

## Living conditions, diet quality and associated factors in women and children from *quilombola* communities in Goiás, Brazil

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THEMATIC ARTICLE

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**Abstract** *The study aimed to describe health and living conditions and analyze factors associated with the quality of the diet of women and children under 5 years of age in 9 rural quilombola communities, certified and without land title in the state of Goiás. Cross-sectional study, in which were constructed the indicators of consumption of ultra-processed foods, diet diversity and diet quality. The association of socioeconomic factors with indicators of dietary diversity and quality was assessed using Pearson's chi-square test, Fischer's exact test and logistic regression analysis. 203 women and 73 children aged 0 to 59 months participated in the study. In women, greater dietary diversity associated with higher income, non-participation in an income transfer program and higher education; in children, fewer people living in the household, B/C socioeconomic classification and diverse maternal diet. Low diet quality in children associated with less diversity in the maternal diet; in women, the income variable was associated with lower diet quality in the chi-square analysis, but the multiple analysis showed an opposite result for this variable. There is an urgency to implement effective actions to guarantee the right to health and adequate and healthy food for this population.*

**Key words** Health, Nutrition, Groups with ancestors from the African continent

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## Introduction

The *quilombo*'s remaining communities, whose historical origin refers to spaces of resistance to slavery, contributed essentially to the formation of Brazilian history and identity. Throughout history, the term "*quilombo*" has gained other contours, but it remains a reference to a movement of resistance to historical oppression, with black ancestry and a differentiated relationship with the territory, maintaining a set of traditional manifestations and practices transmitted for generations<sup>1,2</sup>.

Despite the legal recognition<sup>3</sup> and the institution of public policies that try to "compensate" for centuries of exclusion and invisibility, there is still no realization of the basic rights of this population. Low education, precarious health care, food insecurity (InSAN) and poor housing and sanitation conditions are among the main problems and violations to which these communities are subjected<sup>4-8</sup>.

Even with the expansion of studies on health and nutrition of the *quilombola* population, gaps persist on demography, health, and food and nutrition, especially when it comes to the maternal-child audience, a group admittedly more vulnerable to human rights violations<sup>9</sup>. Two population-based surveys stand out in the literature, the Quilombola Nutritional Call (2006), and the Census of titled *quilombola* territories (2011), which provided data on health conditions, access to public policies, food availability, nutritional status and food security<sup>7,10</sup>.

The trend of increasing overweight among children and adults in *quilombola* communities<sup>11,12</sup> and infant feeding practices and the low quality of food available to this population are worrying aspects of a scenario that reflects the process of food and nutritional transition observed in Brazil, and food and nutritional insecurity in these communities<sup>7,12</sup>.

Given this panorama, the study aimed to describe health and life conditions and analyze the factors associated with the quality of food of women and children under 5 years old in *quilombola* communities in Goiás.

## Methods

### Study design and population

Cross-sectional study, being an excerpt from the research Health Promotion and Quality of

Life in Quilombola Communities from Different Brazilian Regions: a Multicenter Study.

The *quilombola* communities included in this study were selected by lottery, from the records of communities certified in Goiás by the Palmares Cultural Foundation (reference year: 2016). Certified, rural and non-titled communities were considered eligible.

All households in the communities were eligible to participate in the matrix survey. In the present study, a cutout was made for those with women and/or children under 5 years of age. After two unsuccessful attempts to find the residents, the household was excluded from the survey. All women aged 19 to 59 years and all children under 60 months were eligible, stratified into two age groups: 0 to 23 months and 24 to 59 months. When there was more than one child in the same age group in the household, only one was drawn to participate. The final sample consisted of 203 women and 73 children.

### Data collection

Data collection took place between July 2017 and July 2018 through home visits, with the application of semi-structured questionnaires and anthropometric measurements, carried out by previously trained undergraduate and graduate students of the health area. Questions about socioeconomic characteristics of the household and family were preferably answered by a female resident over 18 years of age. Questions about children under 5 years of age were answered by the mother or guardian.

### Variables

#### Socioeconomic, infrastructure and food and nutrition security characterization

Variables related to public services and infrastructure (water source; waste disposal); participation in income transfer programs; monthly family income; gender, education and working conditions of the head of the family were evaluated. The socioeconomic classification of households was based on an adaptation of the Brazil 2019 socioeconomic classification criterion<sup>13</sup>.

The food and nutrition security situation of the household was assessed using the Brazilian Food Insecurity Scale, an instrument to measure perception and experience with hunger composed of 14 questions. The final classification is based on the sum of affirmative answers

to the questions. The cutoff points, considering the presence or absence of residents under 18 years of age in the household, are, respectively: Food and nutrition Security (0 points), or Food Insecurity level Mild (1-3; 1-5), Moderate (4-5; 6-9) or Severe (6-8; 10-14) (14).

### **Health, nutritional status and diet quality**

*Children:* Information on vaccination was collected with direct consultation of the Child Handbook, requested by the interviewer from the family; and vitamin A and iron supplementation (children aged 6 to 24 months), based on the mother's report.

To assess nutritional status, weight and height were measured using a digital scale of the brand Seca with a capacity of 200 kg, graduation of 100 g, portable stadiometer of the brand Seca, for measurements up to 205 cm, and a child stadiometer of the brand Seca for children under 2 years. The indicators height for age and Body Mass Index for age were calculated and classified according to the cutoff points recommended by the WHO<sup>15</sup>.

Food consumption data were collected through a 24-hour Food Recall (R24hr) and, for children under 24 months, a form was also applied containing questions related to breastfeeding (BF) and food consumption the previous day, based on the food consumption markers recommended by the Ministry of Health<sup>16</sup>.

