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Food and nutrition insecurity and risk factors for chronic noncommunicable diseases among solid waste collectors

Insegurança alimentar e nutricional e fatores de risco para doenças crônicas não transmissíveis em catadores de resíduos sólidos

Maria Rafaela Martins de Oliveira[1]
Roseane Saraiva de Santiago Lima[2]
Francisco Regis da Silva[3]
Luisa Maria Oliveira Pinto[4]
Rafaella Maria Monteiro Sampaio[5]

[1] Universidade Federal do Ceará, Hospital Universitário Walter Cantídio, Programa de Residência Integrada Multiprofissional em Atenção Hospitalar à Saúde. Fortaleza, CE, Brasil.

[2] Instituto Federal de Educação, Ciência e Tecnologia do Ceará, Curso de Nutrição. Limoeiro do Norte, CE, Brasil.

[3] Universidade Estadual do Ceará, Programa de Pós-Graduação em Saúde Coletiva. Fortaleza, CE, Brasil.

[4] Hospital Geral de Fortaleza, Ambulatório de Cardiologia. Fortaleza, CE, Brasil.

[5] Universidade de Fortaleza, Centro Universitário Estácio do Ceará, Curso de Nutrição. Fortaleza, CE, Brasil.

Correspondence
Francisco Regis da Silva
E-mail: regisfrs@hotmail.com

Abstract

Previous studies have shown a relationship between food and nutrition insecurity and chronic noncommunicable diseases (NCDs), and it should be noted that nutritional deficiencies and hunger are not the only forms of expression of this condition. The aim of this study was to evaluate the occurrence of food and nutrition insecurity and the risk factors for the development of NCDs among solid waste collectors in a municipality in the countryside of Ceará State (CE), Brazil. A cross-sectional study was conducted with 32 workers, aged 20-66 years. A structured questionnaire was applied to collect personal, socioeconomic, dietary and anthropometric data. Food and nutrition insecurity was evaluated through the Brazilian Food Insecurity Scale (EBIA). There was food and nutrition insecurity in 100% of the sample, low level of education (78.12%) and low income (87.5%), prevalence of overweight (25.0%) and obesity (31.26%) and poor consumption of fruits, vegetables and vegetables. The was a high proportion of moderate and severe food insecurity, and workers presented risk factors for the onset of NCDs.

Keywords: Collectors. Nutritional status. Chronic diseases. Nutrition in Public Health.

Resumo

Estudos têm demonstrado uma relação entre a situação de insegurança alimentar e nutricional com doenças crônicas não transmissíveis (DCNT), destacando que carências nutricionais e fome não são as únicas formas de expressão dessa condição. Desta forma, objetivou-se avaliar a ocorrência de insegurança alimentar e nutricional e os fatores de risco para desenvolvimento de DCNT em catadores de resíduos sólidos em um município do interior cearense. Realizou-se estudo transversal com 32 trabalhadores, com idades de 20 a 66 anos. Aplicou-se um questionário estruturado contendo dados de identificação, socioeconômicos, dietéticos e antropométricos. A insegurança alimentar e nutricional foi avaliada por meio da Escala Brasileira de Insegurança Alimentar (EBIA). Observou-se insegurança alimentar e nutricional em 100% da amostra, baixa escolaridade (78,12%) e baixa renda (87,5%), prevalência de sobrepeso (25,0%) e obesidade (31,26%) e insuficiente consumo de frutas, verduras e hortaliças. A proporção de insegurança alimentar moderada e grave foi alta, e os trabalhadores apresentaram fatores de risco para o desencadeamento de DCNT.

Palavras-chave: Catadores. Estado Nutricional. Doenças Crônicas. Nutrição em Saúde Pública.

