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Food and nutrient intake of adolescent women in Medellín, Colombia

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Abstract

Nutritional imbalance in adolescent girls causes alterations in health, reproductive cycles, and fetal outcomes of future generations. To evaluate the dietary pattern and prevalence of inadequate nutrient intake, a 24-hour multi-step food recall was carried out among 793 adolescent women (14–20 years old) from Medellin, Colombia. Their dietary pattern was characterized by lower than recommended intakes of fruits and vegetables (CRI 0.4, AMD 0.2), dairy (CRI 0.5, AMD 0.2), and proteins (CRI 0.8, AMD 0.3), while starches (CRI 1.2, AMD 0.4), fats (CRI 1.1, AMD 0.6), and sugars (CRI 1.0, AMD 0.5) were at similar or higher levels than recommendations. A high risk of deficiency was found in the usual intake of energy (53.0%), protein (39.8%), calcium (98.9%), folates (85.7%), iron (74.4%), thiamine (44.3%), vitamin C (31.3%), zinc (28.3%), vitamin A (23.4%), cyanocobalamin (17.3%), and pyridoxine (10.9%). A low risk of deficiency was noted in usual fiber intake (0.5%), and a higher than recommended intake was noted in saturated fat (100.0%) and simple carbohydrates (68.8%). Anecdotally, a large proportion of respondents saw decreases in their food consumption during the COVID-19 pandemic. These results suggest an urgent need for nutrition education programs to emphasize the importance of adequate nutrition among adolescent women.

KEYWORDS
24-hour recall, adolescent women, COVID-19, dietary patterns, nutrition

INTRODUCTION

Adolescence is a critical phase in the life cycle. This is the period during which the final growth spurt occurs, and secondary sexual organs and characteristics develop.[1] Accompanying this physical maturation is the construction of social identity, the gaining of skills necessary to assume adult functions, the initiation of sexual relations, and the progressive attainment of socioeconomic independence.[2,3] As those take place, adolescents may acquire risky behaviors that often continue into adulthood, such as tobacco, drug, and alcohol consumption; establishing unhealthy eating habits; and consolidating suboptimal food preferences.[3]

Nutritional requirements during adolescence are high, particularly for females, and macromicronutrient intakes need to be balanced in order to maintain an adequate nutritional status and a healthy lifestyle.[4] This stage is considered the second window of opportunity, after the first 1000 days of life, to reduce nutritional risks, reduce the growing burden of chronic disease,[4,5] and break the intergenerational

cycle of malnutrition.[6] However, there is little information globally on the nutritional status of this age group and the influence that the environment has on their food choices.[7] Scientists, program implementers, and policy experts meeting at the International Summit on Adolescent Girls' and Young Women's Nutrition[6] in 2015 acknowledged such gaps and called for actions to: elevate the urgency of addressing under/malnutrition in adolescent women (AW) to a high international priority; increase the visibility, social status, and health status of AW around the world; address knowledge gaps in adolescent biology and appropriate nutrition; and take actions that improve the nutritional status of young women and their children.[6] Progress was registered in the years following that meeting, but the SARS-CoV-2 pandemic hampered different spheres of life including: increased unemployment, economic instability, and food insecurity; and reduced access to food, especially in the most vulnerable countries, all of which complicated the task of protecting adolescent nutrition.[8]

This study, started in early 2020, aimed initially at evaluating the dietary pattern and the prevalence of inadequate nutrient intake among adolescent AW living in the city of Medellín, Colombia. Results were sought as an input for the development of future interventions in this population. However, with the pandemic wreaking havoc on people's lives, the study expanded its scope to document the effect of COVID-19 on this population's diet to help improve future interventions.