BF was evaluated based on the indicators proposed by the WHO<sup>17</sup>: exclusive breastfeeding (EBF) in children under 6 months; continued breastfeeding at 12 months; breastfeeding among children under 24 months.

Diet assessment was performed for children aged 6 to 59 months and included three indicators:

(a) dietary diversity (DD)<sup>18,19</sup>: a diverse diet was considered if, in the previous day, at least 5 of the 6 food groups (cereals/roots/tubers, beans, legumes and vegetables, fruits, meat and eggs, milk and cheeses) were consumed, defined in accordance with the dietary recommendations for the Brazilian population<sup>20</sup> and for Brazilian children under 2 years of age<sup>21</sup>, regardless of the amount ingested. For children aged 6 to 23 months, the same food groups as for children older than 23 months were used. But, in this first age group, consumption in the milk and cheese group was scored if there was ingestion of breast milk, when the child was breastfed, or other milk, for children who were not being breastfed. It is noteworthy that the recommendation is to

maintain breastfeeding until at least two years of age, and in this case, it would not be necessary to offer another type of milk, other than maternal<sup>21</sup>. However, considering that more than half of the children in this age group no longer received breast milk at the time of the research, and that dividing the group of children under 2 years of age into breastfed and non-breastfed children could further reduce the robustness of the analysis, it was decided to construct the indicator as described.

(b) consumption of Ultra-processed Foods (UPF) on the previous day: considered the intake of one or more foods from this group on the previous day, according to the NOVA Classification, as proposed by the Food Guide for the Brazilian Population<sup>20</sup>.

(c) overall diet quality: aggregation of the two previous indicators, it was considered as a low-quality diet when the minimum diet diversity was not reached and the consumption of at least one UPF on the previous day occurred concomitantly. This indicator was inspired by the proposal of Contreras *et al.*<sup>22</sup>, who evaluated exposure to double suboptimal feeding load (at least one practice of inadequate complementary feeding + consumption of an UPF) among children between 6 and 35 months. In the present study, only the failure to achieve the minimum diversity of the diet was considered as an inadequate dietary practice.

In addition, the proportion of each of the food groups by degree of processing was also calculated in relation to the total food recorded in the R24h. Foods were listed and classified in one of the groups: Group 1: fresh and minimally processed foods + culinary ingredients; Group 2: processed foods; Group 3: UPF. Subsequently, the proportion of the 3 groups was calculated, considering the quantity of food in each of the groups, in relation to the total number of foods recorded.

*Women:* The anthropometric measurements used to assess nutritional status were weight, height and waist circumference, collected using the same equipment used to assess children, except for the infant stadiometer. Nutritional status was classified by Body Mass Index (BMI) and waist circumference, following the cutoff points recommended by the World Health Organization. For waist circumference, the cutoff point of 80 cm was used (WHO)<sup>23</sup>.

Diet assessment encompassed the same three indicators used for children: (a) diet diversity; (b) UPF consumption the day before; and

(c) overall diet quality. The proportional participation of food groups by degree of processing in the total food consumed was also calculated.

### Statistical analysis

The frequencies and proportion of sociodemographic, health and nutrition variables were presented. For the number of food groups consumed, the means and standard deviations by age groups were presented.

Fisher's exact test or Pearson's chi-square test were used to evaluate the factors associated with the indicators diet diversity and quality. The independent variables included in the analysis of women were age, education and marital status of the woman; monthly family income; socioeconomic classification, number of residents and sex of the head of household; household food and nutrition security situation; and participation in an income transfer program. For children, the diversity and quality of the maternal diet and the sex of the child were included in addition to the variables already mentioned. Only cases with all complete data were included in this analysis. The analysis with a  $p$ -value  $< 0.05$  was considered statistically significant.

In addition, a logistic regression analysis was carried out with the estimation of the cross-product ratio (Odds ratio) and a 95% confidence interval, having as outcomes the diverse diet and the low quality of the diet of children aged 6 to 59 months and women. The crude analyzes were performed and the variables that had  $p < 0.20$  were included in the multiple regression, which then went through the backward method until only variables with a  $p$ -value of approximately 0.2 remained in the final model. The analyses were conducted in the Statistical Package for the Social Sciences (SPSS) version 21.

The power of the sample in the group of children was calculated considering the results of the multiple regression analyses for the association between the diverse diet of these and their mothers (two-tailed, Odds Ratio of 0.4, proportion of 42.6% of diverse diet, sample of 47, alpha of 0.05,  $R^2$  of 0.5% and binomial distribution) and returned the value of 20%. Similarly, this was done for women using the association between diverse diet and estimate of monthly family income in minimum wages (two-tailed, Odds Ratio of 4.9, proportion of 25.8% diverse diet, sample of 186, alpha of 0.05,  $R^2$  of 25.4% and binomial distribution) which resulted in a test power of 99%. These calculations were con-

ducted on a post hoc basis for logistic regression in G\*Power 3.1.9.7.

### Ethical aspects

The research was initiated after the consent of the representatives of the communities and the signing of the Informed Consent Form by the participants. The research was approved by the Research Ethics Committee of the Federal University of Alagoas under number 4735646415.4.0000.5013.

### Results

We evaluated 203 adult women and 73 children under 60 months of age (8 children  $< 6$  months; 24 children aged 6 to 23 months; 41 children aged 24 to 59 months) living in nine *quilombo-la* communities in Goiás. Among the women, 65 were biological mothers or guardians of the children included in the study.