Introduction

The concept of food and nutrition security (FNS) emerged during the First World War, and it is widely discussed today. At first, it was believed that the problem was due to food scarcity. However, the increase in food production has not solved the problems of hunger and malnutrition. Later, it was found that the problem of food insecurity was not caused by shortage of food supply, but by lack (low and/or deficient) access to food as a result of poverty.[1]

In this sense, FNS is understood as everyone's right to regular and permanent access to quality food, in sufficient amounts, without compromising other essential needs, based on healthy eating habits which respect cultural diversity and are environmentally and socially sustainable.[2-4]

Therefore, FNS has been increasingly present in the public agenda. An important step was the recognition of food as a human right, introduced in Brazil's Constitutional Amendment No. 64, of February 2010. Brazil's Act no. 11,346, of 15 September 2006, known as the Organic Law on Food and Nutrition Security (LOSAN), created the National Food and Nutrition Security

System (SISAN), whose aim is not only to guarantee this right by means of public policies, plans and initiatives, but also to monitor such activities.[5,6]

Nevertheless, it is estimated that 1.02 billion people, i.e., 14.3% of the world population, have no access to food in enough quantities to meet their basic nutritional needs or suffer chronic hunger, which represents a situation of severe food and nutrition insecurity.[5]

Previous studies have shown the relationship between food insecurity and overweight and obesity, as well as chronic non-communicable diseases (NCDs). It is noteworthy, therefore, that nutritional deficiencies and hunger are not the only reasons for this condition.[7,8]

In Brazil, as well as in other countries of the world, the current dietary pattern includes an insufficient intake of fruits, vegetables and legumes. The lack of intake of these food groups is one of the main risk factors for the global burden of disease worldwide, including cancer and other NCDs, such as obesity, type 2 diabetes and cardiovascular diseases.[9,10]

Although the theme "risk factors for NCDs" is often discussed in the literature, with references to sex, age, education and level of income, little is known about how these particular factors are distributed among the various professions, especially among solid waste collectors. It should be noted that their working environment is conducive to the development of infectious diseases; moreover, as a result of food and nutrition insecurity, these workers are susceptible to NCDs. In other words, they work in an environment that induces a progressive increase of such diseases, which can be further worsened because they live in poverty and lack enough support.[11]

Therefore, nutritional risks faced by solid waste collectors have to be analyzed, because these workers participate in the current economic system in a disadvantageous manner. For these people, solid waste collection is an alternative for survival, but they are directly and constantly exposed to several risk factors to health.

Studies on the food and health conditions of this population are still quite scarce; for this reason, the objective of this research was to evaluate the occurrence of food and nutrition insecurity and the risk factors for development of NCDs among solid waste collectors in a town in the countryside of Ceará State (CE).

Method

A quantitative, cross-sectional and descriptive study was developed and conducted with solid waste collectors from the municipality of Russas (CE), during the month of February 2015. The participants of the study were collectors who work in the streets and at the local landfill, who are members of the Association of Recyclable Material Collectors from Russas (ASCAMARRU). The personal data of the members were provided by the charity Caritas Diocesana.

The population was composed of 55 workers, and sample size consisted of 32 individuals, with a confidence level of 95%, according to the calculation made to determine the sample, based on the estimation of the population mean, as proposed by Triola.[12]

Data were collected at the recycling plant of ASCAMARRU on the days of meetings and courses offered by Caritas Diocesana. The data were collected through a structured questionnaire covering the following topics: personal data, level of education, *per capita* income, condition of food and nutrition insecurity, anthropometric data and consumption of fruits, vegetables and legumes.

Level of education was evaluated according to the standardization performed by the Surveillance System of Risk and Protective Factors for Chronic Diseases by Telephone Survey (VIGITEL). According to VIGITEL, eight years or less of education are considered to be a low level of education.[13] Income was evaluated by considering as poverty line a per capita income value of less than half a minimum wage per month, as determined by the United Nations Development Program (UNDP).[14]

Food insecurity was determined by means of the Brazilian Food Insecurity Scale (EBIA), composed of 15 closed questions with affirmative or negative answers, on the perception of the respondents about the food situation experienced by their family in the last three months prior to the interview. Affirmative answers were assigned the value "1" (one) while negative answers, the value "0" (zero). Based on the sum of points, food situation was classified into four categories: 1) Food Safety, when there are no restrictions of access to food, both in qualitative and quantitative terms, and there is no concern over lack of food in the future; 2) Mild food Insecurity (MFI), when there is concern over lack of food in the near future, which is indicative of a psychological component of insecurity; 3) Moderate food insecurity (MoFI), when there is a situation of impairment of food quality in the attempt to maintain the required quantity; 4) Severe food insecurity (SFI), a condition in which there is a low amount of food available, leading to a situation of hunger.[15,16]

For assessment of nutritional status, weight and height were measured, and then body mass index (BMI) was calculated. BMI is defined as the body mass (Kg) divided by the square of the body height (m^2). The classification proposed by the World Health Organization (WHO) was used as a reference.[17]

Waist circumference (WC) was measured to determine abdominal fat and risk of development of cardiovascular diseases. WC was measured at the lowest curve located between the ribs and the iliac crest; when the lowest curve could not be identified, WC was measured at two centimeters above the navel. The cut-off points in use were those recommended by the WHO,[17] whereby risk is defined as values equal to or greater than 80 cm for females and 94 cm for males.