MATERIALS AND METHODS

A cross-sectional, descriptive study was conducted in a group of AW in the city of Medellín, Colombia between the months of June and July 2021. As Colombia enjoys an equatorial climate, it shows little seasonal variation in food availability, and the diet is similar throughout the year. A sample including 793 randomly selected AW aged 14–20 years from the "Popular," "Manrique," and "Villa Hermosa" communes of the city of Medellín was drawn from a population living in those communes, which came from rosters maintained by World Vision. Identified AW who agreed to participate and complied with the biosafety protocol were included in the study, unless they were pregnant, breastfeeding, or unavailable. The information was collected through a face-to-face interview with each respondent. If required, the person who prepared the food at home was also present. Nutrition students or dietitian nutritionists collected the sociodemographic and food consumption data using a standardized form. Sociodemographic data included commune of residence, ethnicity, family composition, affiliation with social programs (such as System of Identification of Social Program Beneficiaries and Health Promoting Entities), age, educational level, main occupation, and socioeconomic stratum as per Colombia's Departamento Administrativo Nacional de Estadística classification.[9] For the food and nutrient intake assessment, a multi-step adjusted 24-hour recall (R24h) was applied to all 793 participants; of those, a random subsample of 169 women (21%) was asked to answer a second R24h to adjust for inter- and intra-individual variability.[10] All first and second R24hs were distributed across weekdays, including weekends and holidays. The second R24hs were applied on nonconsecutive days.

To determine the quantities of food eaten by AW, visual models, geometric figures, and a photo album with life-size utensils were used, following a methodology validated and used in previous population studies.[11–15] To avoid misestimation of nutrient intakes, the consumption of liquor, water, and nutritional supplements was also quantified. Data on factors that could influence intake, such as body self-image and food insecurity (using the Household Hunger Scale),[16] were also collected. To account for changes due to the pandemic, subjective data were collected on the perceived impact on respondents' (or their household's) ability to acquire foods and on changes in food consumption patterns.

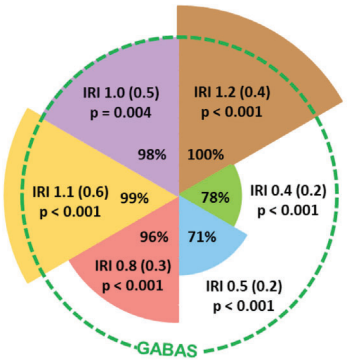
The R24hs were processed using the Evaluation of Dietary Intake (EVINDI) v5 software,[17] which uses Colombia-specific nutritional information from different food composition tables and nutritional labels.[18–22] EVINDI uses the R24h to compute the net amount of nutrients and food consumed. Nutrient analysis was processed using the Personal Computer Software for Intake Distribution Estimation (PC-SIDE) v1,[23] which adjusts for inter- and intra-individual variability of nutrient intake[10] in ways compatible with the Estimated Average Requirement for the Colombian population, established by age groups according to the Recommendations for Energy and Nutrient Intake (RIEN).[24] This study used RIEN's age groups of 14 through 18 and 19 through 20 years.

To analyze dietary patterns, the foods of the first R24h were classified into six groups according to the Food-Based Dietary Guidelines (GABAS) for the Colombian population[25]: (1) starches (cereals, roots, tubers, and bananas); (2) fruits and vegetables; (3) dairy (milk and dairy products); (4) protein (meats, eggs, legumes, nuts, and seeds); (5) fats; and (6) sugars. The Intake Ratio Index (the quotient between the calories consumed and those recommended in the GABAS) was calculated and compared to recommendations by age group.

Statistical analysis

Simple descriptive statistics were used to explore sociodemographic and behavioral characteristics. For energy and nutrient data, the following benchmarks were established:

- Adequacy of usual energy intake (i.e., less than 90% and greater than 110% of the individual energy requirement);
- Percentage of individuals with intakes below and above the Acceptable Macronutrient Distribution Range (%AMDR);
- Protein for total population and over 18 years of age (14%–20%); for under 18 years of age (10%–20%);
- Total fat for the total population and over 18 years of age (20%–35%); for under 18 years of age (25%–35%);
- Total carbohydrate (50%–65%);
- Saturated fat and simple carbohydrate (<10%);



