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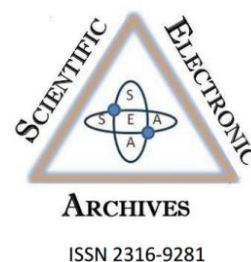
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Preliminary analysis of food flow in Food Banks

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Abstract. Introduction: Hunger has stood out as one of the world's biggest problems, mainly influenced by food waste. Objective: Quantitatively describe the entry and exit of food in two food banks located in the Federal District and in Rio de Janeiro. Methods: Through the spreadsheets provided by the Food Banks of the Federal District and Irajá-RJ, containing total values of food received and usable and disposable products, graphs of time series and trends were made. Results and discussion: The values of usable foods in both food banks were greater than 80% of the monthly amounts, that is, this quantity is destined to registered philanthropic entities. In relation to disposable foodstuffs, these are intended for the manufacture of composting and/or animal feed. Final considerations: The Food Bank has a fundamental role on the use and disposal of foods fit for consumption. In this context, the nutritionist can contribute to the improvement of the Food Banks, aiming at reducing food waste, increasing sustainability and especially food and nutritional safety. Through actions of Food and Nutritional Education, in order to raise awareness of the people involved.

Keywords: Food Waste, Food Supply, Sustainable Development Indicators.

Introduction

According to the Food and Agriculture Organization of the United Nations (FAO), there has been an increase in the number of individuals starving in the world. The numbers have increased gradually in the last 3 years; among these, we can highlight about 811 million people in 2017 to approximately 821 million in 2018. Several factors may be related to hunger, such as economic crises, external natural phenomena, but with prominence in food waste, where annually about 1.3 million kilograms of food are discarded, which are related to Food and Nutritional Insecurity (FAO, 2019; JÚNIOR et al., 2016).

Food waste consists of discarded foods that are fit for human consumption. They are usually discarded in the stages from production to distribution, be they from the planting processes to the consumer itself. However, one of the main reasons for disposal is due to the organoleptic characteristics of the food, especially "in natura" foods. The generation of food waste is closely linked to other issues such as food choices and eating habits, food culture and traditions (MATTSSON, et al., 2018; ZARO, 2018).

According to FAO (2019, P. 18) the largest food producers in the world are the United States of America, China, Brazil and Europe. However, Brazil

faces obstacles with waste during the production and distribution stages. About 64% of the productions generated annually are lost, reflecting on the quality and quantity of the products sold (PHILERENO, 2017).

Given the alarming data regarding hunger and malnutrition, it is necessary to reduce the loss and waste of food throughout the production chain. Starting with the incorporation of global agreements, the United Nations, the European Union and international companies have adopted targets for the waste of food and consequently the reduction of losses in order to achieve the reduction of these by 2030 (MATTSSON, et al., 2018).

Brazil, for its part, has government programs to eradicate hunger in order to guarantee food and nutritional security (SAN) and Human Right to Adequate Food, which, according to Law No. 11.346/2006, determines that all humans have by right adequate and sufficient food for the different social groups and that it respects human dignity. Some examples of the programs are Family Allowance Program (PBF), National School Feeding Program (PNAE), Zero Waste Program (PDZ), Food Acquisition Program (PAA), Simultaneous Donation Program (PDS), among others (Brazil, 2006; Ministry of Health, 2013).

The Food Banks (BA) currently integrate the public policies of Food Security and Nutrition and the Brazil Table Program, Action Program of the Social Service of Commerce (SESC), comprise a non-profit initiative that covers the collection of donated food, through traders and farmers, still fit for human consumption, and distribution to philanthropic entities in order to supply food for individuals with food insecurity and prevent food waste, obtaining the full use of food (ALMEIDA, 2017; CAISAN, 2018).

Currently there are 218 BA, of these 107 are coordinated by the state and municipal governments. The BA of CEASA / Distrito Federal (DF) together with Decree No. 37.312 / 16 (Brazil, 2016)

“Art. 2 The Food Collection and Donation Program - PCDA aims to integrate the processes of receiving and donating food, in order to promote its distribution to the beneficiary public, directly or through previously registered private social entities”.

