

## Differences in eating habits between women with healthy pregnancy and those with preeclampsia

### Diferencias en hábitos alimentarios en mujeres con embarazo saludable y con preeclampsia

### Diferenças nos hábitos alimentares em mulheres com gravidez saudável e naquelas com pré-eclâmpsia

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## Abstract

**Introduction:** In pregnancy it is of utmost importance to have healthy eating habits because these can considerably reduce the risk of overweight, obesity, cardiovascular diseases and hypertensive disorders such as preeclampsia and eclampsia. **Objective:** To determine the differences in the eating habits of women with healthy pregnancies compared to those who developed preeclampsia. **Methodology:** This is a descriptive comparative study in 100 women, using non-probabilistic sampling, considering 50 women with healthy pregnancy, 50 women who developed preeclampsia, and all with 18 years of age or older, no pregnant woman was excluded. The *Encuesta Nutricional en Situación de Embarazo* (Pregnancy Nutritional Survey (Pregnancy Nutritional Survey) was applied. The ethical aspects of research were observed in accordance with the Helsinki declaration. Group differences were analyzed with Pearson's chi-square test. **Results:** The mean age of the participants was 25.2 years; 68% had elementary school education, the pregestational weight reported was 69.8 kg and the gestational weight during pregnancy was 81.1 kg. There were statistically significant differences in current health perception, eating habits (consumption of fish, fruits, nuts, bread, rice or pasta and desserts), and dietary supplementation (multivitamins and minerals) in pregnant women who had a healthy pregnancy compared to those who developed preeclampsia. **Conclusions:** Eating habits during pregnancy are important, women with a healthy pregnancy have a different diet than those who developed preeclampsia, indicating that it is necessary to promote healthy eating since the first contact with the pregnant woman.

**Key words:** Preeclampsia; Healthy diet; Pregnancy complications (DeCS).

## Resumen

**Introducción:** En el embarazo son de suma importancia hábitos alimenticios saludables debido a que estos pueden reducir considerablemente el riesgo de sobrepeso, obesidad, enfermedades cardiovasculares y trastornos hipertensivos como la preeclampsia y eclampsia. **Objetivo:** Determinar diferencias en los hábitos alimenticios en mujeres con embarazo saludable en comparación con las mujeres que desarrollaron preeclampsia. **Metodología:** estudio descriptivo comparativo en 100 mujeres, empleando muestreo no probabilístico considerando 50 con embarazo saludable, 50 que desarrollaron preeclampsia y tener 18 años o más, ninguna mujer embarazada fue excluida. Se aplicó la Encuesta Nutricional en Situación de Embarazo. Se cuidaron aspectos éticos para la investigación de acuerdo con la declaración de Helsinki. Se analizaron diferencias de grupos con prueba Chi Cuadrado de Pearson. **Resultados:** La edad promedio 25.2 años, 68% con estudios primarios, peso pregestacional promedio 69.8 kg y gestacional durante el embarazo de 81.1 kg. Existieron diferencias estadísticamente significativas en la percepción de salud actual, hábitos alimenticios (consumo de pescado, frutas, frutos secos, pan, arroz o pasta y postres) y suplementación dietética (polivitamínicos/minerales) en las mujeres gestantes que cursaron con embarazo saludable en comparación con las que desarrollaron preeclampsia. **Conclusiones:** Los hábitos alimenticios en el embarazo son importantes, las mujeres con embarazo saludable tienen una alimentación diferente que las que desarrollaron preeclampsia, lo que indica que es necesario fomentar la alimentación saludable desde el primer contacto con la mujer gestante.