Food groups	% (n)*	IRI Me (MAD)	Wilcoxon p (RBC)**	KA***
Starches (cereals, roots, tubers and bananas)	100.0 (793)	1.2 (0.4)	<0.001 (0.506)	-0.3332
Fruits and vegetables	77.9 (618)	0.4 (0.2)	<0.001 (-0.713)	-0.3555
Dairy products (Milk and dairy products)	70.7 (561)	0.5 (0.2)	<0.001 (-0.823)	-0.3730
Protein (Meat, eggs, legumes, nuts and seeds)	95.6 (758)	0.8 (0.3)	<0.001 (-0.305)	-0.3348
Fats	99.2 (787)	1.1 (0.6)	<0.001 (0.308)	-0.3333
Sugars	98.0 (777)	1.0 (0.5)	0.004 (0.163)	-0.3334

FIGURE 1 Food groups consumed versus Food-Based Dietary Guidelines for the Colombian population. * The % column indicates the percentage of respondents who consumed the food group. ** RBC classification: 0: no similarity; 0–0.3: low; 0.3–0.5: medium; >0.5: high. ** KA classification: −1 to <0: disagree; 0: poor; >0 to 0.20: slight; 0.21–0.40: reasonable; 0.41–0.60: moderate; 0.61–0.80: substantial; 0.81–1.00: almost perfect. Abbreviations: GABAS, Food-Based Dietary Guidelines; IRI, Intake Ratio Index; KA, Krippendorff's alpha; MAD, median absolute deviation; Me, median; RBC, rank-biserial correlation.

- Risk of deficiency in usual dietary fiber intake and prevalence of risk of deficiency in usual intake of protein, vitamins, and minerals according to the EAR.

These indicators were accompanied by summary measures adjusted as minimum, maximum, percentiles, mean, and standard deviation (SD). The Consumption Ratio Index was accompanied by absolute and relative distributions and summary measures, such as median, median absolute deviation, minimum, and maximum.

Normality and homoscedasticity criteria were established with the Kolmogorov–Smirnov and Levene tests, respectively. For the comparison of the dietary pattern with the GABAS, the Wilcoxon signed-rank test was used, complemented by the effect size correlation called rank-biserial correlation[26] and Krippendorff's alpha[27] to assess concordance. A two-sample test of proportions was used for the comparison of the proportion of AW with risk of inadequate nutrient intakes of the group of women of the study with the national survey of the food and nutritional situation in Colombia (ENSIN 2005). For all tests, a p value of <0.05 was considered statistically significant. Data processing and analysis were performed in EVINDI v5, PC-SIDE v1, Stata 16, and Jasp 0.14.1.0 software.

Ethical guidelines

This research was conducted according to the guidelines of the Declaration of Helsinki,[28] was classified as minimal risk according to Colombian Resolution 8430 of 1993,[29] and was approved by the bioethics committee of the Sede de Investigación Universitaria, Acta 22220002_0096_2021_CTI017.

RESULTS

Survey respondents came from the Medellín communes of Villa Hermosa (37.6%), Manrique (35.3%), and Popular (27.1%) and were largely homogeneous as a group. Most lived as daughters in nuclear (77.5%) or extended (20.4%) families, with a very small proportion (2.1%) living away from their parents. They came almost exclusively from poor backgrounds[9] (98.7% from socioeconomic strata 1 and 2). Most respondents (87.8%) were from the 14–18 years-old age group—the remainder (12.2%) were from the 19–20 years-old age group. Among the 14–18 years-old age group, 92.8% were studying and 85.5% of them were in secondary school. Among the 19–20 years-old age group, 51.6% were studying, 24.7% were housewives, and 11.3% were working. Ethnic identity was largely undifferentiated, with only 11.7% being Black, Afro-Colombian, or half-caste (Table S1).

