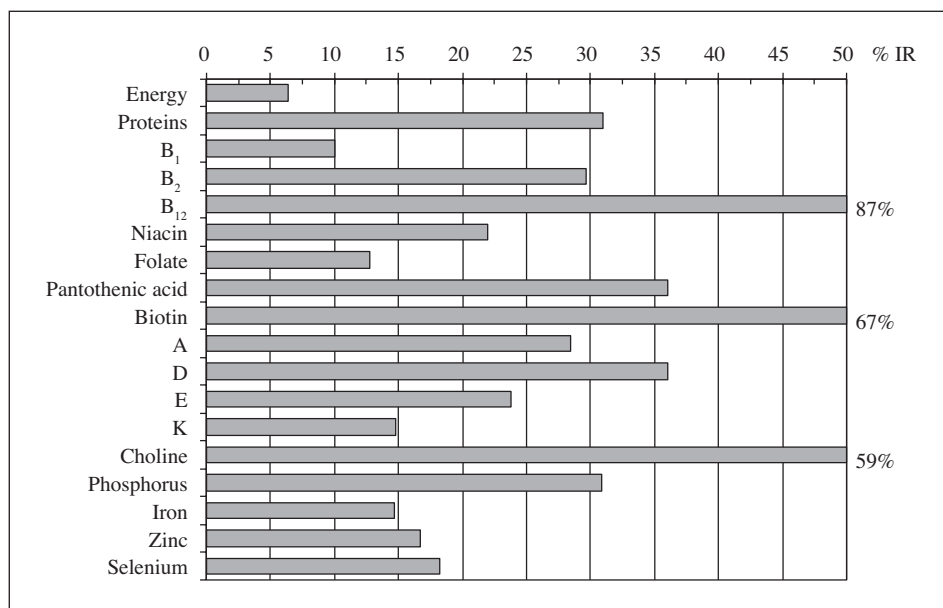


Fig. 1.—Contribution of 2 medium-size eggs (100 g edible portion) to the Recommended Dietary Intakes for women between 20 and 50 years of age<sup>1-3</sup>.

maximally stimulates muscle protein synthesis in both young and older individuals. However, muscle protein synthesis is blunted in elderly when the quantity of protein is less than approximately 20 g per meal<sup>12</sup>. Two medium-sized eggs provide about 12 g of high quality protein, half the recommended amount in a single meal.

It has been shown the role of leucine in the synthesis of muscle tissue<sup>13</sup>. Beta-hydroxy-beta-methylbutyrate, a metabolite of leucine, is very effective in the inhibition of proteolysis<sup>14</sup>. Leucine also helps in satiety control<sup>13</sup>. Eggs are a good food source of this amino acid, and could be of interest in anorexia, cachexia, and to prevent muscle mass loss during weight loss programs. The egg has the advantage that we can separate the white (which contains most of the protein) and yolk (with higher fat content), thereby increasing protein intake with low energy input.

Some studies also describe the production of anti-hypertensive hydrolysates and peptides from egg proteins<sup>15-16</sup>, and points to a possible functional role of the egg and its ingredients.

### *Choline*

Choline participates in several relevant neurochemical processes<sup>17</sup>. It is the precursor and metabolite of acetylcholine<sup>18</sup>. It is the major dietary source of methyl groups via the synthesis of S-adenosylmethionine<sup>19</sup>. Choline is required for the biosynthesis of phospholipids, phosphatidylcholine, lysophosphatidylcholine, choline plasmalogen, and sphingomyelin which are essential components for all membranes<sup>20</sup>. It plays important roles in brain and memory development in the fetus and reduces the risk of neural tube defects<sup>21-22</sup>. Therefore, getting adequate choline in the diet is important throughout life for optimal health.

Eggs are one of the best sources of choline. The human body manufactures its own choline, but not always in sufficient quantity, so dietary sources of choline may be necessary. The adequate intakes of choline are set at 425 mg/day for women, and for pregnant (500 mg/day) and lactating women (550 mg/day) are higher<sup>18</sup>. Since two medium eggs provide about 250 mg of choline, it's easy to see that they cover more than half of the daily need<sup>2-3</sup>.

### *Lutein and zeaxanthin*

Lutein and zeaxanthin are carotenoid pigments that impart yellow or orange color to various common foods. Chicken egg yolk is deemed a better source of lutein and zeaxanthin, even compared to fruits and vegetables<sup>23</sup> because of its increased bioavailability due to the high fat content in eggs<sup>24-25</sup>.