**Palabras clave:** Preeclampsia; Dieta saludable; Complicaciones del embarazo (DeCS).



### Abstrato

**Introdução:** Hábitos alimentares saudáveis são de extrema importância durante a gravidez, pois podem reduzir consideravelmente o risco de sobrepeso, obesidade, doenças cardiovasculares e distúrbios hipertensivos, como pré-eclâmpsia e eclâmpsia. **Objetivo:** determinar diferenças nos hábitos alimentares de mulheres com gravidez saudável em comparação com mulheres que desenvolveram pré-eclâmpsia. **Metodologia:** Estudo comparativo em 100 mulheres, 50 com gravidez saudável e 50 que desenvolveram pré-eclâmpsia. Os critérios de inclusão foram ter gestação saudável, gestação com pré-eclâmpsia e idade igual ou superior a 18 anos, nenhuma gestante foi excluída. Foi aplicado o Inquérito Nutricional em Situação de Gravidez. Os aspectos éticos da pesquisa foram atendidos de acordo com a Declaração de Helsinque. As diferenças foram analisadas com o teste do qui-quadrado de Pearson. **Resultados:** Idade média 25,2 anos, 68% com estudos primários, peso pré-gestacional médio 69,8 kg e gestacional durante a gravidez de 81,1kg. Existem diferenças estatisticamente significativas na percepção da saúde atual, hábitos alimentares (consumo de peixe, frutas, frutos secos, pão, arroz ou massa e sobremesas) e suplementação alimentar (multivitamínicos/minerais) em grávidas que tiveram uma gravidez saudável em comparação com aquelas que desenvolveram pré-eclâmpsia. **Conclusões:** Os hábitos alimentares durante a gravidez são importantes, as mulheres com gravidez saudável possuem uma alimentação diferente daquelas que desenvolveram pré-eclâmpsia, o que indica que é necessário promover uma alimentação saudável desde o primeiro contato com a gestante.

**Palavras-chave:** Pré-eclâmpsia; Dieta saudável; Complicações na gravidez (DeCS).

### Introduction

Nutrition is important in all stages of life, and even more so in pregnancy because the needs are increased, since in addition to covering their nutritional needs must also cover the needs of the fetus <sup>(1)</sup> because good habits prevent the onset of gestational diseases such as hypertension.

Hypertensive disorders that occur during pregnancy such as preeclampsia and eclampsia are one of the main causes of death of mothers and fetuses <sup>(2)</sup>; which makes them a public health problem worldwide; since, worldwide, preeclampsia occurs in 10% of pregnant women and is the cause of 15% of maternal deaths <sup>(3)</sup>. The reported figures for the prevalence of preeclampsia in Mexico are similar to those reported worldwide and range from 2 to 10% <sup>(4)</sup>.

Preeclampsia is a pregnancy-induced hypertensive disorder that appears clinically after 20 weeks into the pregnancy, and is characterized by blood pressure higher than or equal to 140/90 mmHg



and proteinuria <sup>(5)</sup>. It occurs during the postpartum period, mainly in the first 48 hours after delivery, more frequently in women with a personal or family history of preeclampsia. Among the risk factors for the development of preeclampsia are age, race, physical condition, overweight and obesity, arterial hypertension, diabetes mellitus, nephropathy and poor eating habits <sup>(6,7)</sup>, these related factors are preventable or controllable through healthy eating habits.

In Mexico there is a great diversity of beliefs and culture and especially the type and availability of foods that can influence both positively and negatively in the inadequate consumption of food groups, especially in the Northeast part of the country, where research has been conducted in which it has been reported that fruits, dairy products, and legumes are inadequately consumed, while there is high consumption of cereals, which are rich in sugars, meats and sweets <sup>(8)</sup>.

It has been reported that pregnant women have an inadequate consumption of foods that provide dietary fiber, iron, and calcium <sup>(9)</sup>. In relation to the type of food and supplements, a study conducted in Cuba reported that pregnant women most frequently eat meat, milk, fish, and fresh fruits, eating vegetables in a lesser extent and the study also indicated that pregnant women did not take folic acid before the pregnancy due to lack of knowledge <sup>(10)</sup>.

A study <sup>(11)</sup> that reported a systematic review of the literature found that a large percentage of pregnant women presented eating disorders. No scientific evidence has been found about eating habits in the Mexican population; however, researchers <sup>(12)</sup> have suggested that nutritional care during pregnancy is of great importance, since, although a statistically significant relationship with preeclampsia has not been established, it is considered to have an impact on this hypertensive disorder.

In pregnancy, nutritional needs to reduce the risk of overweight, obesity, diabetes, cardiovascular disease, and particularly hypertensive disorders culminating in preeclampsia or eclampsia <sup>(13)</sup> should be given greater consideration. Matamoros, Tamaulipas, is part of the northeastern border



of Mexico, where eating habits include high consumption of meats and processed/fast foods such as ham, sausage, hamburger, hotdogs, boneless BBQ, and soft drinks, foods that are high in sodium and calories. Moreover, this population is culturally influenced by the eating habits of the center of the country, which can generate a healthy diet, especially when it comes to people who migrate from the countryside to the city, considering that the rural diet includes less or no industrialized foods, which has the potential to cause chronic degenerative diseases <sup>(14)</sup>. In pregnant women, their eating habits are of great importance, since, on the one hand, they can act as protectors or, on the other hand, they can increase the risk of developing hypertensive disorders.

