

(1)

assista ao vivo

/tvabrasco @AbrascoDivulga @abra.sco

Ciência & Saúde Coletiva

25 ANOS

Lançamento da edição especial de 25 anos

(<https://www.youtube.com/watch?v=0wH4TimPU-8>)

0130/2020 - Psychometric properties of a modified version of Brazilian household food insecurity measurement scale – Pró-saúde study

Propriedades psicométricas de uma versão modificada da escala Brasileira de insegurança alimentar - Estudo de pró-saúde

Autor:

• Emanuele Souza Marques - MARQUES, E.S. - MG - <emanuelesm@gmail.com (mailto:emanuelesm@gmail.com)>
ORCID: <https://orcid.org/0000-0002-8633-7290> (<https://orcid.org/0000-0002-8633-7290>)

Coautor(es):

• Aline Gaudard e Silva de Oliveira - Oliveira, A.G.S - <alinegaudard@yahoo.com.br (mailto:alinegaudard@yahoo.com.br)>
ORCID: <https://orcid.org/0000-0003-3090-4804> (<https://orcid.org/0000-0003-3090-4804>)

• Eduardo Faerstein - Faerstein, E. - <efaerstein@gmail.com (mailto:efaerstein@gmail.com)>
ORCID: <https://orcid.org/0000-0002-4027-4896> (<https://orcid.org/0000-0002-4027-4896>)

Resumo:

Trata-se dos resultados das etapas iniciais da avaliação psicométrica de uma versão modificada da Escala Brasileira de Insegurança Alimentar com o objetivo de avaliar a insegurança alimentar aos 12 anos. Os dados foram obtidos, por meio de questionários auto-aplicados, de servidores de uma Universidade pública do Rio de Janeiro, que participaram da primeira e quarta ondas do Estudo Pró-Saúde. Avaliou-se a confiabilidade teste-reteste (n=58), consistência interna, validade estrutural, convergente e discriminante (n=3.253). Os coeficientes kappa estavam acima de 0,65; ρ de Cronbach foi de 0,84. As cargas fatoriais ficaram acima de 0,800. A confiabilidade composta foi superior a 0,90. Os valores encontrados da raiz quadrada da variância média extraída foram positivos e estatisticamente significativos. A insegurança alimentar domiciliar durante a adolescência esteve fortemente associada (p

Palavras-chave:

Segurança Alimentar e Nutricional; Validade; Confiabilidade; Questionário.

Abstract:

Facebook
(<https://www.facebook.com/sharer/sharer.php?u=http://www.cienciaesaudecoletiva.com.br/artigos/psychometric-properties-of-a-modified-version-of-brazilian-household-food-insecurity-measurement-scale-prosaude-study/17612>)

text=Psychometric%20properties%20of%20a%20modified%20version%20of%20the%20Brazilian%20household%20food%20insecurity%20measurement%20scale%20-%20prosaude%20study%20-%2017612&body=+http%3A%2F%2Fwww.cienciaesaudecoletiva.com.br/artigos/psychometric-properties-of-a-modified-version-of-brazilian-household-food-insecurity-measurement-scale-prosaude-study%20-%2017612

of-a-modified-version-of-brazilian-household-food-insecurity-measurement-scale-prosaude-study/17612

We present results of initial steps of the psychometric evaluation of a proposed modified version of the Brazilian Household Food Insecurity Measurement Scale aimed at assessing adults' recall of food insecurity at age 12. Data were obtained through self-administered questionnaires civil servants at university campuses in Rio de Janeiro, who participated in the first and fourth waves of the longitudinal Pró-Saúde Study. We evaluated test-retest reliability ($n=58$), internal consistency, factor structure, convergent, discriminant validity ($n=3,253$). Test-retest reliability kappa coefficients were above 0.65; Cronbach's α coefficient was 0.84. Factor loadings were above 0.800. The composite reliability was above 0.90. The square root values of the Average Variance Extracted were positive and statistically significant. Household food insecurity during childhood was strongly associated (p

Keywords:

Food and Nutrition Security; Validity; Reliability; Questionnaires.

Conteúdo:

INTRODUCTION

Household Food Insecurity (HFI) has been a recurring theme in national and international scientific literature due to its high magnitude and relevance. In 2010, the publication *The State of Food Insecurity in the World* showed for the first time a decline in the number of undernourished individuals in the world ¹. However, this number has grown again in 2016 ², highlighting the importance of this problem in the current world scenario.

With the establishment of the Millennium Development Goals, renewed in 2015 through the 2030 Agenda for Sustainable Development, whose stated objective 2 is to end hunger, achieve food security and improve nutrition, and promote sustainable agriculture ³, the measurement of household food insecurity (HFI) has become the focus of a large number of epidemiological and governmental studies.

The evaluation of HFI was for many years carried out by indirect methods ⁴. Since the 1990s, new methods for HFI identification, monitoring and evaluation have been developed. The first instrument to address HFI in a broader context was developed in the United States by the Community Childhood Hunger Identification Project (CCHIP) ⁵. The development of most scales focusing on families' perception or experience of food insecurity ⁶ took place during the 2000s, featuring the Household Food Security Survey Module (HFSSM) ⁷. It is noteworthy that the development of instruments for measuring HFI and its subsequent cross-cultural adaptations occurred in parallel with the development of short versions for use in large study populations ⁷⁻¹⁰.