### Socioeconomic, infrastructure and food and nutrition security characterization

Except for one, the other communities visited are located more than 5 km from the municipality's center, where they accessed most of the public services. Three communities had a public school within the territory, and one had a Primary Health Unit. Regarding household conditions, 47% of women ( $n=95$ ) and 38.3% of children ( $n=28$ ) lived in households whose estimated monthly income was up to 1 minimum wage (R\$937.00 at the time of collection) and about 80% were in socioeconomic strata D and E. Most households were headed by men and 60.6% of women's families and 76.7% of children's families participated in income transfer programs. Regarding the situation of food and nutrition security, 27.2% of women and 26% of children lived in households with moderate or severe insecurity. Among women, 52.2% had less than 8 years of education and more than 80% reported having an informal job or not being working (Table 1).

### Health, nutritional status and diet quality

*Children:* The vaccination record was adequate to the vaccination schedule recommended by the Ministry of Health for 86.3% of the children. Vitamin A supplementation was offered to 55.4% ( $n=36$ ) of the children between 6

and 59 months. Only 17.4% (n=4) of mothers of children between 6 and 23 months reported that they received the ferrous sulfate supplement in

the last 3 months. Of the children investigated, 5.8% (n=4) had stunting, and 20.2% were overweight or obese (Table 2).

**Table 1.** Socioeconomic characterization and access to public services of women and children under 5 years old in households of 9 quilombola communities in Goiás (2018).

| Characteristics                                  | Women |      | Children |      |
|--------------------------------------------------|-------|------|----------|------|
|                                                  | n     | %    | n        | %    |
| <b>Household Conditions</b>                      |       |      |          |      |
| Family income (minimum wage)*                    |       |      |          |      |
| Up to ½                                          | 40    | 19.8 | 13       | 17.8 |
| Between ½ and 1                                  | 55    | 27.2 | 15       | 20.5 |
| Between 1 and 2                                  | 66    | 32.7 | 27       | 37.0 |
| More than 2                                      | 41    | 20.2 | 18       | 24.7 |
| Socioeconomic Strata                             |       |      |          |      |
| Class B                                          | 3     | 1.5  | -        | -    |
| Class C                                          | 43    | 21.5 | 15       | 20.8 |
| Class D-E                                        | 154   | 77.0 | 57       | 79.2 |
| Number of residents in the household             |       |      |          |      |
| Less than 5                                      | 136   | 67.3 | 51       | 69.9 |
| 5 or more                                        | 66    | 32.7 | 22       | 30.1 |
| Family participation in income transfer programs |       |      |          |      |
| Yes                                              | 123   | 60.6 | 56       | 76.7 |
| No                                               | 80    | 39.4 | 17       | 23.2 |
| Food security situation                          |       |      |          |      |
| Secure                                           | 60    | 29.7 | 17       | 23.3 |
| Mild insecurity                                  | 87    | 43.1 | 37       | 50.7 |
| Moderate insecurity                              | 35    | 17.3 | 13       | 17.8 |
| Severe insecurity                                | 20    | 9.9  | 6        | 8.2  |
| Source of drinking water                         |       |      |          |      |
| General distribution or mineral network          | 12    | 5.9  | 6        | 8.2  |
| Others (water truck, spring, well, cistern)      | 191   | 94.1 | 67       | 91.8 |
| Disposal of household waste                      |       |      |          |      |
| Public collection                                | 22    | 10.8 | 7        | 9.6  |
| Others (burning or burial)                       | 181   | 89.2 | 66       | 90.4 |
| Gender of the head of the family                 |       |      |          |      |
| Female                                           | 71    | 35   | 20       | 27.4 |
| Male                                             | 132   | 65   | 53       | 72.6 |
| Education of the head of the family              |       |      |          |      |
| Less than 8 years of study                       | 141   | 69.5 | 39       | 59.1 |
| 8 or more years of study                         | 61    | 30   | 27       | 40.9 |
| <b>Individual Conditions</b>                     |       |      |          |      |
| Woman's education                                |       |      |          |      |
| Less than 8 years of study                       | 107   | 52.2 | 20       | 31.3 |
| 8 or more years of study                         | 94    | 46.8 | 44       | 68.7 |
| Women's working condition                        |       |      |          |      |
| Formal job                                       | 30    | 14.8 | 4        | 6.2  |
| Informal job or no job                           | 168   | 82.8 | 48       | 73.8 |
| Woman's marital status                           |       |      |          |      |
| No partner                                       | 50    | 24.6 | 12       | 18.5 |
| With partner                                     | 153   | 75.4 | 53       | 81.5 |

\* Classification based on the minimum wage value in 2016 (R\$ 937.00).

Source: Authors.

Among the 8 children under 6 months assessed, none were on EBF. Continued BF was prevalent among 77.7% (n=7) of children younger than 12 months and BF in children younger than 24 months was 46.9% (n=15) (Table 2).

The mean DD score for children aged 6 to 23 months (n=23) was 3.83 (SD=1.26) (not shown in table) and 73.9% did not reach the minimum dietary diversity. Among those older than 24 months (n=34), the mean DD score was 4.32 (SD=1.27), and 88.2% of them did not have a diverse diet the previous day. Almost half of the children evaluated (47.4%) had a low-quality

diet (Table 2). On the other hand, only 10.5% of the children reached the minimum diversity and did not consume any UPF the previous day.

Of the 57 children aged 6-59 months with food consumption data, 75.4% consumed at least one UPF, and more than half (52.6%) consumed 2 or more UPF the previous day. The most consumed UPFs were salted and sweet biscuits and powdered artificial juices. In the group of children under 24 months, among the 51 foods recorded from the R24h, 37.3% (n=19) were ultra-processed. For older children, of the 89 foods mentioned, 30.3% (n=27) were ultra-processed.