In a recent study, it was reported that preeclampsia can be prevented when pregnant women are kept informed, pregnancy is monitored from the beginning, and healthy habits are maintained <sup>(15)</sup>. Therefore, the results of this research will allow us to understand the eating habits of pregnant women in northeastern Mexico, specifically in the city of Matamoros, Tamaulipas, and to establish the differences in women who had preeclampsia compared to those who did not develop it, so that, if differences are found, nursing interventions can be focused through early identification of inadequate habits, in order to prevent the risk of preeclampsia or eclampsia. The objective of this study was to determine differences in eating habits in women with a healthy pregnancy compared to women who developed preeclampsia.

## **Methodology**

This is a descriptive and comparative cross-sectional study <sup>(16)</sup> in a population of women with healthy pregnancy and a group of women who developed preeclampsia. The women were attended at a General Hospital in Matamoros, Tamaulipas. The sample was calculated for an infinite population, with a confidence level of 95% and absolute precision of .05, resulting in a sample of 100 subjects. Pregnant women were identified through non-probabilistic sampling, leaving 50



women with preeclampsia and 50 with healthy pregnancy. The inclusion criteria were healthy pregnancy, pregnancy with preeclampsia and being 18 years of age or older, as they were being hospitalized, a characterization interview was conducted and followed-up until postpartum, where the survey was applied. Since no studies on dietary habits were identified in this population, no exclusion criteria were established.

The Nutritional Survey in Pregnancy prepared by the Consejo General de Colegios Oficiales de Farmacéuticos (General Council of Official Pharmacists Associations) was applied. It was comprised by six dimensions: general data (10 questions), obstetric information (6 questions), breastfeeding information (1 question), habits (3 questions), pathophysiological state (3 questions), and eating habits (12 types of food, 8 supplements, type of fats and sweeteners). The response options for food consumption frequency habits are: never, monthly, weekly, and daily, while for the consumption of supplements the different types are listed with the option of selecting those eaten during pregnancy. This instrument was validated in Spanish in Navarra, Spain, the reported correlation coefficients range from  $r = 0.4$  to  $r = 0.6$  <sup>(17)</sup>.

The study was carried out in accordance with the Regulations of the General Health Law on Health Research, the integrity and privacy of the study subjects were protected, and informed consent was obtained <sup>(18)</sup>; it also complied with the Helsinki Declaration <sup>(19)</sup>. We had the approval of the Research and Ethics Committee of the Matamoros Multidisciplinary Academic Unit with Opinion 084, and of the hospital authorities to carry out the fieldwork. The data were collected from June to August 2021 by nursing professionals, processed and analyzed in the Statistical Package for the Social Sciences (SPSS) version 22 for Windows, using descriptive statistics for the characteristics of the sample, and inferential statistics with Pearson's Chi-Square test to determine the differences in eating habits in women with healthy pregnancy compared to those who developed preeclampsia, considering statistical significance when the p value was lower than or equal to .05.



## Results

The mean age of the participants was 25.2 years (SD = 6.1); 68% had elementary school education, 20% had high school education and 8% had university studies. The pregestational weight reported was 69.8 kg (SD = 12.5) and the gestational weight during pregnancy was 81.1 kg (SD = 12.9).

The analysis of differences indicated that the number of children born, hours of rest and hours of physical activity were similar in both groups; statistically significant differences were found in the current health perception, where women with a healthy pregnancy had a better health perception ( $p = .006$ ) (Table 1).

Table 1. Pearson's Chi-Square test for number of children born, health perception, hours of rest and physical activity in healthy pregnancy and pregnancy with preeclampsia, 2021 (n = 100).

Variable	Pregnancy with preeclampsia (n = 50)		Healthy pregnancy (n = 50)		X <sup>2</sup>	p
	F	%	f	%		
<i>Children born</i>						
0	28	56%	20	40%	6.66	.155
1	12	24%	17	34%		
2	8	16%	5	10%		
3 or more	2	4%	8	16%		
<i>Current health perception</i>						
Very good	5	10%	1	2%	10.141	.006
Good	24	48%	39	78%		
Fair	21	42%	10	20%		
<i>Hours of rest</i>						
6 to 8 hours	21	42%	21	42%	.377	.828
9 to 10 hours	23	46%	21	42%		
10 to 12 hours	6	12%	8	16%		
<i>Hour of physical activity</i>						
6 to 8 hours	16	32%	9	18%	3.003	.223
9 to 10 hours	20	40%	27	54%		
10 to 12 hours	14	28%	14	28%		

f = frequency, % = percentage,  $p < 0.05$

Source: prepared by the authors



Regarding drugs use, there were no statistically significant differences in women with healthy pregnancies compared to those who developed preeclampsia (Table 2).