Marques et al ⁶ identified 24 epidemiological instruments aimed at the evaluation and monitoring of HFI. Most instruments used in epidemiological studies are the HFSSM, HFSSM Six-Item Short Form, and the Modified Radimer/Cornell Scale. The HFSSM is the scale with more linguistic variants (translation and cross-cultural adaptation), psychometric and utilization studies ⁶.

The cross-cultural adaptation and validation of HFSSM for Brazil were conducted by six research institutions – Universidade Estadual de Campinas, Universidade de Brasília, Universidade Federal do Mato Grosso, Universidade Federal da Paraíba, Instituto Nacional de Pesquisa Amazônica, and University of Connecticut – resulting in The Brazilian Household Food Insecurity Measurement Scale (Escala Brasileira de Insegurança Alimentar - EBIA) ¹¹. The unidimensional instrument is composed of 14 items about household availability of food due to limited resources ¹². Six of the 14 items are limited to households with at least one member aged less than 18 years. These items questioned whether children or adolescents (i) did not eat a healthy and varied diet, (ii) did not eat enough, (iii) cut meal size, (iv) skipped meal, (v) did not eat all day, and (vi) felt hungry ¹². The EBIA is being widely used in epidemiology researches ¹³⁻¹⁸ and nationally representative surveys ¹⁹⁻²³. The recall period of the EBIA is the last three months prior to the interview.

Marques et al. ⁶ observed that the recall period of the food insecurity scales were 30 days, 3 or 12 months prior to the interview. We could not identify in the literature a scale specifically aimed at assessing HFI in childhood among adults. It is of major interest the development and evaluation of psychometric properties of such an instrument, considering the psychological, physical and social repercussions ²⁴⁻²⁷ of HFI that may occur in the short, medium or long terms. Some studies have shown the late consequences of childhood HFI, such as asthma ²⁸, depression and suicide ideation ²⁹. However, studies assessing medium and long term impacts are scarce ^{30, 31}. Given this situation, the elaboration and validation of an instrument to evaluate the HFI in childhood among adults could allow studies with this approach, helping to fill this gap in the area.

The present paper assesses some psychometric properties (test-retest reliability, internal consistency, factor structure, and construct validity) of a modified scale derived from the Brazilian Household Food Insecurity Measurement Scale, aimed at identifying household food insecurity during childhood.

METHODS

Study design and participants

This study is part of the longitudinal Pró-Saúde Study, whose overall objective is to investigate the role of socioeconomic and sociocultural determinants of health patterns among civil servants at university campuses in the state of Rio de Janeiro, Brazil.

The current analyses include data obtained in the first (1999) and fourth (2012) waves of Pró-Saúde Study, with 4,030 and 3,253 participants, respectively. In both waves, questionnaires were self-administered at the workplace, with the support of trained and certified research assistants and supervisors.

In the 4th wave, some scales of the questionnaire were reapplied within a two-week interval to 58 volunteers who were temporary university employees performing activities similar to permanent civil servants (cohort participants). The conditions under which the questionnaire was administered were identical to those of the main study, i.e. during working hours, in university classrooms, and with help available from trained personnel, with the explanation given that the purpose was to test the adequacy of the questionnaire, rather than the participants' responses. In relation to sample size, Donner et al. (1992) ³² suggest that test-retest evaluations should include from 25 to 50 individuals; other some authors accept twenty as the minimum sample size for kappa estimation ^{33, 34}.

Instrument

The instrument evaluated in the present study is a modified version derived from the Brazilian Household Food Insecurity Measurement Scale, called "Household food insecurity measurement scale in childhood". This modified version was based on items from the original instrument (EBIA). Four of the six items addressed to individuals under 18 years were kept in this version, except the question about feeling hungry. One item addressed to families without individuals under 18 years was kept ("ate less than you felt you should"). This modified version is introduced by the statement "In some families, there are times when there is lack of money at home to buy food." Five questions follow: When you were 12 years old, how often were there occasions when you, for missing money at home to buy food ... (a) ... did you not have a healthy and varied diet? (b) ... did you eat only a few types of food? (c) ... did you eat less than you felt you should? (d) ... did you skip meal? ... and (e) ... did you not eat all day or have only one meal a day?". All questions had four response options (frequently, sometimes, rarely, never). This unidimensional scale was assessed in 4th wave. Individuals who responded "frequently", "sometimes" or "rarely" to at least one of the items were considered to have experienced household food insecurity at age 12.

According to Piaget, at 12 years old, the individual can already reason about the context in which she or he is inserted, using formal logical principles ³⁵. At this age, adolescents acquire the ability to criticize and discuss social values in order to build their own values and autonomy ³⁵. In view of this, the 12-year-old person already presents better understanding about the world around, especially about the socioeconomic and cultural context, thus being able to report more reliably about the experience or not of HFI.