Food pattern

The pattern of food consumption was similar among AW in both age groups. A total of 219 foods were reportedly consumed, the most common ones being sources of carbohydrates. The main sources of protein were eggs (57.6%, $\bar{x}$ = 52.1 g), cheese (35.9%, $\bar{x}$ = 32.3 g), and pork (23.8%, $\bar{x}$ = 41.7 g). Vegetables and fruits were seldom consumed. Of the 40 foods most often mentioned, carrot was in the 26th position (19.5%, $\bar{x}$ = 22.2 g) and mango in the 33rd (12.7%, $\bar{x}$ = 88.0 g). Soft drinks were in the 13th position (32.5%, $\bar{x}$ = 200.4 cc), which was higher than milk in the 15th position (31.1%, $\bar{x}$ = 132.1 cc) (Table S2 shows the first 50 most consumed foods). The intake reported in R24h corresponds to the regular consumption of 70.6% of the girls. Main meals consumed were as expected (breakfast 84.5%, lunch 92.7%, dinner 91.7%, and snacks 51.1%). Supplements were consumed by 6.9% of young women and alcoholic beverages by 2.5% (Table S3).

Intake Ratio Index

When comparing respondents' dietary pattern to the GABAS recommendation, the Intake Ratio Index was lower than the guidelines with

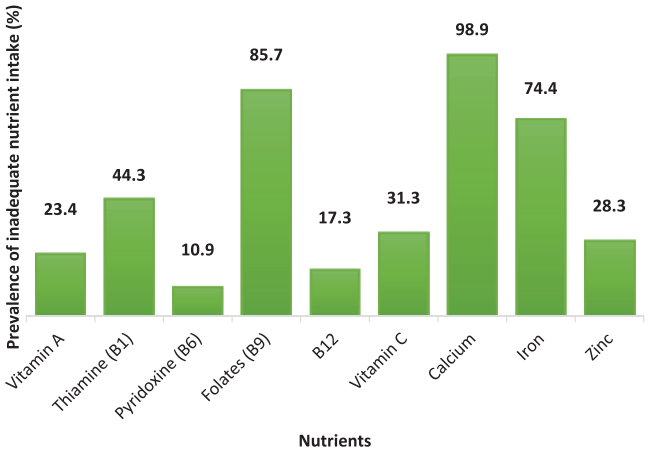


FIGURE 2 Sampled respondents with inadequate intake of key micronutrients.

respect to fruits and vegetables, dairy, and proteins, while higher in starches, fats, and sugars. For all food groups, statistically significant differences were found between what was consumed and what was recommended. Also, there was no strength of agreement according to Krippendorff's alpha in any of the groups compared. The magnitude of these differences, according to the rank-biserial correlation (rB), was high in three of the six correlations. The highest magnitude of effect between what was consumed and recommended was found in the dairy group (rB = −0.823) (Figure 1).

Nutrient intake

The prevalence of inadequate nutrient intake in AW's usual energy and protein intake were 53.0% (SD = 2.2) and 39.8% (SD = 4.0), respectively. Regarding the Acceptable Macronutrient Distribution Range (%AMDR), a higher prevalence of excess in total fat was found at 4.6% (SD = 0.2), with a deficit in total carbohydrates of 1.6% (SD = 7.9). High prevalence of excess saturated fat intake (100.0%) and simple carbohydrates 68.8% (SD = 10.8) were noted. Regarding dietary fiber, most AW (99.5%) had lower intake than recommended. The highest prevalences of inadequate nutrient intakes were for calcium (98.9%, SD = 1.5), folate (85.7%, SD = 7.0), iron (74.4%, SD = 5.7), and thiamine (44.3%, SD = 2.9), while the lowest prevalences included cyanocobalamin (17.3%, SD = 16.2) and pyridoxine (10.9%, SD = 8.4) (Figure 2). Detailed information on the nutrient intake of AW disaggregated by age group can be found in Table S4.