Consumption of fruits, vegetables and legumes was quantified according to Mendes & Catão,[18] based on the following questions: "How often do you consume fruit or natural fruit juice?" and "How often do you consume vegetables and legumes?". The workers were instructed to choose one of the five alternatives for consumption: daily, weekly, monthly, rarely or never. Each participant should inform how many times per day, week or month they consumed a particular food, and then how many servings of the same food they usually consumed at a time.

For clarification purposes, the researchers explained the concept of "serving" and gave examples to the respondents for the intake of fruit and vegetables, based on the Dietary Guidelines for the Brazilian Population. Daily minimum intake of 400 g or five servings of 80 g each were considered to be positive.[19]

The database was organized in the software Microsoft Office Excel®2010. Statistical analysis consisted of a description of the frequencies of variables, percentage, mean and standard deviation, using the software Epi Info, version 6.04.

The workers could participate in the study as long as they had signed an Informed Consent Form (ICF). The research project was approved by the Research Ethics Committee of the Federal Institute of Education, Science and Technology of Ceará (IFCE), Technical Opinion No. 1.176.770.

Results

The sample was composed of 32 workers, mostly females (65.62%; n= 21). The respondents ranged in age between 20 and 63 years. The mean age of females (35.8 ± 3.13) was lower than that of males (44.27 ± 3.52). Mean length of time worked at the landfill was 6.14 years (SD ± 1.47), with a minimum of three months and a maximum of 36 years. There was a higher prevalence of time worked by females, as shown in Table 1.

Among the study participants, 100% presented food insecurity: for 12.50% of these individuals, such food insecurity was considered to be mild; for 34.37%, it was moderate; and for 53.13%, it was severe (Table 2).

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Table 1. Characterization of solid waste collectors from Russas (CE) according to socioeconomic and anthropometric parameters, 2015.

	Males (n=11)				Females (n=21)			
Parameters	Minimum	Maximum	Median	Mean ±SD	Minimum	Maximum	Median	**Mean ±SD**
Age (years)	25.00	63.00	49.00	44.27 ±3.52	20.00	63.00	29.00	35.80 ±3.13
Per capita income (BRL)	62.50	400.00	200.00	223.90 ±39.76	30.00	400.00	80.00	134.13 ±22.02
Time worked (years)	0.25	28.00	6.00	8.88 ±2.71	0.33	36.00	2.00	4.71 ±1.69
Years of study	0.00	8.00	2.00	2.64 ±0.79	0.00	12.00	4.00	5.28 ±0.72
BMI (kg/m²)	19.44	36.30	25.83	26.29 ±1.62	17.50	43.34	25.82	27.56 ±1.58
WC (cm)	74.00	105.00	87.00	88.90 ±3.08	71.00	119.00	81.00	86.85 ±2.82

Caption: BMI: Body Mass Index; WC: Waist circumference.

Source: Research data.

Table 2. Prevalence of food insecurity in accordance with socioeconomic, anthropometric and dietary characteristics of solid waste collectors from Russas (CE), 2015.

Variables	MFI %	MoFI %	SFI %	Total %
Food Insecurity				
	12.50	34.37	53.13	100.00
***Per capita* income**				
< ½ Minimum wage	12.50	31.25	43.75	87.50
≥ ½ Minimum wage	0.00	3.12	9.38	12.50
Years of study				
< 8 years of study	9.38	25.00	43.74	78.12
≥ 8 years of study	3.12	9.38	9.38	21.88
BMI				
Malnutrition	0.00	6.25	3.12	9.37
Normal weight	9.38	3.12	21.87	34.37
Overweight	3.12	12.50	9.38	25.00
Obesity	0.00	12.50	18.76	31.26
WC				
No risk	9.38	15.63	24.99	50.00
Risk	3.12	18.76	28.12	50.00
Fruit consumption				
Daily	3.12	0.00	3.12	6.24
Weekly	0.00	15.63	3.12	18.75
Monthly	3.12	3.12	6.25	12.49
Rarely/Never	6.25	15.63	40.64	62.52
Vegetable and legume consumption				
Daily	3.12	3.12	9.38	15.62
Weekly	3.12	6.25	3.12	12.49
Monthly	0.00	0.00	0.00	0.00
Seldom/Never	6.25	25.00	40.64	71.89

Caption: MFI: Mild Food Insecurity; MoFI: Moderate Food Insecurity; SFI: Severe Food Insecurity; BMI: Body Mass Index; WC: Waist circumference.

