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ORIGINAL

Consumption of ultra-processed foods and anthropometric results in pregnant women treated at a public hospital in Asunción

Consumo de alimentos ultra procesados y resultados antropométricos en gestantes asistidas en un hospital público de Asunción

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ABSTRACT

Introduction: ultra-processed foods are high in sodium, sugars, and fats. The Pan American Health Organization warns that they jeopardize the quality of the diet.
Objective: to determine the consumption of ultra-processed foods and nutritional status by anthropometry in pregnant women who attended the Loma Pyta Maternal and Child Hospital between September and December 2024.
Method: observational, descriptive, cross-sectional study with cross-association, non-probabilistic sampling, including pregnant women after informed consent. Sociodemographic data, obstetric history, frequency of consumption of ultra-processed foods according to the NOVA classification, and anthropometric measurements were recorded. The data were analyzed using Epi Info® software version 7.2.5.0.
Results: one hundred pregnant women were evaluated, with a mean age of 27 years ± 6 SD; mean gestational age of 24 weeks ± 10 SD. One hundred percent consumed some type of ultra-processed food; 94,0 % reported consuming "soft drinks," 87,0 % "packaged sweet cookies," 95,0 % "salty snacks," and 80,0 % "cold cuts." Overweight was observed in 18,0 % and obesity in 44,0 %. Pregnant women who consumed these foods frequently (≥4 times per week) had a higher average weight (74,6 kg ± 17,8 SD) compared to those who consumed them moderately (1 to 3 times per week) (68,2 kg ± 12,6 SD), with a statistically significant difference (p= 0,03).
Conclusion: the consumption of ultra-processed foods was distributed throughout the total sample, and the average weight was significantly higher in pregnant women with a high frequency of consumption, with malnutrition due to excess being the main anthropometric result. Dietary guidelines for pregnant women are needed, with a focus on the food environment and in line with sustainable development goals 2 and 3.

Keywords: Prenatal Nutrition; Sustainable Development; Maternal and Child Health; Health Policies.

RESUMEN

Introducción: los alimentos ultra procesados poseen alto contenido de sodio, azúcares y grasas. La Organización Panamericana de la Salud advierte que los mismos ponen en peligro la calidad de la dieta.
Objetivo: determinar el consumo de ultra procesados y el estado nutricional por antropometría en gestantes que acudieron al Hospital Materno Infantil Loma Pyta, entre setiembre y diciembre de 2024.
Método: estudio observacional, descriptivo, transversal, con asociación cruzada, tipo de muestreo no probabilístico, incluyendo a gestantes previo consentimiento informado. Se registraron datos sociodemográficos, antecedentes obstétricos, frecuencia de consumo de alimentos ultra procesados según clasificación

NOVA y medidas antropométricas. Los datos fueron analizados con el software Epi Info® versión 7.2.5.0. **Resultados**: fueron evaluadas 100 gestantes, edad media 27 años ± 6 DE; edad gestacional promedio 24 semanas ± 10 DE, el 100 % consumió algún tipo de ultra procesado; el 94,0 % refirió consumir "gaseosas", "galletitas dulces empaquetadas" un 87,0 %, "aderezos salados" un 95,0 % y "embutidos" un 80,0 %. Se observó sobrepeso en 18,0 % y obesidad en 44,0 %. Las gestantes que presentaron una frecuencia de consumo alto (≥4por semana) obtuvieron un peso promedio mayor; 74,6 kg ± 17,8 DE, en comparación a aquellas que presentaron una frecuencia de consumo intermedio (1 a 3 veces por semana); 68,2 kg ± 12,6 DE, siendo la diferencia estadísticamente significativa (p= 0,03).
Conclusión: el consumo de ultra procesados se distribuyó en el total de la muestra, el peso promedio fue significativamente mayor en gestantes con alta frecuencia de consumo, siendo la malnutrición por exceso el principal resultado antropométrico. Se requiere de guías alimentarias para embarazadas, con enfoque en el entorno alimentario y en concordancia con los objetivos de desarrollo sostenible 2 y 3.