Pandemic dietary changes

According to respondents' self-reports, the foods consumed decreased among 39.0% of AW due to the pandemic, with meat consumption, fruits or vegetables, and dairy decreasing among 48.0%, 39.7%, and 36.1% of AW, respectively—the main reasons being high costs and lack of economic resources (Table 1). Furthermore, hunger occurred in 40.9% of homes in the 30 days before the survey, according to the Household Hunger Scale classification (Table S3).

DISCUSSION

The present study found that most AW in our sample consumed their three main daily meals, but the amounts eaten were low, with the consumption of fruits, vegetables, dairy products, and proteins lower than GABAS recommendation, and the consumption of starches, fats, and sugars at or higher than recommendations. This pattern is further characterized by a low consumption of nutrient-dense foods. Although the percentage distribution of total fats and carbohydrates in most AW was within recommended ranges, it is based on a diet with a deficit in energy adequacy and excess consumption of saturated fat and simple carbohydrates. Almost all AW surveyed were at risk of deficiency for the usual intake of calcium and fiber; more than half in folate and iron, and a third in protein, thiamine, vitamin C, and zinc. Adolescents between 14 and 18 years of age presented the highest risks of deficiencies—a stage when nutritional alterations have the most deleterious effects in the short and long term.

This dietary pattern is consistent with other reports.[30] A 2018 review of 227 studies from low- and middle-income countries reported that adolescent girls had a frequent intake of energy-dense foods with low nutritional value, but low daily intake of nutrient-dense foods, such as dairy (16.0%), vegetables (37.0%), meats (46.0%), and fruits (44.0%).[31] Likewise, the National Health and Nutrition Survey of Mexico 2012[32] reported that the consumption of AW was based primarily on cereals and tubers (28.7%) and foods high in saturated fats and sugar (20.8%), and much less consumption of animal products (14.1%), dairy products (9.9%), fats (9%), fruits and vegetables (4.7%), and legumes (2.9%).

Compared to the Food and Nutritional Security Profile of Medellín 2015[15] and the National Food and Nutrition Situation Survey 2005,[13] the present study reported a higher proportion of females with energy and saturated fat intake above the reference values and a higher risk of deficiency in the usual intake of calcium, folate, and vitamin C. It also reported a lower proportion of females with fat and carbohydrates total intake above the reference value and a lower risk of deficiency in the usual intake of vitamin A and zinc. The low intakes of iron and protein were similar to the Medellín 2015 profile (Table 2).

The low energy intake reported in these studies hampers amino acid synthesis,[33] possibly leading to stunted growth and slower body maturation during adolescence.[34,35] The high prevalence of calcium deficiency risk, common in this population, increases the risk of osteoporosis in adulthood.[36,37] By contrast, our sample had a high intake of saturated fats and simple carbohydrates, as corroborated by the NOVA-Screener score,[38] which shows a positive and significant association with the intake of sodium, total fats, and saturated fats.

The tendency to overconsume total fat, saturated fat, cholesterol, sodium, and sugar that generally accompanies the nutritional transition is especially marked among adolescents in urban areas.[4] This is of concern as studies in children and adolescents have found that

TABLE 1 Percent of respondents who changed their diet due to the pandemic.

	Decrease in consumption					
	Street food	Quantity	Meat	Fruits or vegetables	Dairy products	There are no changes
Variable	**% (*n*)**	**% (*n*)**	**% (*n*)**	**% (*n*)**	**% (*n*)**	**% (*n*)**
Total (*n*= 793)	58.8 (466)	39.0 (309)	48.0 (381)	39.7 (315)	36.1 (286)	13.2 (105)
Reason						
They are too expensive	48.5 (226)	58.6 (181)	74.0 (282)	70.8 (223)	68.2 (195)	*
Change of habits	29.6 (138)	13.9 (43)	2.6 (10)	3.5 (11)	3.1 (9)	*
Lack of financial resources	10.9 (51)	15.2 (47)	15.2 (58)	15.6 (49)	15.4 (44)	*
Does not like	7.1 (33)	6.8 (21)	7.3 (28)	6.0 (19)	9.1 (26)	*
Health	2.8 (13)	2.6 (8)	0.3 (1)	0.0 (0)	3.1 (9)	*
They are no longer found	0.6 (3)	0.6 (2)	0.3 (1)	0.6 (2)	0.3 (1)	*
Lack of access	0.4 (2)	2.3 (7)	0.3 (1)	3.5 (11)	0.7 (2)	*

*Cannot be computed.