In the decree, No. 12653/2017 established a Solidarity Program of Niterói- RJ, in the Municipal scope, with the name of Solidarity Donor. It was created because of the need for a food and nutritional security policy that did not exist, to meet the demands of the population, especially the neediest (Brazil, 2017).

“Art. 2 The main objective of the program is to collect donations of all kinds of food, promoting its distribution to non-profit organizations that serve meals to their beneficiaries in their own headquarters.”

In addition, the other BAs are associated the Food Procurement Program and the National Supply Company, in order to reduce Food and Nutritional Insecurity (Ministry of citizenship, 2018).

Therefore, the objective of this study was to quantitatively describe the entry and exit of food in two food banks located in the Federal District and in Rio de Janeiro.

Methods

This is a descriptive quantitative study, in which we performed the analysis of data provided by the Food Bank (BA) of the Federal District and Irajá - Rio de Janeiro.

The information regarding the BA-DF was made available through printed spreadsheets by the nutritionist responsible for inputting the values of the food received and discarded in the BA of CEASA-DF. For the use of the information on the work, the person responsible signed the agreement.

Regarding the data provided by BA-RJ, these were accessed through the Electronic Service of The Citizen Information Service (E-Sic®) website, which allows any individual to have access to information from the organizations and entities of the Federal Executive branch. Therefore, the available elements refer to the input and output values of food for the years 2017 and 2018, and it was informed that these would be used for the purpose of work completion of undergraduate course.

The data available in both locations refer to the monthly, quantitative values of food received, used and discarded in the years 2017 and 2018. In addition, information on the destination of the food received was also supplied.

In the case of the BA-DF, data from the first half of 2019 was also provided. In addition, among the values for the first half of 2019, elements containing the amount received according to the separation of food groups were made available.

In both BA, the destination of the edible food was made available. The acquisition of these in relation to the BA-DF was through printed spreadsheets with the locations and quantities. The BA-RJ made available through text through the website E-sic®, in which was cited the information of the Food and Nutritional Security program highlighting the quantity and classes of institutions that receive food, but the quantitative staff was not indicated among these.

All data provided were tabulated in spreadsheets, using the Microsoft Excel 2016® program, and passed from absolute to relative frequency values. The analyses were performed on the relative values.

For a better understanding of the results, time series graphs were developed with the objective to visualize the data by seasonality or even by regular periods that allowed quantitative observation of the edible foods and discarded ones and the comparison between the BAs, relating the years 2017 and 2018, with the aid of the statistical program Minitab 18®.

In addition, the comparison between the food groups was carried out during the 1st half of 2019, and the classification of the predominant group in relation to the receipt, with which the quantities of the different groups were inserted in the Microsoft Excel 2016® program and calculated mean and standard deviation (SD). The data corresponding to the utilization and disposal of the 1st half of 2019 were released in a trend graph, in the Minitab 2018® program, to verify the projection of the year 2019.

Results and discussion

According to data provided by BA-DF, the average food intake from January to July 2019 was grouped into broadleaves (12.81 ± 6.93), fruits (26.41 ± 9.79), spices (10.92 ± 11.31), tubers (14.71 ± 10.61), vegetables and legumes (35.16 ± 13.59). Given this, it is noticeable the predominance of the receipt of fruits, greens and vegetables. In the case of Ba Irajá-RJ, the amount of food received separately was not available, the only groups being fruits, vegetables, legumes, and non-perishable foodstuffs.

Although the indicators of food groups refer to the year 2019, it was shown that there is greater disposal of food in natura, a similar result was found in other regions of the country (SEBRAE, 2018).

In relation to the philanthropic institutions contracted for the receivment of edible food from the BA of the Federal District, according to elements provided, there are 132 entities. The predominant public are children from zero to five years of age, from kindergartens and care-taking facilities, which correspond to 45% of the total public, totaling the largest amount of distribution of donated food.

In comparison to the data available from the BA of Irajá-RJ, there are 200 institutions, these being kindergartens, hospitals, nursing homes, recovery centers, among others. All donated in natura foods are received from farmers throughout the Market of the State Supply Centers (CEASA) of Rio de Janeiro (RJ) and the non-perishable are from the supermarket network Carrefour.

Although the data provided refer to the year 2019, the values found in the literature for comparison refer to the year 2018, because the values are disclosed only at the end of the year.