Palabras clave: Nutrición Prenatal; Desarrollo Sostenible; Salud Materno-Infantil; Políticas de Salud.

INTRODUCTION

Ultra-processed foods (UPFs) are defined as formulations with multiple ingredients, mostly for industrial use only, with little or no natural food content.[1,2] They are promoted by a strong global marketing strategy. In general terms, these products are characterized by high levels of sodium, sugars, and poor-quality fats. The Pan American Health Organization (PAHO) warns that UPFs, which lack nutritional quality, are replacing more nutritious home-cooked meals in the diets of families in Latin America and the Caribbean, noting that this has alarming health effects and requires government regulations to reverse this trend.[3] Pregnancy is a biologically vulnerable stage of life in which nutrition plays a key role. Several studies worldwide have linked the consumption of ultra-processed foods during pregnancy with diets of low nutritional quality and adverse effects on both mother and child, such as gestational diabetes, preeclampsia, obesity, high homocysteine levels, decreased consumption of protein, fiber, iron, zinc, and folate, increased pro-inflammatory status and oxidative stress, greater postpartum weight retention, fetal macrosomia and low birth weight, atopic dermatitis, risk of obesity and neurodevelopmental disorders in childhood. On the other hand, exposure to PFAS (perfluoroalkyl and polyfluoroalkyl substances) and phthalates derived from UPF plastic packaging has also been demonstrated.[4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27] Factors related to UPF consumption during pregnancy have been described as maternal age, social status, pre-pregnancy obesity, multiparity, few years of schooling, and low physical activity during pregnancy.[28,29] In Paraguay, the Food and Nutrition Surveillance System reported that in 2023, obesity was the leading nutritional status in pregnancy, reaching 54 % in adult pregnant women and 34 % in the total population.[30] On the other hand, studies conducted at the country level showed that maternal malnutrition was associated with complications in pregnancy and that the quality of the diet decreases when the pregnant woman has some type of malnutrition.[31,32] However, in Paraguay, there are currently no studies that have addressed the consumption of UPF during pregnancy. The objective was to determine the consumption of ultra-processed foods and the nutritional status of pregnant women who attended prenatal check-ups at the Materno Infantil Hospital in Loma Pyta (Asunción, Paraguay) during the period from September to December 2024.

METHOD

Study design and area

An observational, descriptive, cross-sectional study with cross-association was conducted, evaluating pregnant women who attended prenatal check-ups at the Loma Pyta Maternal and Child Hospital, Asunción, Paraguay, from September to December 2024.

Inclusion and exclusion criteria

Adolescent and adult pregnant women at any stage of pregnancy who had signed the informed consent form were included. Those with physical and/or cognitive disabilities and those belonging to the indigenous population were excluded.

Sample type and sample size

Sampling was non-probabilistic convenience sampling, using the EPIDAT statistical package version 3.*1*, for a universe of 150 pregnant women who attended that center during the study period, a frequency of 25 % of some alteration in nutritional status,[30] a confidence level of 95 %, and a margin of error of 5 %. The minimum sample size calculated was 99 pregnant women.

Recruitment

Recruitment was carried out through prenatal care clinics, which were accessed with the permission of the healthcare center authorities.

Variables

Sociodemographic variables, obstetric history, consumption of ultra-processed foods, and anthropometric measurements (weight, height) were recorded.

Data management and analysis

Data were recorded in a Microsoft Excel spreadsheet. They were then analyzed using Epi Info version 7.2.5.0. The descriptive section of the results was expressed according to quantitative or qualitative variables. For quantitative variables, the results were presented as means and standard deviations. For qualitative variables, the results were presented as absolute frequencies (n) and relative frequencies (%). To search for statistically significant differences between variables, Student's t-test was applied with a p-value <0,05.