**Table 2.** Health variables, nutritional status and dietary practices of children from 0 to 59 months and women in 9 *quilombola* communities in Goiás (2018).

| Characteristics                                                          | n   | %    |
|--------------------------------------------------------------------------|-----|------|
| <b>Women</b>                                                             |     |      |
| Nutritional status (n=201)                                               |     |      |
| Low weight                                                               | 5   | 2.5  |
| Eutrophy                                                                 | 73  | 36.3 |
| Overweight                                                               | 67  | 33.3 |
| Obesity                                                                  | 56  | 27.9 |
| Waist circumference (n=193)                                              |     |      |
| >80 cm                                                                   | 46  | 23.8 |
| >88 cm                                                                   | 73  | 37.8 |
| Food consumption (n=192)                                                 |     |      |
| Diverse diet                                                             | 50  | 26.0 |
| Consumption of at least 1 UPF on the previous day                        | 110 | 57.9 |
| Low quality diet                                                         | 74  | 38.7 |
| <b>Children</b>                                                          |     |      |
| Updated vaccination record (n=73)                                        | 63  | 86.3 |
| Vitamin A supplementation in the last six months – 6 to 59 months (n=65) |     |      |
| Yes                                                                      | 25  | 38.5 |
| Yes, but I don't know if it was in the last 6 months                     | 11  | 16.9 |
| Iron supplementation in the last three months – 6 to 23 months (n=23)    | 4   | 17.4 |
| Nutritional status (n=69)                                                |     |      |
| Height for age < -2 SD                                                   | 4   | 5.8  |
| BMI (Kg/m <sup>2</sup> ) by age ≥ +1 SD                                  | 14  | 20.2 |
| Feeding practices – 0 to 23 months                                       |     |      |
| Exclusive breastfeeding for <6 months (n=8)                              | 0   | 0.0  |
| Continued breastfeeding at 12 months (n=9)                               | 7   | 77.8 |
| Breastfeeding for children under 24 months (n=32)                        | 15  | 46.9 |
| Food Consumption – children aged 6 to 59 months (n=57)                   |     |      |
| Diverse Diet                                                             | 21  | 36.8 |
| Consumption of at least 1 UPF on the previous day                        | 43  | 75.4 |
| Consumption of 2 or more UPF on the previous day                         | 30  | 52.6 |
| Low Quality Diet                                                         | 27  | 47.4 |

SD: Standard deviation; BMI: Body Mass Index; UPA: ultra-processed food. In the BMI by age indicator, the percentage refers to children with +1 and +2 SD – overweight + obesity.

Source: Authors.

The analysis of factors related to diversity and diet quality was performed for 47 children between 6 and 59 months with complete data for the independent variables evaluated. The higher DD was associated with the lower number of residents in the household ( $p=0.039$ ), the socioeconomic classification B/C ( $p=0.026$ ) and the diverse maternal diet ( $p<0.001$ ). For children, the only variable that showed a significant association with poor diet quality was lower maternal DD ( $p=0.046$ ) (Table 3).

Crude and multiple analyses for children are presented in Table 4. In the multiple model, there was a greater chance of a diverse diet in children whose mothers also had a diverse diet. A lower chance of poor diet quality was also observed when the mothers had a diverse diet (the only variable that remained in the multiple model with  $p<0.20$ ) (Table 4).

**Women:** The mean age of the women was 39 years ( $SD=11.71$ ). Regarding nutritional status, the BMI assessment showed that 61.2% ( $n=123$ ) were overweight or obese, and 2.5% ( $n=5$ ) were underweight; 61.6% ( $n=119$ ) had high waist circumference, indicating an increased risk of cardiovascular disease.

In the evaluation of food consumption ( $n=191$ ), the DD score was 3.81 ( $SD=1.02$ ), and 26% of them had a diverse diet. For the subgroup of women mothers of children under 5 years of age ( $n=63$ ), the mean DD score was 3.75 ( $SD=1.07$ ), and 30% had a diet considered diverse (Table 2).

The prevalence of consumption of at least one UPF the previous day was 57.9% among all women, with the most consumed being salty and sweet biscuits and powdered artificial juices. Of the 137 types of food consumed by women the previous day, 34 (24.8%) were ultra-processed.

The analysis of factors related to dietary diversity and quality included 186 women with complete data for the independent variables evaluated. An adequate DD was related to higher income ( $p<0.001$ ), non-participation in an income transfer program ( $p=0.038$ ) and higher education ( $p<0.001$ ). Regarding the low quality of the diet, only one significant relationship was found, with lower income ( $p<0.001$ ).

In the multiple model for diverse diet in women, there was a lower chance of this outcome in those who lived in households with 5 or more residents and a higher chance of diverse diet in those with estimated family income with more than 1 monthly minimum wage and in those with 8 years of study or more. In the model of low diet quality in women, it was found

that there was a lower chance of this outcome if they lived in households with 5 or more residents and a higher chance for those with an estimated monthly family income of more than 1 minimum wage (Table 5).

## Discussion

The women and children of the *quilombola* communities evaluated in the study experience a situation of economic vulnerability and social exclusion, have a low-quality diet and a high prevalence of overweight, reinforcing existing findings for the *quilombola* population of Goiás and other regions of the country and pointing to an invisibility of these groups by public agents<sup>4,5,10,11</sup>. Women and young children are more susceptible to the negative consequences of socioeconomic and health inequalities, which is aggravated when it comes to the black population<sup>24</sup>, especially Afro-rural communities<sup>9</sup>. The location of communities in the rural region can be a hindrance to access to public services, such as schools and health facilities. This implies rethinking the organization of these services, considering not only the distance from urban centers, but the characteristics of communities, the human and technological resources necessary to ensure equitable care in health and other areas<sup>9,25</sup>.