Other variables

In the first wave of the Pró-Saúde study, a multiquestionnaire was applied, which included the following sociodemographic questions: (i) how many children the mother had (1 to 4, 5 or more); (ii) who was the head of household (father, mother/other); (iii) place of residence (Capital/Big City, Small Town/Rural area); (iv) family economic situation (rich/middle class, poor/very poor); (v) family past standard of living (better than now/same as now, worse than now); and (vi) insufficient food due to lack of money in childhood (frequently/sometimes, rarely/never). With the exception of the number of children, all other variables were related to the same period of life (age 12) to which the HFI scale refers.

Assessment of the psychometric properties and other analyses

The psychometric properties evaluated were test-retest reliability, internal consistency, factor structure, and construct validity. To estimate test-retest reliability the scale was used quadratic weighted kappa. According to Streiner & Norman (2008)³⁶, the most appropriate estimator for assessing intra- or interobserver agreement (test-retest reliability) on Likert scales, as assessed in this study, is weighted kappa. The weighted Kappa calculation considers the observed agreement ratio (po), the expected agreement ratio by chance (pe) and the sample size (N), w_{ij} is the weight given to cell i,j (in this study, weights were quadratic), and k is the upper limit value of the score. It was estimated separately for each item, with 95% confidence intervals obtained by bootstrap. The values obtained were interpreted according to the criteria proposed by Shrout (moderate: 0.60 to 0.79, substantial: ≥ 0.80)³⁷.

To evaluate the internal consistency of the scale, the Cronbach's α coefficient and its one-sided 95% lower confidence limit were calculated. According to Nunnally et al. (1994)³⁸, values greater than 0.70 are considered satisfactory in the early stages of scale development. We also examined the α coefficients after removing each item from the analysis and the item-rest correlations.

The factorial structure of the scale was initially tested by an exploratory factor analysis (EFA) by the principal factor analysis (PCA), using geomin oblique rotation. The number of factors was identified by the eigenvalue criterion above one and the inflection point of the scree-plot. Then, confirmatory factor analysis (CFA) were applied to test the model identified previously. As appropriate to modelling categorical items, all analyses used the robust weighted least squares mean and variance adjusted estimator (WLSMV) and used polychoric matrices³⁹. Potential residual (error) correlations were examined using the modification indices (MI). The assessment of the model's fits used the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI) and Root Mean Square Error of Approximation (RMSEA). The models presenting CFI and TLI greater than 0.90⁴⁰ and RMSEA less than 0.08 were considered satisfactory⁴¹.

Then, the convergent and discriminant factor validity of the scale was formally evaluated by calculating the composite reliability and the Average Variance Extracted (AVE), respectively. Composite reliability takes factor loadings and measurement errors into account. Its estimate ranges from 0 to 1 (in each factor) and values ≥ 0.70 are considered satisfactory^{39, 42}. The AVE also ranges from 0 to 1. This estimate assesses the amount of variance extracted in a factor compared to the amount of variance due to random measurement error³⁹. A statistically significant positive sign of this difference would endorse factor-based discriminant validity (i.e., non-violation), whereas a statistically significant negative sign would favour rejection.

After the psychometric evaluation, we investigated the associations between the results of the proposed instrument and variables previously described in the literature as related to food insecurity. The presence of HFI during childhood was considered to be the individuals with at least one positive response one of the items of the new instrument. The relationships between the reported experience of HFI during childhood and six sociodemographic variables collected in the 1st wave aforementioned were tested, using chi-square test. The literature in the area points out that poverty, low family economic situation, higher number of children in the household, female-headed households, and other sociodemographic factors are associated with HFI⁴³⁻⁴⁷. Thus, it is expected that the HFI positively correlates with the sociodemographic variables mentioned.

In this study, for the evaluation of construct validity, the presence of HFI during childhood was considered for those who answered "frequently", "sometimes" or "rarely" to any of the five items of the scale. Those who answered "never" to the five items were considered to have "no HFI", that is they had household food security. For the other psychometric analyzes, the 4 response options were used. Data analysis was carried in the Stata 15.0⁴⁸ and Mplus 7.2⁴⁹ softwares.

The research project was approved by the Research Ethics Committees of the Institute of Social Medicine CAAE 0041.0.259.000-11, and University Hospital Pedro Ernesto (224/1999) – State University of Rio de Janeiro, Brazil.

RESULTS

In the 4th wave, the age of the respondents varied between 34 and 79 years (mean: 52.4 years); 56.6% were female; 52.7% self-reported as white. In baseline (1st wave), 62.9% respondents were married; 75.8% had at least complete secondary education and approximately 60% had monthly family income above US\$384.81 (R\$1,500).

Test-retest reliability estimates are shown in Table 1. Weighted kappa values were above 0.647, being considered moderate for three items and substantial for two items. The frequency of positive responses ('frequently', 'sometimes' or 'rarely') to each item showed that only items (d) '... did you miss any meal?' and (e) '... did you not eat for a whole day or have only one meal a day?' had an endorsement frequency below 20% (Table 1).

Cronbach's α coefficient for the scale was 0.84, demonstrating a satisfactory internal consistency. The changes in the α coefficients after excluding each of the items were very small and the item-rest correlations were above 0.60 (Table 2).

The initial exploratory factor analysis indicated that one factor with eigenvalue above 1.0 could be extracted. The loadings ranged from 0.873 to 0.931, and therefore no residual variances were above 0.70. The analysis showed high values for the CFI and TLI, but the RMSEA was above 0.08.