Data collection instruments

The data collection instrument was a questionnaire structured in four sections, which was digitized using Google Forms. The sections of the questionnaire were as follows: sociodemographic data, obstetric history data, anthropometric data, questionnaire on the frequency of consumption of ultra-processed foods and beverages according to the degree of processing established by the NOVA classification, applying the validated questionnaire on the frequency of consumption of ultra-processed foods and beverages. This was adapted from the study by Dey R. *et al.*[33], which presents a classification of five groups of ultra-processed foods with their respective subgroups; adapted from the study by Meza-Miranda, "Critical nutrients in processed and ultra-processed foods intended for children and their suitability for the Pan American Health Organization profile," Paraguay[34] to measure consumption dichotomously (consumes/does not consume) and the frequency of consumption (high consumption: more than 4 times per week/intermediate consumption: 1 to 3 times per week). No low consumption frequency was established, as there are no minimum consumption recommendations for these foods. Nutritional status was assessed using anthropometry, taking the weight (kg) and height (meters) of pregnant women with a calibrated scale and Seca height meter, and then applying the reference established by the current technical standard, classifying nutritional status as: adequate, underweight, overweight, and obese.[35]

Ethical issues

The principles of bioethics and the Declaration of Helsinki were respected. This was a prospective observational study in humans, and ethical issues were considered from that perspective, as pregnant women (mother-fetus pairs) were studied in direct contact. Pregnant women were treated as autonomous individuals, and all signed informed consent forms. The privacy and confidentiality of the information were respected. The study did not generate any expenses for the patients. All participants benefited from the written report of the nutritional assessment by anthropometry. All pregnant women were referred to the Nutrition office for professional advice. The protocol was approved by the Ethics Committee of the Universidad del Pacífico, Asunción, with ruling No. 020/2024 CE.

RESULTS

The sample consisted of 100 pregnant women, aged between 15 and 43 years. The average age was 27 ± 6 years. Table 1 presents the results regarding the sociodemographic data of the sample interviewed, highlighting that 50,0 % came from the Central Department, 42,0 % were in stable relationships, 32,0 % reported having an income below the minimum wage, and 40,00 % were housewives. In terms of years of schooling, 7,0 % reported having less than 9 years of schooling (incomplete basic education).

The average gestational age was 24 ± 10,3 weeks, with a minimum of 5 and a maximum of 39 weeks. Regarding the number of prenatal checkups, the average was 3,7 ± 2,3, with a minimum of 1 and a maximum of 13.

One hundred percent of the pregnant women surveyed reported consuming some type of processed and/or ultra-processed product, within the distribution of food groups proposed by this research based on the NOVA Classification.[30] To consider the degree of processing of foods that have been industrially manipulated, the following groups were distinguished with their respective subgroups:

1. Dairy products: sweet flavored yogurts, chocolate drinks, dairy desserts/custards, creams, ice cream.
2. Sugary drinks: soft drinks, powdered juices, juices packaged in cartons or bottles.
3. Sweet products: packaged sweet cookies/alfajores, cereal bars or boxes, packaged sweets/chocolates, bonbons, candies, powdered or ready-to-eat gelatins.

4. Salty products: packaged dressings, packaged salty snacks, canned foods.
5. Meat products: sausages/hot dogs, chorizo, cold cuts, mortadella; combo burgers, hamburgers, breaded cutlets, and/or frozen packaged nuggets made from beef or chicken.

Table 1. Sociodemographic data of the pregnant women surveyed

Variables	n	%
Department of origin		
Asunción	29	29,00
Canindeyú	1	1
Central	50	50
Mountain range	12	12
Pte. Hayes	8	8,00
Marital status		
Married	23	23
Single	35	35
Stable union	42	42
Years of study		
Less than 9 years	7	7
Between 9 and 11 years	23	23
12 years old	48	48,00
Over 12 years old	22	22,00
Income		
1 minimum wage	55	55
More than 2 minimum wages	13	13
Less than one minimum wage	32	32,00
Occupation		
Housewife	40	40
Private sector employee	3	3
Public sector employee	1	1
Student	19	19
Self-employed	37	37