The inequities found in this study are also experienced in titled communities<sup>7</sup>. The process of land titling does not, by itself, guarantee the improvement of living conditions in communities when there is, in fact, no political agenda committed to the fulfillment of the rights of this population. Data from the research carried out in those communities showed that half of the families were in severe food and nutrition insecurity<sup>6</sup>, a worse situation in relation to the communities evaluated in this study, where less than 10% of the households were in such a situation. Even so, more than 60% of the households of the *quilombola* communities of Goiás visited had some degree of food and nutrition insecurity.

Silva *et al.*<sup>8</sup> evaluated rural *quilombola* and non-*Quilombola* communities in Northeast Brazil and identified that, although the prevalence of insecurity was high in all communities studied, it was higher and more severe among *quilombolas*. In a population-based study with households with Brazilian children under 5 years of age, levels of food and nutrition insecurity observed in the Central-West region were almost 3 times lower than in our study, reinforcing

**Table 3.** Association of sociodemographic factors, maternal and child, with the diversity and quality of the diet of children aged 6 to 59 months and women in 9 *quilombola* communities in Goiás (2018).

| Variables                                                   | Diverse Diet  |      |         |                 |      |         | Low quality diet |      |         |                 |      |         |
|-------------------------------------------------------------|---------------|------|---------|-----------------|------|---------|------------------|------|---------|-----------------|------|---------|
|                                                             | Women (n=186) |      |         | Children (n=47) |      |         | Women (n=186)    |      |         | Children (n=47) |      |         |
|                                                             | n             | %    | P-value | n               | %    | P-value | n                | %    | P-value | n               | %    | P-value |
| Number of residents in the household                        |               |      |         |                 |      |         |                  |      |         |                 |      |         |
| Less than 5                                                 | 36            | 29.3 | 0.158   | 14              | 58.3 | 0.039*  | 43               | 35   | 0.155   | 8               | 33.3 | 0.380   |
| 5 or more                                                   | 12            | 19   |         | 6               | 26.1 |         | 29               | 46   |         | 11              | 47.8 |         |
| Estimated monthly family income (minimum wage) <sup>1</sup> |               |      |         |                 |      |         |                  |      |         |                 |      |         |
| Up to 1                                                     | 11            | 12.5 | <0.001* | 8               | 34.8 | 0.380   | 45               | 51.1 | 0.001*  | 11              | 47.8 | 0.380   |
| More than 1                                                 | 37            | 37.5 |         | 12              | 50.0 |         | 27               | 27.6 |         | 8               | 33.3 |         |
| Beneficiary of income transfer programs                     |               |      |         |                 |      |         |                  |      |         |                 |      |         |
| Yes                                                         | 23            | 20.2 | 0.038*  | 17              | 43.6 | 1.000   | 44               | 38.6 | 1.000   | 15              | 38.5 | 0.697   |
| No                                                          | 25            | 34.7 |         | 3               | 37.5 |         | 28               | 38.9 |         | 4               | 50   |         |
| Gender of the head of the family                            |               |      |         |                 |      |         |                  |      |         |                 |      |         |
| Male                                                        | 93            | 24.6 | 0.725   | 13              | 38.2 | 0.511   | 45               | 36.9 | 0.528   | 14              | 41.2 | 1.000   |
| Female                                                      | 49            | 28.1 |         | 7               | 53.8 |         | 27               | 42.2 |         | 5               | 38.5 |         |
| Socioeconomic Strata                                        |               |      |         |                 |      |         |                  |      |         |                 |      |         |
| Class B/C                                                   | 2             | 66.7 | 0.164   | 7               | 77.8 | 0.026*  | 0                | -    | 0.284   | 2               | 22.2 | 0.278   |
| Class D/E                                                   | 46            | 25.1 |         | 13              | 34.2 |         | 72               | 39.3 |         | 17              | 44.7 |         |
| Household food security                                     |               |      |         |                 |      |         |                  |      |         |                 |      |         |
| Security                                                    | 18            | 34   | 0.137   | 5               | 65.5 | 0.258   | 20               | 37.7 | 0.870   | 3               | 37.5 | 1.000   |
| Insecurity                                                  | 30            | 22.6 |         | 15              | 38.5 |         | 52               | 39.1 |         | 16              | 41   |         |
| Woman's education                                           |               |      |         |                 |      |         |                  |      |         |                 |      |         |
| Less than 8 years of study                                  | 15            | 15.0 | <0.001* | 4               | 28.6 | 0.334   | 42               | 42.0 | 0.366   | 4               | 28.6 | 0.343   |
| 8 or more years of study                                    | 33            | 38.4 |         | 16              | 48.5 |         | 30               | 34.9 |         | 15              | 45.5 |         |
| Woman's marital status                                      |               |      |         |                 |      |         |                  |      |         |                 |      |         |
| No partner                                                  | 13            | 29.5 | 0.556   | 3               | 42.9 | 1.000   | 18               | 40.9 | 0.860   | 4               | 57.1 | 0.417   |
| With partner                                                | 35            | 24.6 |         | 17              | 42.5 |         | 54               | 38   |         | 15              | 37.1 |         |
| Woman's age                                                 |               |      |         |                 |      |         |                  |      |         |                 |      |         |
| Up to 30 years                                              | 12            | 25.5 | 1.000   | 10              | 33.3 | 0.127   | 20               | 42.6 | 0.604   | 15              | 50   | 0.122   |
| More than 30 years                                          | 36            | 25.9 |         | 10              | 58.8 |         | 52               | 37.4 |         | 4               | 23.5 |         |
| Diversity of maternal diet                                  |               |      |         |                 |      |         |                  |      |         |                 |      |         |
| Non-diverse diet                                            | -             | -    |         | 9               | 26.5 | <0.001* | -                | -    |         | 17              | 50   | 0.046*  |
| Diverse diet                                                | -             | -    |         | 11              | 84.6 |         | -                | -    |         | 2               | 15.4 |         |
| Child's gender                                              |               |      |         |                 |      |         |                  |      |         |                 |      |         |
| Male                                                        | -             | -    |         | 11              | 45.8 | 0.770   | -                | -    |         | 9               | 37.5 | 0.770   |
| Female                                                      | -             | -    |         | 9               | 39.1 |         | -                | -    |         | 10              | 43.5 |         |