When comparing the amounts of accredited entities in other regions, we obtained as results 193 institutions in Porto Alegre-RS, 60 entities in the Metropolitan Region of SP which refers to the lowest value found, but the data found for this amount of SP was from the Brazil Table Program, as no data was found directly from the BA, and in Portugal about 75 institutions. All the BA mentioned have in common the predominant audience of children and adolescents (Associação Prato Cheio, 2018; Banco de alimentar, 2019; Banco de Alimentos de Porto Alegre, 2018).

Food unsuitable for human consumption is intended for the manufacture of composting and/or animal feed. Given this, it is remarkable the total utilization of the food received in the BA (BELIK, 2012). However, in this study it was not possible to identify how food distributed to the entities would be wasted.

According to the data shown in Figure 1, it is noted that there was oscillation in the first half of 2017; both in the BA of Irajá-RJ and in the BA of Brasilia-DF, but in the RJ presented a considerable increase in food waste in February.

In relation to the 2018 data, a reduction in usable foods was observed in the BA-DF, resulting in an increase in discarded foods in April. In the RJ, the values used follow a sequential line between the first half of the year, with few oscillations, but the months of August and September show a reduction compared to the other months (Figure 2).

The utilization of the registered foods was approximately 80%, with the exception of the months of February 2017 in the RJ and April 2018 in the DF. Therefore, it is important to highlight the importance of BA, because the foods that could be discarded and consequently wasted are destined, through donations, to the associated institutions (Figure 1 and 2).

When comparing the data referring to the second half of the year, it is noticed that in both years and States there approximates the percentages of entry and disposal (Figure 1 and 2).

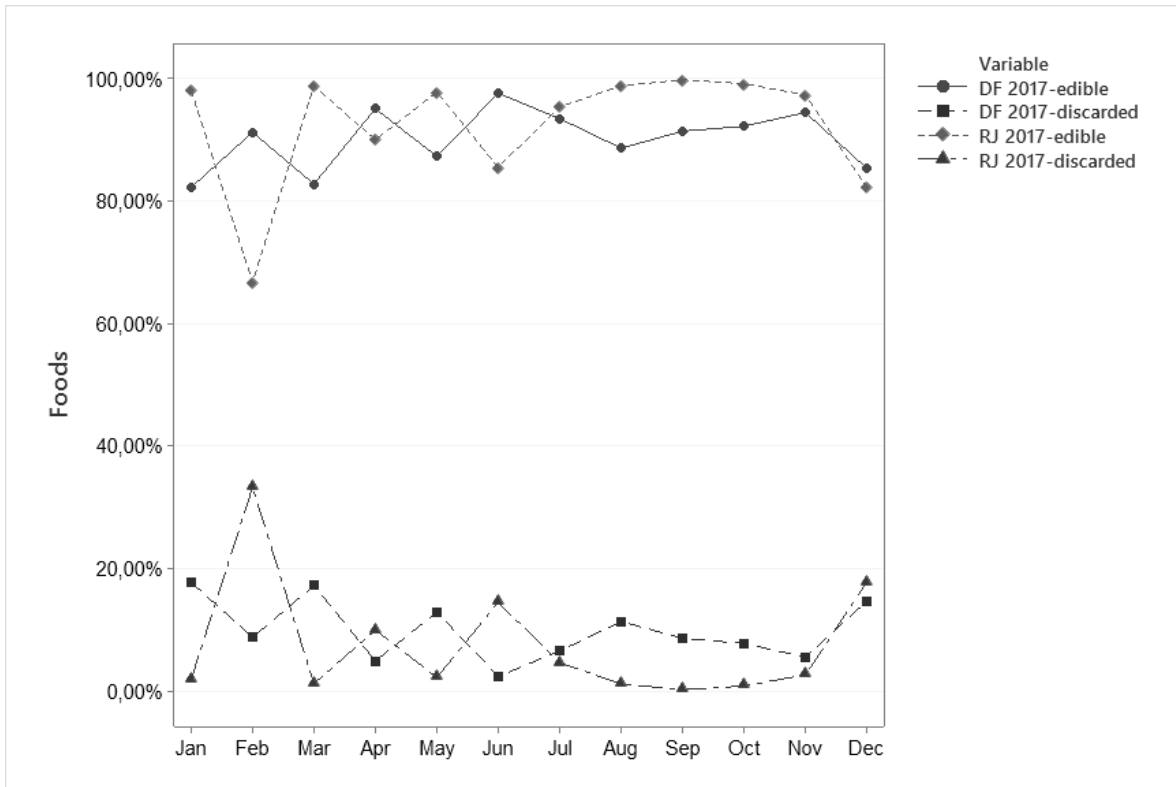


Figure 1. Comparison of the values of edible and discarded foods in the Food Banks of Brasilia-DF and Irajá-RJ in 2017.