Table 2. Consumption of processed and ultra-processed foods by food group

Processed and/or ultra-processed food groups	Consumes		Does not consume		Total	
	n	%	n	%	n	%
Dairy products						
Sweet flavored yogurts	84	84,00	16	16,00	100	100,00
Chocolate treats	63	63,00	37	37	100	100,00
Dairy desserts	60	60	40	40	10	100
Sugary drinks						
Soft drinks	94	94,00	6	6,00	100	100,00
Powdered juices	59	59,00	41	41,00	100	100,00
Juices packaged in cartons or bottles	87	87,00	13	13	100	100,00
Sweet products						
Packaged sweet cookies/alfajores	87	87,00	13	13,00	100	100,00
Cereal bars or boxes	58	58,00	42	42	100	100
Packaged sweets: chocolates, bonbons, candies, powdered or ready-to-eat gelatin desserts	68	68,00	32	32,00	100	100,00
Savory products						
Packaged dressings	95	95,00	5	5,00	100	100,00
Packaged savory snacks/snacks	49	49,00	51	51	100	100,00
Canned food	74	74,00	26	26	100	100,00
Meat products						
Sausages	80	80,00	20	20,00	100	100

Combo burgers	35	35,00	65	65	100	100
Frozen packaged hamburgers	65	65,00	35	35	100	100
Frozen breaded cutlets and/or nuggets	59	59	41	41	100	100,00

In group 1, the most frequently consumed dairy product was "flavored sweet yogurt" (84,0 %), followed by "chocolate drinks" at 63,0 % and "dairy desserts" at 60,0 %. In group 2, sugary drinks, 94,0 % reported consuming "soft drinks" and 87,0 % "juices packaged in cartons or bottles." In group 3, corresponding to sweet products, higher consumption was observed for the subgroup of "packaged sweet cookies," reaching 87,0 %. Meanwhile, group 4, salty products, showed consumption of 95,0 % for the subgroup of "salty snacks." Finally, in group 5, meat products, the subgroup with the highest consumption frequency was "sausages" (80,0 %), followed by "frozen hamburgers" (65,0 %)(table 2).

Regarding the nutritional status of pregnant women, 62,00 % of women were found to be overweight or obese (table 3).

Table 3. Diagnosis of the nutritional status of pregnant women according to anthropometry

Nutritional status of pregnant women	n	%
Adequate	23	23,00
Underweight	15	15
Obesity	44	44
Overweight	18	18,00
Total	100	100,00

The frequency of consumption of processed and ultra-processed foods was classified as into "high consumption" (consumption of one or more types of UPF 4 or more times per week) and "intermediate consumption" (consumption of one or more types of UPF 1 to 3 times per week). For practical purposes, low consumption of these foods was not defined, as there are no minimum consumption recommendations. With this classification of consumption frequency groups, the Student's t-test was applied to measure the difference in mean body weight between pregnant women in both groups. Pregnant women who had a high consumption frequency had a higher average weight (74,6 ± 17,8 kg) compared to those who had an intermediate consumption frequency (68,2 ± 12,6 kg), with a statistically significant difference (p= 0,0394).

Table 4. Average weight of pregnant women by UPF consumption groups

Consumption groups	Average weight (kg)	SD
High consumption (n=47)	74,6	± 17,8
Intermediate consumption (n=53)	68,2	± 12,6
Note: *p-value <0,0394		

DISCUSSION

In Paraguay, the food environment is characterized by high availability and accessibility of UPFs, which are industrialized drinkable and edible products with high amounts of sugars, fats, and salt. Their consumption contributes to health problems such as overweight and obesity, which affect a significant percentage of the adult and child population.[36] In the present study, the entire sample of pregnant women reported consuming some type of ultra-processed food product. Studies conducted in Brazil by Graciliano and Paula WO concluded that an increase in the consumption of ultra-processed foods was associated with a decrease in the quality of the diet in pregnant women, resulting in a deficit in the consumption of proteins, fiber, and micronutrients such as magnesium, iron, potassium, zinc, selenium, copper, vitamins D and E, and folates. In addition, there was a reduction in the consumption of foods such as legumes, roots, and tubers in their natural form. High consumption of ultra-processed foods was also associated with higher intake of calories, fats, and sodium in pregnant women.[37,38] Fraga ACSA *et al.* concluded that the sociodemographic and obstetric risk factors associated with high consumption of ultra-processed foods in pregnant women were low educational attainment and a history of previous births, with older pregnant women showing lower consumption of these foods.[39] In the present study, it was found that 30,0 % of pregnant women did not complete secondary education (less than 12 years of schooling) and the average age was 27,4 years.