A one-factor model was then tested in a confirmatory analysis (Model A, Table 3). Factor loadings were above 0.873 and despite the high values for the CFI and TLI, the RMSEA was above 0.08, suggesting a poor fit. Since modification indices indicated a residual correlation between items 1 and 2, a model specifying this correlation was explored (Model B, Table 3). This model had a better fit, with factor loadings above 0.800. The composite reliability found for model A was 0.96 and for model B was 0.94. In both models presented, the square root values of the AVEs were positive and significant. The model B (proposed model) and its factor loadings are shown in Figure 1.

Table 4 shows the relationship between the presence of HFI during childhood and selected construct-related variables assessed in wave 1. Recalled HFI during childhood was higher for participants who at age 12 had a larger family, whose household was headed by the mother or someone other than the father, lived in a small town or rural area, had a poor economic situation, and had experienced insufficient food due to lack of money.

DISCUSSION

To our knowledge, the scale analyzed here is the first instrument aimed at measuring household food insecurity in childhood. As previously mentioned, the existing scales present a recall period of one 50, 51, three 52-55 or twelve 8, 56-59 months prior to the interview. Epidemiologic evidence about adverse long-term consequences of childhood food insecurity is needed in lifecourse studies, but frequently it is not possible to capture this information through longitudinal studies, that is following up individuals from childhood through adulthood.

Although few studies assessed test-retest reliability of household food security scales^{51, 60}, ours found test-retest reliability estimates similar to those observed by Kleinman et al. (2007)⁵¹, who examined the 18-item Household Food Security Survey Module (HFSSM) subsequently adapted for Brazilian Portuguese¹¹. Derrickson et al. (2000)⁶⁰ evaluated the test-retest reliability of the 18-item HFSSM version via Pearson correlation coefficient, as $r = 0.75$ ($p < 0.01$).

The results of Cronbach's α coefficient of this study were similar to that found by Vargas & Penny (2000)⁵⁹, Gulliford et al. (2004)⁸ and Hromi-Fiedler et al. (2009)⁶¹. The studies that evaluated the internal consistency the HFSSM and your variants presented Cronbach's α coefficient ranging from 0.73⁵⁶ to 0.95^{55, 62}.

We note, however, that comparisons of reliability estimates across studies are problematic; being directly related to the quality of the measurement process, each study may have a unique *modus operandi*. However, in the long term, several studies with good reliability results (internal consistency, intra- and inter-observer/test-retest reliability) using the original scale tend to confirm its quality⁶³.

Regarding validity aspects, the best fit factorial structure presented adequate factorial loadings for all items and fit indexes, with the exception of RMSEA. The studies

that evaluated the dimensional validity of the original (18 items) 50, 52, 53, 58, 61, 64 and short (6 items) 8, 57 versions of the Household Food Security Survey Module mostly applied exploratory factorial analyses and do not present the values of the factorial loadings of the items, hampering the comparison of results. However, studies analysing dimensional validity corroborate the structure of one factor proposed by the original instrument 8, 52, 53, 57, 58, 61, 64, the latter similar to that found in this study.

Inconsistent fit indices are common in psychometric analyses, especially among RMSEA and CFI 65. Some authors point out that this inconsistency may be underestimated 66, 67, since some surveys report only the adjustment indexes with favorable results. However, Lai & Green (2016) 65 and Mueller & Hancock (2010) 68 advise the researchers to report all the analyzed estimates, inconsistent or not.

When analyzing the modification indexes of the model with a single factor (model A), a residual correlation between items (a) and (b) was suggested, indicating a content redundancy among the items. A possible overlapping of ideas of the items (a) ... did you not have a varied and healthy diet? and (b) ... do you eat only a few types of food? – which was confirmed by the high correlation between the residuals of these items. Future studies that include discussions on the writing of the items by specialists and, subsequently, testing on individuals from the target population in order to assess their understanding are encouraged. However, it is important to consider that a possible redundancy among these items was not observed in the Brazilian Household Food Insecurity Measurement Scale 12, 69, and may occur only in this abridged-version.

This modified version of the Brazilian Household Food Insecurity Measurement Scale presented discriminant factor validity. The convergent validity (values above 0.70 for composite reliability) was satisfactory, demonstrating the scale measures what it intends to measure. This scale also showed adequate construct validity. The results of bivariate analyses were consistent with what is described in the theoretical field, as well as other studies 8, 50, 55, 57, 59, 70-74. Derrickson et al. (2001) 73, Gulliford et al. (2004) 8, Pérez-Escamilla et al. (2004) 74, Melgar-Quiñonez et al. (2005) 71, Yuyama et al. (2007) 55, Hackett et al. (2007) 70 corroborated the construct validity of the HFSSM and its linguistic and cultural variants by observing a strong association between household food insecurity and food consumption. Derrickson et al. (2001) 73 and Gulliford et al. (2006) 50 verified a strong association of the scale with socioeconomic variables, low cost foods and lower monthly household income, respectively. Vargas & Penny (2010) 59 also corroborated construct validity by associating scale with demographic issues, such as family size.