The analysis of differences of physiological variables showed that the presence of gestational diabetes, women's diseases and special diets were not statistically significant when comparing women with a healthy pregnancy with those with preeclampsia (Table 3).

Table 2. Pearson's Chi-Square test for alcohol, tobacco and drug use in healthy pregnancy and pregnancy with preeclampsia, 2021 (n = 100).

Variable	Pregnancy with preeclampsia (n = 50)		Healthy pregnancy (n = 50)		X <sup>2</sup>	p
	f	%	f	%		
<i>Tobacco use</i>						
No	46	92%	46	92%	.000	1.000
Previously	3	6%	3	6%		
Currently using	1	2%	1	2%		
<i>Alcohol use</i>						
No	45	90%	46	92%	.122	.727
Previously	5	10%	4	8%		
<i>Drugs user</i>						
No	47	94%	46	92%	.154	.695
Previously	3	6%	4	8%		

f = frequency, % = percentage, p = < 0.05

Source: prepared by the authors

Table 3. Pearson's Chi-Square test for pathophysiological variables in healthy pregnancy and pregnancy with preeclampsia, 2021 (n = 100).

Variable	Pregnancy with preeclampsia (n = 50)		Healthy pregnancy (n = 50)		X <sup>2</sup>	p
	f	%	f	%		
<i>Gestational diabetes</i>						
No	48	96%	48	96%	.000	1.000
Yes	2	4%	2	4%		
<i>Women's diseases</i>						
Minor problems	43	86%	46	92%	.919	.338
Serious illness	7	14%	4	8%		
<i>Special diets</i>						
Hypoglycemic Diet	2	4%	0	0%	4.000	.261
Hypolipidemic Diet	1	2%	4	8%		
Lacto-ovo vegetarian diet	3	6%	2	4%		
None	44	88%	44	88%		

f = frequency, % = percentage, p = < 0.05

Source: prepared by the authors





In determining whether the dietary habits of pregnant women with preeclampsia were different compared to those who did not develop the disorder, it was observed that the eating habits perception was similar in both groups ( $p = .096$ ), all women reported daily consumption of vegetables, women who developed preeclampsia reported a lower frequency of consumption of fish ( $p = .013$ ), fruits ( $p = .012$ ), nuts ( $p = .008$ ), desserts ( $p = .005$ ), and higher consumption of bread ( $p = .003$ ), rice or pasta ( $p = .007$ ) (Table 4).

Table 4. Pearson's Chi-Square test for eating habits in healthy pregnancy and pregnancy with preeclampsia, 2021 (n = 100).

Variable	Pregnancy with preeclampsia (n = 50)		Healthy pregnancy (n = 50)		X <sup>2</sup>	p
	f	%	f	%		
<i>Eating habits perception</i>						
Poorly balanced	4	8%	0	0%	4.679	.096
Fairly balanced	30	60%	36	72%		
Well balanced	16	32%	14	28%		
<i>Dairy products</i>						
Never	1	2%	0	0%	3.099	.377
Daily	22	44%	23	46%		
Monthly	2	4%	0	0%		
Weekly	25	50%	27	54%		
<i>Eggs</i>						
Daily	19	38%	17	34%	1.254	.534
Weekly	1	2%	0	0%		
Monthly	30	60%	33	66%		
<i>Meats</i>						
Never	2	4%	2	4%	.481	.923
Daily	3	6%	2	4%		
Monthly	29	58%	32	64%		
Weekly	16	32%	14	28%		
<i>Sausages</i>						
Never	2	4%	0	0%	4.274	.233
Daily	11	22%	7	14%		
Monthly	27	54%	27	54%		
Weekly	10	20%	16	32%		
<i>Fish</i>						
Never	13	26%	3	6%	8.724	.013
Weekly	12	24%	21	42%		
Monthly	25	50%	26	52%		
<i>Fruits</i>						
Daily	12	24%	16	32%	8.821	.012
Weekly	30	60%	34	68%		