On the other hand, the results of the nutritional status assessment showed high levels of obesity (44,0

%), values close to the distribution in Asunción (42,5 %) and higher than the country level (34,0 %) according to reports published by the Food and Nutrition Surveillance System. As for the distribution of malnutrition due to deficiency, it was present in 15,0 %, which was lower than the percentage in Asunción and at the national level; 21,2 % and 25,2 %, respectively.[30] In the study conducted in Paraguay by Giménez SE[31], the relationship between the presence of maternal malnutrition and complications in pregnancy was verified. Acosta Mogrovejo conducted research in Peru with the aim of identifying the relationship between nutritional status and eating habits in full-term pregnant women. It was found that 44,0 % had inadequate eating habits, with a significant relationship between weight gain and eating habits (p=0,003) in pregnant women.[40] Lourenço conducted research on 417 pregnant women in Brazil, with an average age of 24,7 years, which showed that the frequency of consumption of processed and ultra-processed foods was negatively associated with skeletal components of fetal growth at the end of pregnancy. This study demonstrated that a higher frequency of consumption of processed and ultra-processed foods during the prenatal period was negatively associated with head circumference and femur length. Daily consumption of these foods was particularly unfavorable with respect to the cephalic plane, with significant negative differences detected at all levels of cephalic perimeter distribution compared to the lowest frequency of consumption (weekly) of processed and ultra-processed foods.[41]

While the present study found that the average maternal weight was higher in pregnant women who consumed processed and ultra-processed products daily, compared to those whose consumption frequency was weekly (p<0,05), the consumption of this type of food has been linked to the development of obesity and other chronic noncommunicable diseases, such as diabetes, cardiovascular disease, and cancer.[42,43] The intake of these foods during pregnancy could be even more concerning as it would affect not only maternal health but also fetal health. The high content of sugars, fats, and sodium promotes the development of malnutrition with a corresponding decrease in the quality of the maternal diet, increasing the risk of complications and adverse perinatal outcomes. It may also represent exposure to harmful chemicals, as according to the study by Baker BH *et al.*, consumption of ultra-processed foods may increase exposure to phthalates. Policies are needed to reduce dietary exposure to these chemicals from food packaging and processing, as socioeconomic barriers may prevent dietary recommendations from being the sole means of reducing this risk.[44]

In the present study, 80,0 % of pregnant women reported consuming animal products such as “sausages,” while 94,0 % reported consuming sugary drinks in the form of soft drinks and 87,0 % reported consuming juices packaged in cartons or bottles. Cordova R. *et al*. led a cohort study in seven European countries (*European Prospective Investigation into Cancer and Nutrition -EPIC- study)* that included 266,666 subjects (60 % women). After 11 years of follow-up, the findings showed that 4 461 participants (39 % women) developed cancer and cardiometabolic diseases. Higher consumption of processed and ultra-processed products (by an increase of 1 standard deviation, ~260 g/day without alcoholic beverages) was associated with an increased risk of multimorbidity of cancer and cardiometabolic diseases. Among the subgroups, the associations were most notable for animal products and artificially sweetened and sugar-sweetened beverages.[45]

The limitations of this study are its single-center nature, sample size, and sampling method. Among its strengths is the current interest in the issue under investigation, as there are not many studies addressing this specific topic at the country level. In addition, it should be noted that sampling was performed prospectively and by highly trained personnel in the field. It is recommended to expand the sample size, include other health services, and measure other study variables that address pregnancy and newborn follow-up.