The present study has some limitations. The HFI and some variables used in the construct analysis present a long recall period (when the respondents were 12 years old), which may lead to recall bias. However, we believe that HFI is such a salient event in the lifecourse of those who go through this experience, that the possibility of this bias is minimal. In addition, a sensitivity analysis was carried out excluding older people. The statistics increased, but there was no change in the results found, with no evidence of recall bias. Another possible limitation refers to the large sample size used to validate an instrument with few items since a large number of individuals can influence the psychometric analysis performed. The low value of RMSEA suggests internal validity problem and needs more psychometric studies before being recommended for use. Additionally, our analyzes are based on responses of individuals with a certain degree of schooling, and the possibility of different reliability and validity results cannot be ruled out if applied in a different population group. Further studies should evaluate its psychometric performance in other population contexts, as well as other properties such as scalability.

CONCLUSION

Our investigation of test-retest reliability, internal consistency, structural, convergent, discriminant, and construct validity represents the first evaluation of a modified version of the Brazilian Household Food Insecurity Measurement Scale proposed to assess food insecurity in childhood. Test-retest reliability kappa coefficients were moderate; Cronbach's α coefficient was satisfactory. Factor loadings were above 0.800; the RMSEA value indicated poor fit. The convergent discriminant, and construct validity were non-violation.

A possible step to be considered in future studies is the evaluation of the items included in the instrument proposed by specialists and the target population, in order to assess the need for inclusion of new items either from the original instrument or not, changes in the wording of the remaining items or even exclusions. In addition, studies exploring possible cut points for this instrument are needed.

FUNDING

FAPERJ grants #232477 and #216981.

COLLABORATIONS

ESM and AGSO were responsible for the data analysis, conceiving and drafting the article, and the final critical review. EF was responsible for designing and coordinating the Pro-Saúde study, conceiving and drafting the article, and final critical review.

REFERENCES

1. FAO. The State of Food Insecurity in the World: Addressing food insecurity in protracted crises. Rome: Food and Agriculture Organization of the United Nations; 2010.
2. FAO. The State of Food Insecurity in the World: Building Resilience For Peace And Food Security. Rome: Food and Agriculture Organization of the United Nations; 2017.
3. UN. Transforming our World: The 2030 Agenda for Sustainable Development. United Nations; 2015.
4. Kepple AW, Segall-Corrêa AM. Conceituando e medindo segurança alimentar e nutricional. *Ciência & Saúde Coletiva*. 2011;16:187-99.
5. Wehler CA, Scott RI, Anderson JJ. The community childhood hunger identification project: a model of domestic hunger: demonstration project in Seattle, Washington. *Journal of nutrition education*. 1992;24(1, suppl.):29S-35S.
6. Marques ES, Reichenheim ME, de Moraes CL, Antunes MML, Salles-Costa R. Household food insecurity: a systematic review of the measuring instruments used in epidemiological studies. *Public Health Nutrition*. 2014;18(5):877-92.
7. Bickel G, Nord M, Price C, Hamilton W, Cook J. Guide to Measuring Household Food Security - Revised 2000. Alexandria, VA: Food and Nutrition Service, USDA; 2000.
8. Gulliford MC, Mahabir D, Rocke B. Reliability and validity of a short form household food security scale in a Caribbean community. *BMC public health*. 2004 Jun 16;4:22.
9. USDA. U.S. Household Food Security Survey Module. United States Department of Agriculture, Economic Research Service; 2019 [updated 2019; cited 2019 Sep 19]; Available from: <https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/survey-tools.aspx>.
10. Interlenghi GS, Reichenheim ME, Segall-Corrêa AM, Pérez-Escamilla R, Moraes CL, Salles-Costa R. Suitability of the eight-item version of the Brazilian Household Food Insecurity Measurement Scale to identify risk groups: evidence from a nationwide representative sample. *Public Health Nutrition*. 2018;22(5):776-84.