<sup>1</sup>Classification based on the minimum wage in 2016 (R\$ 937.00). P-value obtained by Fisher's exact test or Pearson's chi-square test.

Source: Authors.

ing the higher frequency of inequalities in *quilombola* communities<sup>26</sup>, which may have worsened during the COVID-19 pandemic<sup>27</sup>.

In the context of infant feeding practices, the maintenance of EBF for 6 months seems to be one of the greatest challenges, with early supply

of teas, other milks and foods, practices permeated by cultural issues and traditional knowledge<sup>28,29</sup>. In the context of food and nutrition insecurity in which *quilombola* communities live, BF, which has great importance for child nutrition and health, with lifelong repercussions<sup>30</sup>,

**Table 4.** Association of sociodemographic, maternal and child factors with the diversity and quality of the diet of children aged 6 to 59 in 9 *quilombola* communities in Goiás (2018).

| Variables                                                   | Diverse diet     |          |         |                     |          |         | Low quality diet |          |         |                     |         |         |
|-------------------------------------------------------------|------------------|----------|---------|---------------------|----------|---------|------------------|----------|---------|---------------------|---------|---------|
|                                                             | Crude regression |          |         | Multiple regression |          |         | Crude regression |          |         | Multiple regression |         |         |
|                                                             | OR               | 95%CI    | P-value | OR                  | 95%CI    | P-value | OR               | 95%CI    | P-value | OR                  | 95%CI   | P-value |
| Number of residents in the household                        |                  |          |         |                     |          |         |                  |          |         |                     |         |         |
| Less than 5                                                 | 1.0              |          |         | 1.0                 |          |         | 1.0              |          |         |                     |         |         |
| 5 or more                                                   | 0.2              | 0.1-0.9  | 0.029   | 0.4                 | 0.1-1.6  | 0.191   | 0.5              | 0.2-1.8  | 0.314   |                     |         |         |
| Estimated monthly family income (minimum wage) <sup>1</sup> |                  |          |         |                     |          |         |                  |          |         |                     |         |         |
| Up to 1                                                     | 1.0              |          |         |                     |          |         | 1.0              |          |         |                     |         |         |
| More than 1                                                 | 1.9              | 0.6-6.1  | 0.294   |                     |          |         | 1.8              | 0.6-6.0  | 0.314   |                     |         |         |
| Beneficiary of income transfer programs                     |                  |          |         |                     |          |         |                  |          |         |                     |         |         |
| Yes                                                         | 1.0              |          |         |                     |          |         | 1.0              |          |         |                     |         |         |
| No                                                          | 0.8              | 0.2-3.7  | 0.751   |                     |          |         | 0.6              | 0.1-2.9  | 0.547   |                     |         |         |
| Gender of the head of the family                            |                  |          |         |                     |          |         |                  |          |         |                     |         |         |
| Male                                                        | 1.0              |          |         |                     |          |         | 1.0              |          |         |                     |         |         |
| Female                                                      | 1.9              | 0.5-6.8  | 0.336   |                     |          |         | 1.1              | 0.3-4.1  | 0.865   |                     |         |         |
| Socioeconomic Strata                                        |                  |          |         |                     |          |         |                  |          |         |                     |         |         |
| Class B/C                                                   | 1.0              |          |         |                     |          |         | 1.0              |          |         |                     |         |         |
| Class D/E                                                   | 0.1              | 0.0-0.8  | 0.029   |                     |          |         | 0.3              | 0.1-1.9  | 0.229   |                     |         |         |
| Household food security                                     |                  |          |         |                     |          |         |                  |          |         |                     |         |         |
| Security                                                    | 1.0              |          |         |                     |          |         | 1.0              |          |         |                     |         |         |
| Insecurity                                                  | 0.4              | 0.1-1.8  | 0.221   |                     |          |         | 0.9              | 0.2-4.1  | 0.853   |                     |         |         |
| Woman's education                                           |                  |          |         |                     |          |         |                  |          |         |                     |         |         |
| Less than 8 years of study                                  | 1.0              |          |         |                     |          |         | 1.0              |          |         |                     |         |         |
| 8 or more years of study                                    | 2.3              | 0.6-9.0  | 0.213   |                     |          |         | 0.5              | 0.1-1.8  | 0.285   |                     |         |         |
| Woman's marital status                                      |                  |          |         |                     |          |         |                  |          |         |                     |         |         |
| No partner                                                  | 1.0              |          |         |                     |          |         | 1.0              |          |         |                     |         |         |
| With partner                                                | 1.0              | 0.2-5.0  | 0.986   |                     |          |         | 2.2              | 0.4-11.3 | 0.336   |                     |         |         |
| Woman's age                                                 |                  |          |         |                     |          |         |                  |          |         |                     |         |         |
| Up to 30 years                                              | 1.0              |          |         |                     |          |         | 1.0              |          |         |                     |         |         |
| More than 30 years                                          | 2.8              | 0.8-9.8  | 0.094   |                     |          |         | 3.2              | 0.9-12.3 | 0.082   |                     |         |         |
| Diversity of maternal diet                                  |                  |          |         |                     |          |         |                  |          |         |                     |         |         |
| Non-diverse diet                                            | 1.0              |          |         | 1.0                 |          |         | 1.0              |          |         | 1.0                 |         |         |
| Diverse diet                                                | 15.3             | 2.8-82.6 | 0.002   | 12.1                | 2.1-68.1 | 0.005   | 0.2              | 0.0-0.9  | 0.043   | 0.2                 | 0.0-0.9 | 0,043   |
| Child's gender                                              |                  |          |         |                     |          |         |                  |          |         |                     |         |         |
| Male                                                        | 1.0              |          |         |                     |          |         | 1.0              |          |         |                     |         |         |
| Female                                                      | 0.8              | 0.2-2.4  | 0.642   |                     |          |         | 0.8              | 0.2-2.5  | 0.677   |                     |         |         |