Lutein and zeaxanthin are essential components for eye health. They constitute the main pigments found

in the yellow spot of the human retina which protect the macula from damage by blue light, improve visual acuity and scavenge harmful reactive oxygen species<sup>26</sup>. Lutein and zeaxanthin have been associated with reduced risk of cataract development and age-related macular degeneration<sup>27</sup>.

Egg intake has been shown to increase levels of lutein and zeaxanthin without increasing serum lipids. A randomized cross-over design study involving 33 men and women consuming 1 egg per day for 5 weeks reported increased serum lutein (26%), and zeaxanthin (38%), but serum concentrations of total cholesterol, LDL cholesterol, HDL cholesterol and triacylglycerols were not affected<sup>28</sup>.

### *Omega 3*

Many clinical and epidemiologic studies have shown positive roles for n-3 fatty acids in infant development; cancer; cardiovascular diseases<sup>29</sup>; and more recently, in various mental illnesses, including depression, attention-deficit hyperactivity disorder and dementia<sup>29,30</sup>. These fatty acids are also known to have effects against inflammation, platelet aggregation, hypertension, and hyperlipidemia<sup>29</sup>. Experts have recently recommended increases in intakes of n-3 fatty acids by the general population<sup>29,31-32</sup>, and the target for eicosapentaenoic acid plus docosahexaenoic acid (EPA + DHA) consumption was recommended to be at least 500 mg/day for general population to maintain overall good health<sup>33</sup>.

For its essential character, it is necessary to include them in the diet throughout life. But they are very important during pregnancy and lactation, since they are a component of neuronal membranes, and essential for brain development and cognitive function<sup>30</sup>. One of the main dietary sources of omega 3 fatty acids is fish, but many pregnant women avoid their consumption because of the possible contaminants that may have. Eggs can be enriched in omega-3 fatty acids, and can be an excellent food source for these fatty acids in pregnancy.

### *Vitamin D*

Vitamin D deficiency is the most common nutritional deficiency and likely the most common medical condition in the world. So improvement of vitamin D intake is necessary, and eggs are a good food source of this nutrient.

This Vitamin D is essential not only for the homeostasis of calcium and phosphorus<sup>34</sup>, but also for neuromuscular transmission, correct bone mineralization and modulation of cell growth and differentiation<sup>35</sup>. In addition, a growing number of studies suggesting that vitamin may play an important role in the prevention and control of chronic diseases such as osteoporosis,

hypertension, cardiovascular disease, diabetes, certain types of cancer, and overweight and obesity<sup>36</sup>. Vitamin D has been related to cognitive function and suggested to protect against depression. Individuals with higher serum 25(OH)D concentrations showed a reduced risk of depression<sup>37</sup>.

Vitamin D intake is inadequate in Spanish adult population<sup>38</sup>, schoolchildren<sup>39-40</sup> and in women<sup>41</sup>. A low serum vitamin D levels in Spanish schoolchildren has been associated with high blood pressure<sup>42</sup>, high triglyceride levels<sup>42-43</sup>, and high serum IL-6 and hs-CRP in obese children<sup>44</sup>. Vitamin D intake and serum levels have been found significantly higher in children consuming 3-4 eggs/week, compared to children with lower consumption, so eggs may prevent vitamin D deficiency in childhood<sup>45</sup>.

### Eggs in the Dietary Guidelines

A person's whole diet, not any single component, is what is crucial for good nutrition. Moderate amounts of any food can be incorporated into a prudent, balanced, and healthy diet. Unfortunately, some people misinterpret the recommendation of a moderate consumption of eggs, and eliminate them from their diets. In the case of nutritious foods, such as eggs, complete avoidance may do more harm than good. Excessive consumption of any food, and also eggs, is unwise. For most people, however, the avoidance of eggs is also undesirable and unnecessary. Although people with high cholesterol levels who are sensitive to dietary cholesterol intake may need to strictly limit their consumption of egg yolks, most other people need not be concerned about their moderate intake of eggs.

In the Dietary Guidelines<sup>46-47</sup>, eggs are part of the group of "Meat, Poultry and Fish group". The Dietary Guidelines calls for two to three servings from this group every day, without having to dominate one type of food (meat/fish/eggs) over another. One egg can counts as one-third to one-half of this protein rich foods group serving. Eggs have other desirable properties in addition to their nutritional value. They are inexpensive, convenient, easy to prepare, and easy to chew, and they play important roles in a wide variety of recipes.

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