CONCLUSIONS

In conclusion, the consumption of processed and ultra-processed foods among pregnant women who attended the Loma Pyta Maternal and Child Hospital during the months of September and December 2024 showed values indicating a high intake of these foods, and malnutrition was also evident in a large part of the sample. This situation is concerning given the scientific evidence that consumption of these food products is associated with harmful effects on the health of both mother and child. Paraguay is committed to achieving the Sustainable Development Goals (SDGs), among which SDG 2 “Zero Hunger” aims to end all forms of malnutrition and meet the nutritional needs of vulnerable groups, including pregnant women, by promoting healthy and sustainable food systems and environments. The implementation of dietary guidelines at the country level, specifically designed for the pregnant population, is required as a public health policy, complemented by other social policies on access to healthy foods. It is also necessary to strengthen existing policies, such as Law 7092 on “Front-of-package warning labels on packaged foods,” which requires regulation, implementation, and monitoring.

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None.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHOR CONTRIBUTION

Conceptualization: María Isabel López-Ocampos.
Research: María Isabel López-Ocampos.
Methodology: María Isabel López-Ocampos.
Writing – original draft: María Isabel López-Ocampos.
Writing – review and editing: María Isabel López-Ocampos.

ANNEX

Data collection instrument				
SOCIODEMOGRAPHIC DATA OF PREGNANT WOMEN				
Date of sample collection: DD/MM/YY				
Age:				
Alphanumeric code:				
Marital status:	Single Married Divorced Common-law marriage Widowed Other (specify):			
Occupation:	Housewife Public sector employee Private sector employee Self-employed Student Other (specify)			
Educational level (years of study in the formal education system): years of study completed.				
Income:	Less than minimum wage 1 minimum wage Between 1 and 2 minimum wages More than 2 minimum wages			
BACKGROUND OF PREGNANT WOMEN				
Obstetric:	Current gestational age (in weeks): Number of prenatal checkups:			
ANTHROPOMETRIC DATA				
Pre-pregnancy weight (kg)				
Current weight (kg)				
Height (meters)				
Nutritional status	Adequate/Underweight/Overweight/Obese			
FREQUENCY OF CONSUMPTION OF PROCESSED AND ULTRA-PROCESSED FOODS AND BEVERAGES				
	3	2	1	Observation
How often do you consume industrially packaged foods and/or beverages?				
Do you consume sweet flavored yogurts?				
Do you consume industrially packaged chocolate drinks in cartons or bottles?				

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Do you consume industrially packaged dairy desserts, such as flans, creams, ice cream, etc.?				
Do you consume powdered or ready-to-eat gelatin?				
Do you consume powdered juices?				
Do you consume industrially packaged juices in cartons or bottles?				
Do you consume soft drinks?				
Do you consume sweet and/or savory canned products?				
Do you consume industrially packaged sweet or savory cookies?				
Do you consume cereal bars and/or industrially packaged cereals? Such as cornflakes, etc.?				
Do you consume industrially packaged alfajores, chocolates, bonbons, sweet pastries, candies, gummy candies, chewing gum, etc.?				
Do you consume hot dogs, sausages, cold cuts, mortadella, and industrialized cold cuts in general?				
Do you eat industrially packaged frozen hamburgers?				
Do you consume nuggets, breaded cutlets, and/or other frozen and industrially packaged chicken or meat products?				
Do you eat fast food combos (hamburgers, French fries, soft drinks) from international fast food chains?				
Do you consume industrially packaged condiments such as mayonnaise, ketchup, mustard, sauces, preserves, etc.?				
Do you consume industrially packaged salty snacks such as potato chips, Doritos, Saladix, nachos, etc.?				
Do you consume foods and/or beverages that have warning labels on the front of the package?				
Do you have any questions or comments about the topics covered in the questionnaire?				
References: 3= Very often 2= Often 1= No In all cases, ask if you can indicate the product brand(s) and record it as a comment.				
Very frequently: Daily consumption Frequently: 1 to 3 times per week				