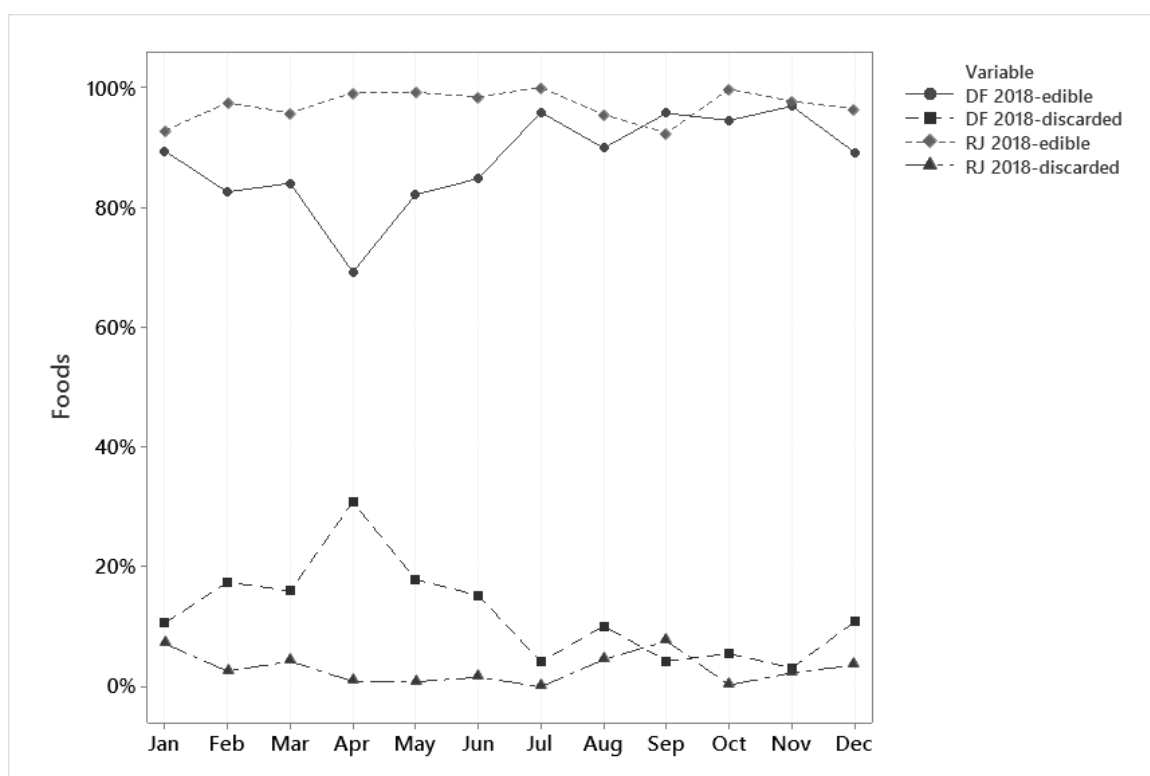


Figure 2. Comparison of the values of edible and discarded foods in the Food Banks of Brasilia-DF and Irajá-RJ in 2017.

Source: The authors, using information from the Food Bank of Brasilia-DF and Irajá - RJ, 2019.

According to the annual reports of the BA, in 2017, 338 tons of food were collected in Brasilia-DF and 288 tons of food in Irajá-RJ. Data referring to other localities in the country demonstrate that there was no pattern in the amount collected as seen in Porto Alegre-RS (1,857 tons), in the Metropolitan Region of São Paulo-SP (217 tons) (ASSOCIAÇÃO PRATO CHEIO, BANCO de ALIMENTOS de PORTO ALEGRE, 2017).