Monthly	8	16%	0	0%		
<i>Nuts</i>						
Never	8	16%	0	0%		
Weekly	16	32%	14	28%	9.746	.008
Monthly	26	52%	36	72%		
<i>Vegetables</i>						
Daily	41	82%	40	80%	.065	.799
Weekly	9	18%	10	20%		
<i>Bread</i>						
Daily	14	28%	5	10%		
Weekly	29	58%	44	88%	11.845	.003
Monthly	7	14%	1	2%		
<i>Rice or pasta</i>						
Daily	7	14%	0	0%		
Weekly	41	82%	43	86%	9.825	.007
Monthly	2	4%	7	14%		
<i>Desserts</i>						
Daily	2	4%	11	22%		
Weekly	44	88%	39	78%	10.532	.005
Monthly	4	8%	0	0%		

f = frequency, % = percentage, p = < 0.05

Source: prepared by the authors

The analysis of dietary supplementation consumption showed statistically significant differences in the consumption of multivitamins and minerals, i.e., those who developed preeclampsia reported higher consumption of such supplements (p = .000) (Table 5).

Table 5. Pearson's Chi-Square test for dietary supplementation due to the development of preeclampsia and healthy pregnancy, 2021 (n = 100)

Variable	Pregnancy with preeclampsia (n = 50)		Healthy pregnancy (n = 50)		X <sup>2</sup>	p
	f	%	f	%		
<i>Milk fortified with calcium and vitamins</i>						
Yes	26	52%	30	60%	.649	.420
No	24	48%	20	40%		
<i>Fiber and prebiotics</i>						
Yes	12	24%	6	12%	2.439	.118
No	38	76%	44	88%		
<i>Probiotics</i>						
Yes	4	8%	2	4%	.709	.400
No	46	92%	48	96%		
<i>Folic acid and vitamin B12</i>						
Yes	43	86%	47	94%	1.778	.182
No	7	14%	3	6%		
<i>Iron</i>						
Yes	7	14%	3	6%	1.778	.182



No	43	86%	47	94%		
<i>Multivitamins and minerals</i>						
Yes	39	78%	15	30%	23.188	.000
No	11	22%	35	70%		

f = frequency, % = percentage, p = < 0.05

Source: prepared by the authors

## Discussion

When determining the differences in the eating habits of women with a healthy pregnancy compared to women who developed preeclampsia, it was empirically proven that there are statistically significant differences in current health perception, eating habits (consumption of fish, fruits, nuts, bread, rice or pasta and desserts), and dietary supplementation (multivitamins and minerals) of pregnant women who had a healthy pregnancy compared to those who developed preeclampsia. In the first instance, it was considered important to assess how the pregnant woman perceives her general health status. This study identified that most of the women who did not develop preeclampsia perceived themselves to be in better health compared to those who did. In the literature review, no scientific evidence was found describing how pregnant women perceive their general health status, which makes it difficult to compare these findings. However, a qualitative study reported that women without cardiovascular risk who were pregnant with preeclampsia had difficulty perceiving themselves to be at risk <sup>(20)</sup>.

The aforementioned shows the importance that nursing professionals should assess since the first contact with the pregnant woman how she perceives her health status, since her self-care during pregnancy will depend on how she perceives herself, i.e., if the pregnant woman perceives herself as healthy, she will not change her lifestyle habits.

Diet is part of the care that pregnant women should attend during pregnancy. This study found that women without preeclampsia indicated that they consumed fish, fruits, nuts and desserts more frequently. A study conducted in Cuba <sup>(10)</sup> found that pregnant women consumed mostly fresh



fruits, unlike other authors <sup>(21, 22)</sup> who reported a significant decrease in fruit consumption. No literature was found comparing these data in women with a healthy pregnancy and in pregnant women who developed preeclampsia; however, it has been documented that fruits, due to their high content of potassium, vitamin C and water, contribute to the prevention of preeclampsia <sup>(23)</sup>. On the other hand, the literature indicates that weight gain is associated with the development of preeclampsia, and in pregnant women, this is caused by a poor diet, including inadequate fruit consumption <sup>(24)</sup>.

Another beneficial food that women with a healthy pregnancy reported consuming more frequently was nuts, which are a source of fiber, vitamin B6, proteins, fats in the form of Omega-3, phosphorus, magnesium, zinc, vitamin E, folic acid and calcium <sup>(23)</sup>. In the systematic review, it was found that supplementation with folic acid, calcium, vitamin D, coenzyme Q and L-arginine is indispensable for the prevention of preeclampsia <sup>(12)</sup>. However, it is important to teach the pregnant woman about the type and quantity of nuts that she can consume, since there are also some products on the market that are high in sodium and/or calories.