<sup>1</sup> Classification based on the minimum wage value in 2016 (R\$ 937.00). Crude and multiple regression analysis with estimated Odds Ratio (OR) and 95% confidence interval (95%CI).

Source: Authors.

can have an even greater relevance, being a safe and low-cost strategy for infant feeding<sup>31,32</sup>. Therefore, it is essential that actions to promote, protect and support BF, consider the social and cultural specificities of these families.

The analysis of the food consumption of *quilombola* women and children showed a monotonous eating pattern, with restricted food diversity and variety and high consumption of UPF, data that follow the trend observed for the Bra-

**Table 5.** Association of sociodemographic, maternal and child factors with the diversity and quality of the diet of women in 9 *quilombola* communities in Goiás (2018).

| Variables                                                   | Diverse diet     |         |         |                     |          |         | Low quality diet |         |         |                     |         |         |
|-------------------------------------------------------------|------------------|---------|---------|---------------------|----------|---------|------------------|---------|---------|---------------------|---------|---------|
|                                                             | Crude regression |         |         | Multiple regression |          |         | Crude regression |         |         | Multiple regression |         |         |
|                                                             | OR               | 95%CI   | P-value | OR                  | 95%CI    | P-value | OR               | 95%CI   | P-value | OR                  | 95%CI   | P-value |
| Number of residents in the household                        |                  |         |         |                     |          |         |                  |         |         |                     |         |         |
| Less than 5                                                 | 1.0              |         |         | 1.0                 |          |         | 1.0              |         |         | 1.0                 |         |         |
| 5 or more                                                   | 0.6              | 0.3-1.2 | 0.134   | 0.4                 | 0.2-0.9  | 0.034   | 0.6              | 0.3-1.2 | 0.144   | 0.4                 | 0.2-0.9 | 0.020   |
| Estimated monthly family income (minimum wage) <sup>1</sup> |                  |         |         |                     |          |         |                  |         |         |                     |         |         |
| Up to 1                                                     | 1.0              |         |         | 1.0                 |          |         | 1.0              |         |         | 1.0                 |         |         |
| More than 1                                                 | 4.2              | 2.0-9.0 | 0.000   | 4.9                 | 2.1-11.1 | 0.000   | 2.7              | 1.5-5.1 | 0.001   | 3.4                 | 1.8-6.5 | 0.000   |
| Beneficiary of income transfer programs                     |                  |         |         |                     |          |         |                  |         |         |                     |         |         |
| Yes                                                         | 1.0              |         |         | 1.0                 |          |         | 1.0              |         |         |                     |         |         |
| No                                                          | 2.1              | 1.1-4.1 | 0.029   | 1.6                 | 0.8-3.4  | 0.205   | 1.0              | 0.5-1.8 | 0.968   |                     |         |         |
| Gender of the head of the family                            |                  |         |         |                     |          |         |                  |         |         |                     |         |         |
| Male                                                        | 1.0              |         |         |                     |          |         | 1.0              |         |         |                     |         |         |
| Female                                                      | 1.2              | 0.6-2.4 | 0.601   |                     |          |         | 0.8              | 0.4-1.5 | 0.481   |                     |         |         |
| Socioeconomic Strata                                        |                  |         |         |                     |          |         |                  |         |         |                     |         |         |
| Class B/C                                                   | 1.0              |         |         |                     |          |         | 1.0              |         |         |                     |         |         |
| Class D/E                                                   | 0.2              | 0.0-1.9 | 0.149   |                     |          |         | 0.0              | 0.0-.   | 0.999   |                     |         |         |
| Household food security                                     |                  |         |         |                     |          |         |                  |         |         |                     |         |         |
| Security                                                    | 1.0              |         |         |                     |          |         | 1.0              |         |         |                     |         |         |
| Insecurity                                                  | 0.6              | 0.3-1.1 | 0.111   |                     |          |         | 0.9              | 0.5-1.8 | 0.863   |                     |         |         |
| Woman's education                                           |                  |         |         |                     |          |         |                  |         |         |                     |         |         |
| Less than 8 years of study                                  | 1.0              |         |         | 1.0                 |          |         | 1.0              |         |         |                     |         |         |
| 8 or more years of study                                    | 3.5              | 1.7-7.1 | 0.000   | 3.3                 | 1.6-7.1  | 0.002   | 1.3              | 0.7-2.4 | 0.321   |                     |         |         |
| Woman's marital status                                      |                  |         |         |                     |          |         |                  |         |         |                     |         |         |
| No partner                                                  | 1.0              |         |         |                     |          |         | 1.0              |         |         |                     |         |         |
| With partner                                                | 0.8              | 0.4-1.6 | 0.517   |                     |          |         | 1.1              | 0.6-2.2 | 0.732   |                     |         |         |
| Woman's age                                                 |                  |         |         |                     |          |         |                  |         |         |                     |         |         |
| Up to 30 years                                              | 1.0              |         |         |                     |          |         | 1.0              |         |         |                     |         |         |
| More than 30 years                                          | 1.0              | 0.5-2.1 | 0.960   |                     |          |         | 1.2              | 0.6-2.4 | 0.532   |                     |         |         |

<sup>1</sup> Classification based on the minimum wage value in 2016 (R\$ 937.00). Crude and multiple regression analysis with estimated Odds Ratio (OR) and 95% confidence interval (95%CI).