TABLE 2 Comparing energy and nutrient intake in 14- to 18-year-old adolescent women to ENSIN 2005 and Medellín Profile 2015.

		Medellín women's group 2021 *n*= 793	Medellín profile 2015** *n*= 841	ENSIN 2005 *n*= 3457	
Nutrient*		**% (SD)**	**% (SE)**	**% (95% CI)**	***p* value**
Energy	<90% of adequacy	56.1 (2.7)	70.1 (0.13)	66.2 (62.2–70.2)	<0.001
	>110% of adequacy	18.0 (4.9)	9.2 (0.14)	13.7 (10.8–16.6)	0.002
Protein		41.3 (3.7)	39.7 (0.11)	50.1 (46.0–54.2)	<0.001
Total fat	<25%AMDR	0.6 (6.6)	3.4 (0.09)	****	****
	>35%AMDR	4.5 (0.3)	20.5 (0.16)	5.6 (3.7–7.5)	0.216
Saturated fat >10%AMDR		100.0 (***)	75.7 (0.18)	31.5 (27.7–35.3)	<0.001
Total carbohydrates	<50%AMDR	4.1 (9.3)	15.4 (0.19)	4.3 (2.6–6.0)	0.802
	>65%AMDR	2.4 (6.7)	7.5 (0.16)	34.7 (30.8–38.6)	<0.001
Simple carbohydrates >10%AMDR		64.3 (6.6)	****	****	****
Dietary fiber		0.6 (1.3)	0.7 (0.03)	8.5 (6.2–10.8)	<0.001
Vitamin A		21.9 (15.6)	42.6 (5.9)	34.9 (31.0–38.8)	<0.001
Thiamine		47.0 (2.9)	****	****	****
Pyridoxine		8.6 (10.8)	****	****	****
Folates		87.1 (8.3)	66.3 (0.19)	****	****
Cyanocobalamin		21.0 (16.7)	****	****	****
Vitamin C		31.8 (5.8)	19.1 (0.32)	19.3 (16.0–22.6)	<0.001
Calcium		99.4 (1.2)	98.2 (0.08)	99.1 (98.5–99.7)	0.405
Iron		75.1 (6.9)	76.0 (0.16)	33.2 (29.3–37.1)	<0.001
Zinc		28.6 (8.0)	52.9 (0.08)	32.3 (28.4–36.2)	0.043

Abbreviations: AMDR, Acceptable Macronutrient Distribution Range; SD, standard deviation; SE, standard error.

*Adequacy of the usual energy intake, percentage of individuals with consumption above and below the %AMDR, low risk of deficiency in the intake of dietary fiber, and prevalence of risk of deficiency in the usual intake of protein, vitamins, and minerals.

**The 2015 Medellín Profile includes data for men and women, unlike the 2005 ENSIN and the 2021 Medellín women's group, which include data for women without men. The *p* value corresponds to the comparison between the ENSIN 2005 and the group of women from Medellín 2021.