11. Segall-Corrêa AM ER, Sampaio MdFA et al. Acompanhamento e Avaliação da Segurança Alimentar de Famílias Brasileiras: Validação de Metodologia e de Instrumento de Coleta de Informação. Urbano/Rural. [Relatório Técnico – Preliminar]. Campinas, SP: Universidade Estadual de Campinas/Organização Pan-Americana da Saúde/Ministério de Saúde; 2004.
12. Segall-Corrêa AM, Marin-León L, Melgar-Quiñonez H, Pérez-Escamilla R. Refinement of the Brazilian Household Food Insecurity Measurement Scale: Recommendation for a 14-item EBIA. *Revista de Nutrição*. 2014;27:241-51.
13. Cabral CS, Lopes AG, Lopes JM, Vianna RPdT. Food security, income, and the Bolsa Família program: a cohort study of municipalities in Paraíba State, Brazil, 2005-2011. *Cadernos de Saúde Pública*. 2014;30:393-402.
14. Fávaro T, Ribas DLB, Zorzatto JR, Segall-Corrêa AM, Panigassi G. Segurança alimentar em famílias indígenas Teréna, Mato Grosso do Sul, Brasil. *Cadernos de Saúde Pública*. 2007;23:785-93.
15. Interlenghi Gdos S, Salles-Costa R. Inverse association between social support and household food insecurity in a metropolitan area of Rio de Janeiro, Brazil. *Public Health Nutr*. 2015 Nov;18(16):2925-33.
16. Moraes CL, Marques ES, Reichenheim ME, Ferreira MF, Salles-Costa R. Intimate partner violence, common mental disorders and household food insecurity: an analysis using path analysis. *Public Health Nutr*. 2016 Nov;19(16):2965-74.
17. Salles-Costa R, Pereira RA, Vasconcellos MTLd, Veiga GVd, Marins VMrd, Jardim BC, et al. Association between socioeconomic factors and food insecurity: a population-based study in the Rio de Janeiro metropolitan area, Brazil. *Revista de Nutrição*. 2008;21:99s-109s.
18. Vianna RPdT, Segall-Corrêa AM. Household food insecurity in municipalities of the Paraíba State, Brazil. *Revista de Nutrição*. 2008;21:111s-22s.
19. Brasil. Pesquisa Nacional de Demografia e Saúde da Criança e da Mulher – PNDS 2006. Relatório Final. Brasília, DF: Ministério da Saúde; 2008.
20. Brasil. Quilombos do Brasil: Segurança Alimentar em Territórios (Brazil's Quilombos: Food Security in Brazilian Quilombolas Territories). *Cadernos de Estudos Desenvolvimento Social em Debate* nº 20. Brasília, DF: Ministério do Desenvolvimento Social e Combate à Fome, Secretaria de Avaliação e Gestão da Informação; 2014.
21. IBGE. Pesquisa Nacional por Amostras de Domicílios. Segurança Alimentar 2004 (The National Household Sample Survey. Food Security 2004). Rio de Janeiro, RJ: Instituto Brasileiro de Geografia e Estatística 2006.
22. IBGE. Pesquisa Nacional por Amostras de Domicílios. Segurança Alimentar 2004/2009. Rio de Janeiro, RJ: Instituto Brasileiro de Geografia e Estatística; 2010.
23. IBGE. Pesquisa Nacional por Amostras de Domicílios. Segurança Alimentar 2013 (The National Household Sample Survey. Food Security 2013). Rio de Janeiro, RJ: Instituto Brasileiro de Geografia e Estatística; 2014.
24. Alaimo K, Olson CM, Frongillo EA, Jr. Low Family Income and Food Insufficiency in Relation to Overweight in US Children: Is There a Paradox? *Arch Pediatr Adolesc Med*. 2001;155(10):1161-7.
25. Campbell CC. Food Insecurity: A Nutritional Outcome or a Predictor Variable? *Journal of Nutrition*. 1991;121:408-15.
26. Kleinman RE, Murphy JM, Little M, Pagano M, Wehler CA, Regal K, et al. Hunger in Children in the United States: Potential Behavioral and Emotional Correlates. *PEDIATRICS*. 1998;101(1):e3.
27. Olson CM. Nutrition and Health Outcomes Associated with Food Insecurity and Hunger. *The Journal of Nutrition*. 1999;129:521S-4S.
28. Kirkpatrick SI, McIntyre L, Potestio ML. Child hunger and long-term adverse consequences for health. *Arch Pediatr Adolesc Med*. 2010 Aug;164(8):754-62.
29. McIntyre L, Williams JV, Lavorato DH, Patten S. Depression and suicide ideation in late adolescence and early adulthood are an outcome of child hunger. *Journal of affective disorders*. 2013 Aug 15;150(1):123-9.
30. FRAC. The Impact of Poverty, Food Insecurity, and Poor Nutrition on Health and Well-Being. Food Research & Action Center; 2017.
31. Gundersen C, Ziliak JP. Food Insecurity And Health Outcomes. *Health Affairs*. 2015 2015/11/01;34(11):1830-9.
32. Donner A, Eliasziw M. A goodness-of-fit approach to inference procedures for the kappa statistic: confidence interval construction, significance-testing and sample size estimation. *Statistics in medicine*. 1992 Aug;11(11):1511-9.
33. Blackman NJ, Koval JJ. Interval estimation for Cohen's kappa as a measure of agreement. *Statistics in medicine*. 2000 Mar 15;19(5):723-41.
34. Donner A. Sample size requirements for the comparison of two or more coefficients of inter-observer agreement. *Statistics in medicine*. 1998 May 30;17(10):1157-68.
35. Rappaport CR, Fiori WR, Davis C. Teorias do Desenvolvimento: conceitos fundamentais. E.P.U; 1981.
36. Streiner DL, Norman GR. Health measurement scales: a practical guide to their development and use. 4th ed. London: Oxford Medical Publications; 2008.
37. Shrout PE. Measurement reliability and agreement in psychiatry. *Statistical methods in medical research*. 1998 Sep;7(3):301-17.
38. Nunnally J, Bernstein L. Psychometric theory. New York: McGraw-Hill Higher, INC; 1994.