Source: Research data.

Although 62.50% of the respondents participated in some type of cash transfer program, 87.50% had a per capita income of less than half a minimum wage, a situation that was found in all levels of food insecurity. It was more critical in more severe levels of food insecurity.

It was found that 78.12% of the respondents had studied for less than eight years. Similarly to the results for per capita income, the amount of respondents with a low level of education was inversely proportional to the increase in the degree of food insecurity.

As far as nutritional status was concerned, it became apparent that only 34.37% of the respondents presented normal nutritional status according to BMI, and 56.26% of them were classified as overweight and obese. The largest percentage of obese patients was found among workers with serious food insecurity.

Waist circumference was inadequate in 50% of the participants, mainly in those with a higher degree of food insecurity.

There was poor consumption of fruits, vegetables and legumes: 62.50% of the respondents reported that they did not consume fruits and 71.88% said they did not eat vegetables and legumes. As with other indicators of chronic diseases, the amount of people who did not consume these foods was higher in higher degrees of food insecurity.

Discussion

Food insecurity is a phenomenon that has been observed throughout the world, both in developing countries and in developed countries, thus compromising the health and well-being of 963 million people.[18]

In Brazil, the National Household Sample Survey (PNAD),[20] conducted in 2013, identified food insecurity in 25.8% of the household residents, and the prevalence of severe food insecurity was 3.6%. The most precarious conditions were found in the Northeast region, where overall prevalence of food insecurity was 45.0%, and of severe food insecurity, 5.6%.

Overall prevalence of food insecurity among solid waste collectors from Russas (CE) was far higher than the prevalence found in the Northeast Region. Severe food insecurity was higher in such workers (53.13%) than the sum of all degrees of insecurity in that region. However, it should be noted that this study used a specific sample, which consisted of a population with precarious subsistence conditions.

In 2008, the Brazilian Institute for Social and Economic Analyses (IBASE)21 evaluated the condition of food security of beneficiary families of the Bolsa Família Program (PBF) in different regions of Brazil. The beneficiaries of PBF have lower income and are more vulnerable to food

deprivation. This is the same situation experienced by solid waste collectors, hence the two groups can be compared. In the Northeast, 87.1% of the PBF beneficiaries were experiencing food insecurity, a lower rate than the one found in the present study. The prevalence of mild (22.2%) and moderate food insecurity (38.7%) was higher among PBF beneficiaries, while severe food insecurity was two times as high among solid waste collectors.

Santos et al.[22] assessed food insecurity among solid waste collectors of Brasília, Federal District. They used an abridged food insecurity scale validated in Brazil, and found prevalence of 75.0% of families exposed to such a situation - a rate which was also lower than the one found in this study.

Some studies reported an association between food insecurity and chronic diseases, such as diabetes, obesity and hypertension. Terrell et al.[23] investigated the association between food insecurity and the risk of development of NCDs, and found that individuals experiencing food insecurity were more prone to the occurrence of diabetes. In addition, their study reported poor glycemic control by individuals with diabetes, hypertension and proteinuria, respectively, who were under food insecurity, when compared to those under food security.

Food insecurity, by itself, favors the emergence of NCDs, caused by reduction and deprivation of nutrients which are essential to health. In addition, there are several other factors associated with this condition which also trigger these diseases. The above-mentioned study examined factors which included income, level of education, nutritional status and intake of fruits and vegetables.

NCDs affect individuals of all socioeconomic classes but, even more severely, people belonging to vulnerable groups with low level of education and income.[24] Anschau et al.,[16] while studying beneficiaries of cash transfer programs living in the city of Toledo, Paraná State, noted that the higher the level of education of a family, the lesser their likelihood of experiencing food insecurity. Anschau et al.[16] also found a strong association between income and food insecurity: the lower the per capita income of a family, the greater their likelihood of being under moderate and severe food insecurity. These conditions are similar to those found among the collectors of the present study.