Regarding the consumption of desserts, it is known that they can cause weight gain, and sometimes it is recommended not to consume them during pregnancy due to their high content of carbohydrates and sugars. In this sample, it was observed that women who did not develop preeclampsia consumed desserts more frequently. This does not mean that it is recommended to increase their consumption, on the contrary, it emphasizes the need for future research to analyze the amount and type of desserts consumed by pregnant women and to make a comparison between those who developed preeclampsia and those who did not. Since this study did not deepen this analysis, it is considered a limitation, and it is recommended to use this result with caution.

Women who developed preeclampsia reported consuming bread, rice or pasta more frequently, similar to what was reported in another study where it was found that a high percentage consumed



bread, rice, and/or pasta, with the difference that in that research it was determined that they consumed them inadequately <sup>(25)</sup>. Despite this, bread, rice and/or pasta are not considered harmful for pregnant women; however, despite the differences found in this research, it is not possible to determine if it is the correct consumption since the amount of consumption, type of product and method of preparation were not analyzed.

The preparation of rice, pasta is another important criterion to consider since, in the prevention of preeclampsia, it is necessary to substantially reduce salt when preparing these foods and to opt for steaming, boiling or cooking with olive, sunflower or corn oil. Finally, it is recommended that they consume pasta, rice or whole-grain breads <sup>(1)</sup>.

In the analysis of dietary supplementation, most of those who developed preeclampsia indicated having consumed multivitamins and minerals. In this regard, the scientific evidence is not conclusive, since in the literature review it was found that the results of previous studies are heterogeneous when analyzing supplementation with vitamins and minerals <sup>(12)</sup>, so it is not possible to conclude whether the administration of multivitamins is related to preeclampsia. Further research is needed, therefore, the results of this comparative study should be taken with caution.

It is evident that eating habits during pregnancy are of great relevance because they can act as a protective factor or cause alterations in the pregnancy with an impact on the mother or the fetus <sup>(12)</sup>. Therefore, nursing professionals should consider the education of the pregnant woman as part of their interventions to promote healthy eating habits before, during and after pregnancy.

Finally, among the limitations identified in this research is the type of instrument used to measure eating habits, although it is a Spanish-language scale, it has not been validated in the Hispanic population. However, what is reported in this study is an important contribution to understanding the differences in eating habits between women with healthy pregnancies and those with preeclampsia. On the other hand, since this study was conducted in a generalized population, it is



recommended that in future research, exclusion criteria be applied to reduce confounding variables such as chronic diseases, training in healthy eating, and history of preeclampsia, among others.

## **Conclusions**

Eating habits during pregnancy are very important; women with a healthy pregnancy had a different diet than women who developed preeclampsia; however, it was observed that regarding the eating habits perception there was no difference, it was similar in both groups. Women without preeclampsia reported consuming fish, fruits, nuts and desserts more frequently, and women with preeclampsia reported consuming bread, rice or pasta more frequently. Most of those who developed preeclampsia reported consuming multivitamins and minerals.

Preeclampsia is a pregnancy complication that can be preventable if risk factors are identified in order to develop preventive measures. Based on the results of this research, it is recommended that from the planning of the pregnancy and/or from the first contact with the pregnant woman, her health perception should be analyzed, and the educational intervention should be focused on the eating habits considering the type, quantity and method of food preparation; likewise, research should continue to include the analysis with the recommended criteria for the educational intervention and verify its effectiveness from the beginning of the pregnancy.

This study contributes to the practices of health professionals by describing the types of foods consumed by pregnant women, as well as the differences in diet between pregnant women who developed preeclampsia and those who had a healthy pregnancy, which will allow clinicians to focus their interventions to promote healthy eating during pregnancy.

## **Conflicts of interest**

The authors stated that there are no conflicts of interest.