Source: Authors.

zilian and world population<sup>33</sup>. In a study with Brazilian children between 6 and 36 months, only 20% had a diverse diet<sup>34</sup>, and another population-based study showed that at least 50% of Brazilian and Central-West children had a diverse diet, being more prevalent in children aged between 6 and 23 months<sup>35</sup>. Factors that denote inequities, such as living at home with food and nutrition insecurity, low maternal education, domicile in the rural area and lack

of contact between the mother and the health service aggravate the situation and point to an association with an even lower DD<sup>22,35-40</sup>.

DD is associated with linear growth in children and with the adequacy of macro and micronutrients in children and adults, being a good proxy for diet quality and being related to positive health outcomes<sup>19,40,41</sup>. Our study pointed out that the possibility of the child having a diverse diet and a better quality diet is greater

when the mother also has a diverse diet. However, due to the characteristic of the study, it is not possible to state whether this is an influence of maternal or caregiver eating behavior on the child or a result of the greater access of the family to varied foods.

If among children a direct influence of socioeconomic factors on dietary diversity could not be observed, among *quilombola* women, education and income had a substantial impact on this indicator. However, conversely, higher income was a risk factor for poor diet quality in the multiple analyses. This result may suggest, as already found in other studies, that in some groups with higher income there is a higher consumption of UPF, an element that makes up the analysis of diet quality in the present study and may be causing this effect. However, it is necessary to deepen the understanding of the role of income and UPF consumption in different social groups. However, it should be noted that there is already an important set of evidence on social inequalities in food and nutrition, showing that population groups with lower socioeconomic status, including low income and education, of black color/race and living in rural areas, have more difficulty in achieving an adequate and healthy diet<sup>42-44</sup>.

More than 75% of the children and about 30% of the women in the study had consumed at least one UPF the previous day. Similar results were found in a study that evaluated the food consumption of children between 12 and 60 months in *quilombola* communities in Alagoas, Brazil<sup>42</sup> and also in a national survey with Brazilian children under 5 years of age<sup>35</sup>, but in this last study, children older than 2 years of age ingested more UPF than younger children. In a research on UPF consumption and metabolic syndrome in *quilombola* women from Alagoas, this dietary practice was frequent and the high consumption of these foods was associated with a higher prevalence of hypertension, while a lower UPF consumption score was protective against diabetes and low HDL<sup>45</sup>.

The situation of food availability in titled *quilombola* territories, in which cookies, biscuits, soft drinks and artificial juices were more common in households than vegetables<sup>7</sup>, dialogues with the results found. There is already robust evidence that high consumption of UPF is associated with negative health outcomes, especially the development of obesity and chronic non-communicable diseases in children and adults<sup>46</sup>.

High prevalences of overweight were found in children and women, and in children, the prevalence was higher than in national surveys<sup>47,48</sup>. Despite this scenario, it is known that the *quilombola* population is still more susceptible to malnutrition and nutritional deficiencies<sup>9,49,50</sup>. Understanding and acting on malnutrition in its different forms, which are interrelated and often coexist, involves considering that its roots include, in addition to biological and nutritional elements, a socioeconomic and political component, deeply related to the quality of food to which the population has access<sup>51</sup>.

In addition to broader actions, such as income transfer programs and food and nutritional security policies, more specific initiatives have been implemented for the *quilombola* population, such as the Brazil Quilombola Program<sup>52</sup>. However, the program functioned more as a device for the symbolic inclusion of *quilombola* communities in the Brazilian public agenda, than as a realizer of effective actions for change in reality<sup>53</sup>.

The sample size, the heterogeneity in the number of families per community and the scarcity of more complete official demographic records made more robust and stratified analyses per community difficult, being important limitations of the study. It is estimated that the total number of households included in the survey in Goiás (without considering the number of households with women and children) represented 60 to 70% of the total number of households in these communities at the time of the study, according to information provided by *quilombola* leaders. Even with some results similar to those found for women, most of the analyzes for the group of children did not present statistical significance, which was possibly due to the low sample size for this age group.

Despite the limitations, the study innovates in making an evaluation of multiple aspects in *quilombola* communities in Goiás, covering different regions of the state, and focusing on food practices. Although the results cannot be extrapolated to other populations, the scenario found possibly resembles that of other rural *quilombola* communities in the state and in other regions of the country, contributing to the understanding of the living conditions of this population. The panorama outlined by this study highlights the urgency of effective and culturally adapted actions to improve access to adequate food and health for this population.

### **Collaborations**

PO Silva: study conception, methodology (methodological development or design), writing (preparation of the original draft and review), and primary responsibility for the final content. RM Schincaglia: statistical analysis and critical review of the manuscript. LMP Santos: supervision, project coordination, and critical review of the manuscript. MB Gubert: study conception, methodology (methodological development or design), project coordination, and critical review of the manuscript.

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