***It is not possible to normalize the data.

****This was not analyzed.

unhealthy food choices impact future cardiometabolic health[39] and are associated with chronic diseases, such as obesity, diabetes, and cardiovascular risk.[33,35]

Regarding fruits and vegetables, the World Health Organization recommends consuming an average of 400 grams daily.[40] This goal is missed in most circumstances. In the present study, fiber intake was very low (13.1 g/day, SD = 4.0), mirroring studies from Costa Rica (19.3 g/day of fiber) and Canada (13.3 g/day of fiber). The potential outcomes are dire since low fiber intake is associated with a higher incidence of constipation, diabetes, diverticulosis, obesity,[39] hypertension, colon cancer, and the loss of intestinal microbiota balance.[39,41] Conversely, adequate fiber intake has been associated with lower glycemic index, lower blood cholesterol, and a healthy microbiota that favors[42] an adequate immune response and a lower risk of cardiovascular diseases.[43]

Worldwide nutrition surveys also show insufficient intake of energy and nutrients in adolescents, and more so in females than males.[4,13] Micronutrient deficiencies (such as iron and folate) can lead to impaired physical growth, decreased productivity and, if pregnancy occurs, potential negative outcomes, such as premature birth, small for gestational age, and low birthweight. Low maternal folate intake is associated with preventable ailments, such as neural tube defects and lip and cleft palate.[44] Timely detection and interventions that promote diets rich in micronutrients could allow for an adequate approach to the aforementioned disorders; however, such actions are not common in the current context, and no guidelines have been identified for critical nutrient supplementation that target adolescents.[45]

The imbalance in food and nutrient intake of AW is influenced by interlocking factors at the personal (attitudes, beliefs, food preferences, and biological changes), environmental (family, friends, school, and norms), and macrosystem levels (distribution systems, advertising, food availability, and production).[4] Those factors were aggravated by the COVID-19 pandemic, which considerably deteriorated the situation among food-insecure populations due to decreases in employment and income, especially in countries such as sub-Saharan Africa, South Asia, and some Latin American countries.[46] Our findings are consistent with those data.

Dietary guidelines offer simple and practical recommendations to food intake as they are based on dietary pattern analysis.[47] The few countries with guidelines targeting adolescents recommend consuming five food groups daily and avoiding foods and beverages with high amounts of fat and/or sugar, such as soft drinks and sweets.[45] Efforts at subnational levels should focus on complying with these guidelines, evaluating them, and making adjustments according to available foods to ensure that the recommendations are translated into locally effective and feasible interventions.[6] The difficulties inherent to the methods for assessing dietary intake in terms of under- or overestimation of food consumption are recognized as limitations.

Adolescents are the basis for the future development of countries, both for their reproductive role and their contribution to economic productivity. Nutrition during female adolescence offers an opportunity to break the intergenerational cycle of malnutrition, chronic diseases, and poverty, but AW's specific needs must be addressed, taking into account their rapid physical growth, increased nutrient needs due to menarche, and possible pregnancies.[45]

The high deficiency of energy and nutrients found among AW in this study demands urgent prioritization of food assistance programs for this group, including the strengthening and expansion of school feeding programs in schools. These programs should be contextualized, particularized, and built with AW's participation. They should also include nutrition education that highlights the positive aspects of healthy food choices at this stage of their life as well as considering their eating practices and access to affordable food. Empowering AW with such knowledge has the potential to not only improve their nutritional status but also that of their families and future generations.

CONCLUSION

The high social and economic vulnerability of AW increased following the pandemic, further deepening a dietary pattern characterized by an already lower than recommended consumption of fruits, vegetables, dairy products, and proteins, while the intake of starchy foods, fats, and sugars stabilized or increased. This pattern increased the risk of deficiency in energy and nutrient intake, concomitant with high consumption of saturated fat and simple carbohydrates. Adolescents in the 14- to 18-year-age group presented the highest risks—a time in the life cycle when nutritional alterations have the most deleterious effects in the short and long term. While this study mirrors global patterns, it offers specific insights into how to orient and design intervention programs that effectively target this demographic in Colombia.

AUTHOR CONTRIBUTIONS

All authors contributed to the conceptualization of the study, and reviewed and approved the manuscript. S.L.R.-M., N.C.G., L.M.M.C., and G.B. were responsible for project coordination, data collection, analysis, and interpretation. L.D.F. coordinated the process of identification and recruitment of study participants. G.B. managed project funding and liaison of participating entities.

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COMPETING INTERESTS

There are no competing interests.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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