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## Bibliographic References

1. Sigüencia JM, Suárez AG, Acurio PE. Orientación educativa de la dieta para embarazadas de bajo nivel adquisitivo en la realidad ecuatoriana. *Revista Conrado* [Internet]. 2022 [Referenced on January 22, 2022];18(89):569-579. Available at: <https://conrado.ucf.edu.cu/index.php/conrado/article/view/2768>
2. Organización Mundial de la Salud (WHO), Organización Panamericana de la Salud. Día de la concientización sobre la preeclampsia. [Internet]. Oficina Regional para las Américas de la Organización Mundial de la Salud 7 / Organización Panamericana de la Salud; 2019 [Referenced on January 10, 2022]. Available at: <https://www.paho.org/es/noticias/1-8-2019-dia-concientizacion-sobre-preeclampsia>
3. Centro Nacional de Excelencia Tecnológica en Salud (CENETEC). Guía de práctica clínica. prevención, diagnóstico y tratamiento de la preeclampsia en segundo y tercer nivel de atención [Internet]. Secretaría de Salud. 2017 [Referenced on January 13, 2022]. Available at: <http://www.cenetec-difusion.com/CMGPC/S-020-08/ER.pdf>
4. Organización Mundial de la Salud (WHO). Mortalidad materna. Datos y cifras. [Internet]. Ginebra: OMS; 2018 [Referenced on January 10, 2022]. Available at: <https://www.who.int/es/news-room/fact-sheets/detail/maternal-mortality>
5. Velumani V, Durán C, Hernández LS. Preeclampsia: una mirada a una enfermedad mortal. *Revista de la Facultad de Medicina (México)*. [Internet]. 2021 [Referenced on January 16, 2022];64(5):7-18. Available at: <https://doi.org/10.22201/fm.24484865e.2021.64.5.02>
6. Cabrera JD, Pereira MP, Ollague RB, Ponce MM. Factores de riesgo de preeclampsia. *RECIAMUC Revista Científica de Investigación Actualización del Mundo de las Ciencias* [Internet]. 2019 [Referenced on January 13, 2022];3(2):1012-1032. Available at: [https://doi.org/10.26820/reciamuc/3.\(2\).abril.2019.1012-1032](https://doi.org/10.26820/reciamuc/3.(2).abril.2019.1012-1032)
7. Herrera-Sánchez K. Preeclampsia. *Revista Médica Sinergia* [Internet]. 2018 [Referenced on January 13, 2022];3(3):8-12. Available at: <https://revistamedicasinergia.com/index.php/rms/article/view/117>
8. Galaviz-Alarcón SM, Ramos-Peña EG, Núñez-Rocha GM, Salas-García R. Alimentación y marginación en la población del noreste de México. *Revista Salud Pública y Nutrición ESPYN* [Internet]. 2019 [Referenced on January 15, 2022];18(1):8-14. Available at: <https://respyn.uanl.mx/index.php/respyn/article/view/430>
9. López LB, Poy MS, Barretto L, Calvo EB. Variabilidad en la ingesta de nutrientes durante el embarazo en una cohorte de mujeres argentinas. *Arch Lat Nut* [Internet]. 2018 [Referenced on January 16, 2022];68(3):190-201. Available at: <https://www.alanrevista.org/ediciones/2018/3/art-1/>
10. Oliva-Machado I, González-Díaz Y, Marcheco-Teruel B, Carmenate-Naranjo D, De la Torre-Santos ME. Consumo alimentario y hábitos dietéticos y tóxicos en embarazadas de la Provincia de Villa Clara. *Acta méd. cent* [Internet]. 2020 [Referenced on January 12, 2022];14(2):142-