39. Brown TA. Confirmatory factor analysis for applied research. 2nd ed. New York: The Guilford Press; 2015.
40. Bentler PM. On the fit of models to covariances and methodology to the Bulletin. *Psychological bulletin*. 1992 Nov;112(3):400-4.
41. Browne MW, Cudeck R. Alternative ways of assessing model fit. In: Bollen KA, Long JS, editors. *Testing structural equation models*. Newbury Park, CA: Sage; 1993. p. 136-62.
42. Hair JF, Black WC, Babin BJ, Anderson RE, Tatham RL. *Análise multivariada de dados*. 6th ed. Porto Alegre: Bookman; 2009.
43. CONSEA. III Conferência Nacional de Segurança Alimentar e Nutricional - Por um Desenvolvimento Sustentável com Soberania e Segurança Alimentar e Nutricional. Brasília: Conselho Nacional de Segurança Alimentar e Nutricional - CONSEA; 2007.
44. Freitas MCS. Segurança alimentar e nutricional – algumas considerações. 2005 [updated 2005; cited 2019 Sep 19]; Available from: Maria do Carmo Soares de
45. Gundersen C. Individual and Household Determinants of Child Food Insecurity and Hunger. Washington, DC: Economic Research Service and the Food, Nutrition Service of the U.S. Department of Agriculture; 2013 [updated 2013; cited 2019 Sep 19]; Available from: https://sites.nationalacademies.org/cs/groups/dbasssite/documents/webpage/dbasse_084308.pdf.
46. Pessanha LDR. *A Experiência Brasileira em Políticas Públicas para a Garantia do Direito ao Alimento*. Rio de Janeiro: Instituto Brasileiro de Geografia e Estatística; 2002.
47. Valente FLS. *Direito Humano à Alimentação: Desafios e conquistas*. São Paulo: Cortez; 2002.
48. StataCorp. *Stata Statistical Software, Release 15*. College Station, TX: Stata Corporation; 2018.
49. Muthén LK, Muthén BO. *Mplus User's Guide*. 7th ed. Los Angeles, CA: Muthén & Muthén; 1998-2015.
50. Gulliford MC, Nunes C, Rocke B. The 18 Household Food Security Survey items provide valid food security classifications for adults and children in the Caribbean. *BMC public health*. 2006 Feb 8;6:26.
51. Kleinman RE, Murphy JM, Wieneke KM, Desmond MS, Schiff A, Gapinski JA. Use of a single-question screening tool to detect hunger in families attending a neighborhood health center. *Ambulatory pediatrics: the official journal of the Ambulatory Pediatric Association*. 2007 Jul-Aug;7(4):278-84.
52. Hackett M, Melgar-Quinonez H, Perez-Escamilla R, Segall-Correa AM. Gender of respondent does not affect the psychometric properties of the Brazilian Household Food Security Scale. *International journal of epidemiology*. 2008 Aug;37(4):766-74.
53. Melgar-Quinonez HR, Nord M, Perez-Escamilla R, Segall-Correa AM. Psychometric properties of a modified US-household food security survey module in Campinas, Brazil. *European journal of clinical nutrition*. 2008 May;62(5):665-73.
54. Oliveira JS, Lira PICd, Andrade SLLSd, Sales AC, Maia SR, Batista Filho M. Insegurança Alimentar e estado nutricional de crianças de São João do Tigre, no semi-árido do Nordeste. *Revista Brasileira de Epidemiologia*. 2009;12:413-23.
55. Yuyama LKO, Aguiar JPL, Pantoja L, Maeda RN, Melo T, Alencar FH, et al. Segurança/insegurança alimentar em famílias urbanas e rurais no estado do Amazonas: I. validação de metodologia e de instrumento de coleta de informação. *Acta Amazonica*. 2007;37:247-52.
56. Buscemi J, Beech BM, Relyea G. Predictors of obesity in Latino children: acculturation as a moderator of the relationship between food insecurity and body mass index percentile. *Journal of immigrant and minority health*. 2011 Feb;13(1):149-54.
57. Gulliford MC, Mahabir D, Nunes C, Rocke B. Self-administration of a food security scale by adolescents: item functioning, socio-economic position and food intakes. *Public Health Nutr*. 2005 Oct;8(7):853-60.
58. Rafiei M, Nord M, Sadeghizadeh A, Entezari MH. Assessing the internal validity of a household survey-based food security measure adapted for use in Iran. *Nutrition journal*. 2009 Jun 26;8:28.
59. Vargas S, Penny ME. Measuring food insecurity and hunger in Peru: a qualitative and quantitative analysis of an adapted version of the USDA's Food Insecurity and Hunger Module. *Public Health Nutr*. 2010 Oct;13(10):1488-97.
60. Derrickson JP, Fisher AG, Anderson JE. The core food security module scale measure is valid and reliable when used with Asians and Pacific Islanders. *J Nutr*. 2000 Nov;130(11):2666-74.
61. Hromi-Fiedler A, Bermúdez-Millán A, Melgar-Quinonez H, Pérez-Escamilla R. Psychometric Properties of an Adapted Version of the U.S. Household Food Security Survey Module for Assessing Food Insecurity Among Low-Income Pregnant Latinas. *Journal of hunger & environmental nutrition*. 2009;4(1):81-94.
62. Álvarez MC, Estrada A, Montoya EC, Melgar-Quinónez H. Validación de escala de la seguridad alimentaria doméstica en Antioquia, Colombia. *Salud Pública de México*. 2006;48:474-81.
63. Reichenheim ME, Moraes CL. Operacionalização de adaptação transcultural de instrumentos de aferição usados em epidemiologia. *Revista de Saúde Pública*. 2007;41:665-73.
64. Wilde PE. Differential response patterns affect food-security prevalence estimates for households with and without children. *J Nutr*. 2004 Aug;134(8):1910-5.
65. Lai K, Green SB. The Problem with Having Two Watches: Assessment of Fit When RMSEA and CFI Disagree. *Multivariate Behavioral Research*. 2016 2016/05/03;51(2-3):220-39.