Excess weight (overweight and obesity included) is the sixth most important factor for the global burden of disease, because it is associated with several NCDs e.g., cardiovascular diseases, namely, hypertension and stroke, diabetes, colon and rectal cancers, breast cancer, etc. In Brazil, the prevalence of excess weight in the adult population increased from 43.2% in 2006 to 51.0% in 2012. The sum of the levels of overweight and obesity in this study was similar to the sum found by Freitas & Antunes,[25] in a study conducted with workers of a recycling plant in Azusa, Ceará. In this plant, the percentage of people with excess weight was 57.0%, but when obesity was analyzed alone, the present study showed almost twice as much the same rate found by those authors (18.7%). Bittencourt & Muttoni[26] evaluated the nutritional status of workers of recycling cooperatives of Porto Alegre (Rio Grande do Sul state) and found a higher percentage of overweight and obese

individuals (66.7%) than the studies mentioned above, and a higher total percentage of obese individuals (27.8%) than the one found in Azusa (CE), but still lower than the rate of the collectors of the present study.

In the case of BMI and SAN, the data in this paper corroborate the findings of Santos et al.,4 whose study reported that nutritional deficit was not very prevalent while prevalences of excess weight and obesity were quite high. Velásquez-Melendez et al.[27] found an association between obesity and moderate food insecurity only. This result contradicts the present study, in which high frequency of obesity was also found in the group with severe food insecurity.

Although BMI is the indicator most often used in clinical practice, it is limited when it comes to a distinction between muscle weight from fat weight. Therefore, BMI should be combined with other body composition methods.[28]

Waist circumference is an indicator associated with the risk of occurrence of cardiovascular diseases. In the present study, the risk was above the limit recommended for 50.0% of the participants, a lower rate than the one reported by Bittencourt and Muttoni[26] (74.0%), in a study with workers of recycling cooperatives in Porto Alegre (RS).

Previous studies have shown that dietary changes have positive and negative effects on health. An inadequate fat-rich diet, with highly refined and processed foods, poor in fruits, vegetables and legumes, is associated with the emergence of various NCDs, including cancer. Oliveira et al.,[11] in a study with workers of a recycling plant in the municipality of Viçosa, Minas Gerais State, found insufficient intake of fibers by this population: 52.0% and 89.0% of the participants reported not having the habit of consuming vegetables and leafy greens, respectively. This is a similar result to the one in the study in question, in which it was found that a large part of the respondents had no knowledge of the concept of fruits, vegetables and leafy greens. After these concepts had been clarified, some workers reported that they only consumed these foods when they found them in the garbage.

When the participants of this study asked questions about fruit juice intake, it was noted that they consume processed beverages on a regular basis and were not aware of nutritional differences between natural and processed beverages. Consumption of fruits and vegetables was much lower at more severe levels of food insecurity, which was expected, because the more intense the situation of insecurity, the more impaired a diet is in quantitative and qualitative terms. The individuals who reported consuming these foods only did that once a day but such consumption did not always correspond to one serving.

Conclusion

Based on the results, it was found that solid waste collectors from the municipality of Russas (CE) face moderate and severe food insecurity, which clearly shows that these workers are subject to a high degree of social marginalization and vulnerability to hunger. In addition, this population was found to be highly susceptible to various types of non-communicable chronic diseases, and such risks are intensified by increased food insecurity.

One of the limitations of the present study is the lack of previous research on the health and nutrition status of this population, which hinders a comparison between the results. In addition, further research has to be made on the conditions of living, health and nutrition of solid waste collectors.

In view of the relationship between food insecurity and socioeconomic characteristics and increased risk of NCDs, social responsibility initiatives and public policies are required to ensure health as well as food and nutrition security.

In addition, it is expected that the present results may encourage interest in new research and assist in the design or improvement of local public policies on food and nutrition in order to benefit such population.

Contributors

MRM Oliveira worked at all stages of the study: design, data collection, analysis, and writing of the paper; RSS Lima participated in the design of the study and helped drafting and revising the final draft of the paper; FR Silva participated in the writing and final revision of the paper; LMO Pinto participated in the writing and final revision of the paper; RMM Sampaio participated in the writing and final revision of the paper.

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