151. Available at:  
<http://www.revactamedicacentro.sld.cu/index.php/amc/article/view/1164/1368>
11. Rodríguez-Blanque R, Sánchez-García JC, Menor-Rodríguez MJ, Sánchez-López AM, Aguilar-Cordero MJ. Trastornos alimenticios durante el embarazo. JONNPR [Internet]. 2018 [Referenced on January 14, 2022];3(5):347-356. Available at: <https://doi.org/10.19230/jonnpr.2388>
  12. Torres-Villamil LA, Flores-Rojas AC, Pinzón-Espitia OL, Aguilera-Otalvaro PA. Cuidado nutricional en la prevención de la preeclampsia: Una revisión sistemática. Rev Esp Nutr Comunitaria [Internet]. 2018 [Referenced on January 15, 2022];24(2):1-14. Available at: [https://www.renc.es/imagenes/auxiliar/files/RENC\\_2018\\_2\\_5\\_LA\\_Torres\\_Vilamil\\_Cuidad\\_o\\_prevenion\\_de\\_la\\_preeclampsia.pdf](https://www.renc.es/imagenes/auxiliar/files/RENC_2018_2_5_LA_Torres_Vilamil_Cuidad_o_prevenion_de_la_preeclampsia.pdf)
  13. Illana A, Lara LF, Rodríguez J. Alimentación durante el embarazo y la lactancia. Revista Rol de Enfermería [Internet]. 2018 [Referenced on January 16, 2022];41(9):617-624. Available at: <https://medes.com/publication/141803>
  14. Gómez-Delgado Y, Velázquez-Rodríguez EB. Salud y cultura alimentaria en México. Revista Digital Universitaria [Internet]. 2019 [Referenced on January 14, 2022];20(1):1-11. Available at: <http://doi.org/10.22201/codeic.16076079e.2019.v20n1.a6>
  15. Muñoz-Solorzano LR, Alvarado-Franco HJ, Alvarado-Muñoz RN, Alvarado-Muñoz BJ. Preeclampsia: complicación durante el embarazo que se puede prevenir. Pro Sciences: Revista de Producción, Ciencia e Investigación [Internet]. 2020 [Referenced on January 15, 2022];4(30):72-76. Available at: <https://doi.org/10.29018/issn.2588-1000vol4iss30.2020pp72-76>
  16. Hernández-Sampieri R, Mendoza CP. Metodología de la Investigación: Las rutas cuantitativa, cualitativa y mixta. 1a ed. México: McGraw Hill; 2018. p. 714.
  17. Goni-Mateos L, Martínez-Hernández JA, Santiago-Nery S, Cuervo-Zapatel M. Validación de una encuesta para evaluar el estado nutricional y los estilos de vida en las etapas preconcepcional, embarazo y lactancia. Rev Esp Nutr Comunitaria [Internet]. 2014 [Referenced on January 16, 2022];19(2):105-113. Available at: [https://www.renc.es/imagenes/auxiliar/files/RENC%202013-2\\_art%205\(1\).pdf](https://www.renc.es/imagenes/auxiliar/files/RENC%202013-2_art%205(1).pdf)
  18. Cámara de Diputados del H. Congreso de la Unión. Reglamento de la Ley General de Salud en materia de investigación para la salud. Secretaría General [Internet]. México; 2014 [Referenced on November 22, 2021]. Available at: [https://www.diputados.gob.mx/LeyesBiblio/regley/Reg\\_LGS\\_MIS.pdf](https://www.diputados.gob.mx/LeyesBiblio/regley/Reg_LGS_MIS.pdf)
  19. Asociación Médica Mundial. Declaración de Helsinki de la AMM: Principios éticos para las investigaciones médicas en seres humanos [Internet]. Francia: WMA; 2017 [Referenced on May 25, 2022]. Available at: <https://bit.ly/2r2W2cs>
  20. Brown MC, Bell R, Collins C, Waring G, Robson SC, Waugh J, et al. Women's perception of future risk following pregnancies complicated by preeclampsia. Hypertension in pregnancy. [Internet]. 2013 [Referenced on January 13, 2022];32(1):60-73. Available at: <https://doi.org/10.3109/10641955.2012.704108>
  21. Jardí C, Aparicio E, Bedmar C, Aranda N, Abajo S, March G, et al. Food consumption during pregnancy and post-partum. ECLIPSES study. Nutrients [Internet]. 2019 [Referenced on January 13, 2022];11(10):2447-2463. Available at: <https://doi.org/10.3390/nu11102447>





22. Lee YQ, Loh J, Ang RS, Chong MF. Tracking of maternal diet from pregnancy to postpregnancy: a systematic review of observational studies. *Current Developments in Nutrition* [Internet]. 2020 [Referenced on January 15, 2022];4(8): nzaa118. Available at: <https://doi.org/10.1093/cdn/nzaa118>
23. Mogollón V, Forero D. Nutrición: riesgos y cuidados en el embarazo. En Forero DE, editora. *Prevención de la enfermedad y la muerte en el embarazo y la primera infancia: un aporte desde la psicología del consumidor*. [Internet]. 1a ed. Colombia: Konrad Lorenz; 2015. p. 113-148. [Referenced on January 15, 2022]. Available at: <https://repositorio.konradlorenz.edu.co/bitstream/handle/001/2557/4.pdf?sequence=5&isAllowed=y>
24. Cantero-Izquierdo A, Pelado-García EM, Sánchez-Domingo M. Análisis de la adherencia a la dieta mediterránea y de los consejos nutricionales recibidos durante el embarazo. *Revista NURE Investigación* [Internet]. 2021 [Referenced on January 16, 2022];18(111):1-18. Available at: <https://www.nureinvestigacion.es/OJS/index.php/nure/article/view/1998/962>
25. De Nobili L. Descripción de la distribución de la frecuencia de consumo alimentario en embarazadas del servicio de obstetricia del Hospital Nac. Prof. A. Posadas. *Rev. electrón. Portales Médicos.com* [Internet]. 2021 [Referenced on January 16, 2022];16(3):34-44. Available at: <https://www.revista-portalesmedicos.com/revista-medica/descripcion-de-la-distribucion-de-la-frecuencia-de-consumo-alimentario-en-embarazadas-del-servicio-de-obstetricia/>

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