66. Jackson DL, Gillaspay JA, Purc-Stephenson R. Reporting practices in confirmatory factor analysis: an overview and some recommendations. *Psychological methods*. 2009 Mar;14(1):6-23.
67. McDonald RP, Ho MH. Principles and practice in reporting structural equation analyses. *Psychological methods*. 2002 Mar;7(1):64-82.
68. Mueller RO, Hancock GR. Structural equation modeling. In: Hancock GR, Mueller RO, editors. *The reviewer's guide to quantitative methods in the social sciences*. New York, NY: Routledge; 2010. p. 371-84.
69. Brasil. Nota técnica n. 128: relatório da Oficina Técnica para Análise da Escala de Medida Domiciliar da Insegurança Alimentar. Brasília, DF: Ministério do Desenvolvimento Social e Combate à Fome. Secretaria de Avaliação e Gestão da Informação; 2010.
70. Hackett M, Zubieta AC, Hernandez K, Melgar-Quinonez H. Food insecurity and household food supplies in rural Ecuador. *Archivos latinoamericanos de nutricion*. 2007 Mar;57(1):10-7.
71. Melgar-Quiñonez H, Zubieta AC, Valdez E, Whitelaw B, Kaiser L. Validación de un instrumento para vigilar la inseguridad alimentaria en la Sierra de Manantlán, Jalisco. *Salud Pública de México*. 2005;47:413-22.
72. Pérez-Escamilla R, Segall-Corrêa AM, Maranhã LK, Sampaio MdFA, Marín-León L, Panigassi G. An Adapted Version of the U.S. Department of Agriculture Food Insecurity Module Is a Valid Tool for Assessing Household Food Insecurity in Campinas, Brazil. *Journal of Nutrition*. 2004;134:1923-8.
73. Derrickson JP, Fisher AG, Anderson JE, Brown AC. An assessment of various household food security measures in Hawaii has implications for national food security research and monitoring. *J Nutr*. 2001 Mar;131(3):749-57.
74. Perez-Escamilla R, Segall-Correa AM, Kurdian Maranhã L, Sampaio Md Mde F, Marín-Leon L, Panigassi G. An adapted version of the U.S. Department of Agriculture Food Insecurity module is a valid tool for assessing household food insecurity in Campinas, Brazil. *J Nutr*. 2004 Aug;134(8):1923-8.

Outros idiomas:



Como Citar

MARQUES, E.S., Oliveira, A.G.S, Faerstein, E.. Psychometric properties of a modified version of Brazilian household food insecurity measurement scale – Pró-saúde study. *Cien Saude Colet [periódico na internet]* (2020/Jun). [Citado em 22/01/2021]. **Está disponível em:** <http://www.cienciaesaudecoletiva.com.br/artigos/psychometric-properties-of-a-modified-version-of-brazilian-household-food-insecurity-measurement-scale-prosaude-study/17612>

Últimos Artigos

Adesão aos acordos voluntários de redução de sódio no Brasil (</artigos/adesao-aos-acordos-voluntarios-de-reducao-de-sodio-no-brasil/17925>)
0026/2021

Prevalência de alto risco cardiovascular na população adulta brasileira segundo diferentes critérios: estudo comparativo (</artigos/prevalencia-de-alto-risco-cardiovascular-na-populacao-adulta-brasileira-segundo-diferentes-criterios-estudo-comparativo/17924>)
0025/2021

A relevância de um ecossistema tecnológico no enfrentamento à covid-19 no Sistema Único de Saúde (SUS): o caso do RN (</artigos/a-relevancia-de-um-ecossistema-tecnologico-no-enfrentamento-a-covid-19-no-sistema-unico-de-saude-sus-o-caso-do-rn/17923>)
0024/2021

Uma Abordagem Desafiadora sobre as Políticas Públicas Contemporâneas no Brasil (</artigos/uma-abordagem-desafiadora-sobre-as-politica-publicas-contemporaneas-no-brasil/17921>)
0022/2021

The impact of COVID-19 pandemic in the quality of sleep by Pittsburgh Sleep Quality Index: A systematic review. (</artigos/the-impact-of-covid19-pandemic-in-the-quality-of-sleep-by-pittsburgh-sleep-quality-index-a-systematic-review/17919>)
0020/2021

Realização



Patrocínio



FIOCRUZ



CAPES

Ministério
da Educação

Ministério da
Ciência e Tecnologia



CLAVES



Organização
Pan-Americana
da Saúde

Revista Ciência & Saúde Coletiva da Associação Brasileira de Saúde Coletiva
Impressa ISSN 1413-8123 | Online ISSN 1678-4561

Avenida Brasil, 4036 / sala 700 – Manguinhos – CEP: 21040-361, Rio de Janeiro/RJ
(21) 3882-9153 e (21) 3882-9151 - Todos os direitos reservados para ABRASCO.