However, in 2018 there was an increase in food collection in Brasilia-DF (344 tons) and in Irajá-RJ (590 tons). In comparison to the same year, Porto Alegre-RS received about 769 tons, a smaller volume that may be associated with climatic situations, and in the Metropolitan Region of São Paulo-SP approximately 277 tons, being considered the lowest amount of food received among these (ASSOCIAÇÃO PRATO CHEIO 2018; BANCO de ALIMENTOS de PORTO ALEGRE, 2018).

In international food banks there is a greater amount of edible foods as for example the BA of Portugal, located in a relatively small and developed country. When comparing with the data found in some BA in Brazil, it is noted that the amount of food collected is higher, in the year 2018 were 7,768 tons of food, this may be related to the awareness of the population on the topic, the collaboration of supermarkets through campaigns and the consolidation of Portugal as a member of the

European Federation of Food Banks (BANCO ALIMENTAR, 2019).

Reinforcing this positive scenario, the receipt of food comes from surpluses of agricultural production, food businesses and the program with the European Union. There is also solidarity in relation to the distribution of food both for entities and through meals made for people in need. This entire program aims to combat hunger and social exclusion (BANCO ALIMENTAR, 2019).

It is noteworthy that the differences between the quantities received in BAs in Brazil may be associated with the influence of natural phenomena and especially climate changes that affect production and consequently donations (MATTSSON, et al., 2018).

It is known that the food received goes through a selection process in the BA where it is possible to separate the food fit for consumption from the discarded, analyzing the data collected in this study, a greater amount of edible food was observed, which can strengthen the prevention of food and nutritional insecurity. No values were found for comparison with other food banks because in these the data was reduced only to the amount of food received.

This profile of greater food use is reinforced by the trend in BA-DF in 2019; we can note that there is a continuous increase in the amount of edible foods and consequently a decrease in discarded foods, during the analyzed period (Figure 3).

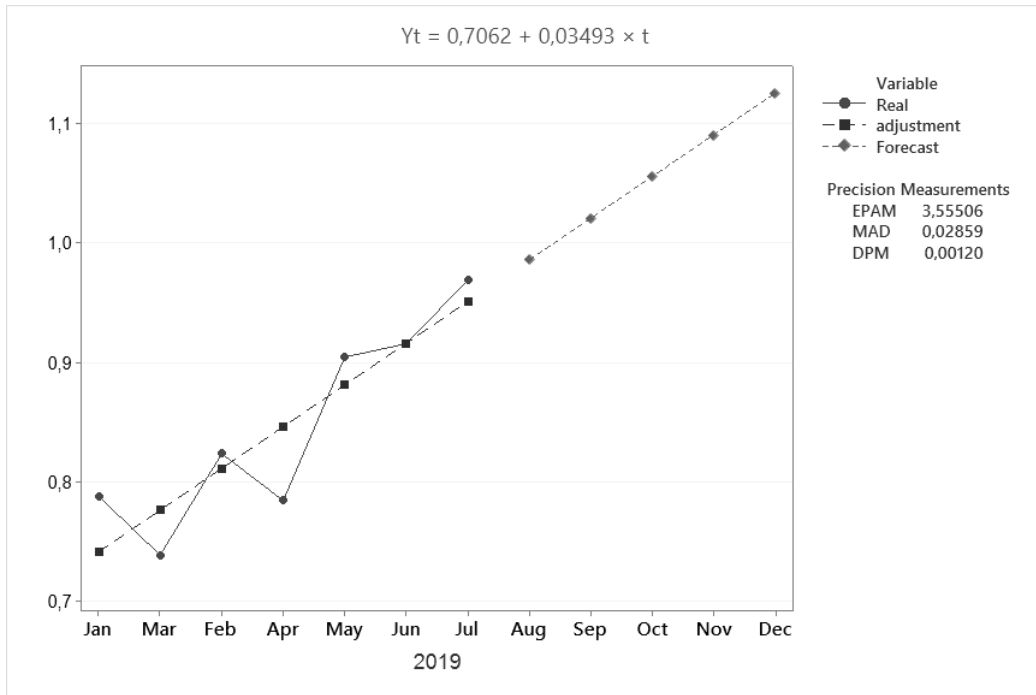


Figure 3. Trend analysis for edible food in the Food Bank of Brasilia-DF in the 2nd half of 2019

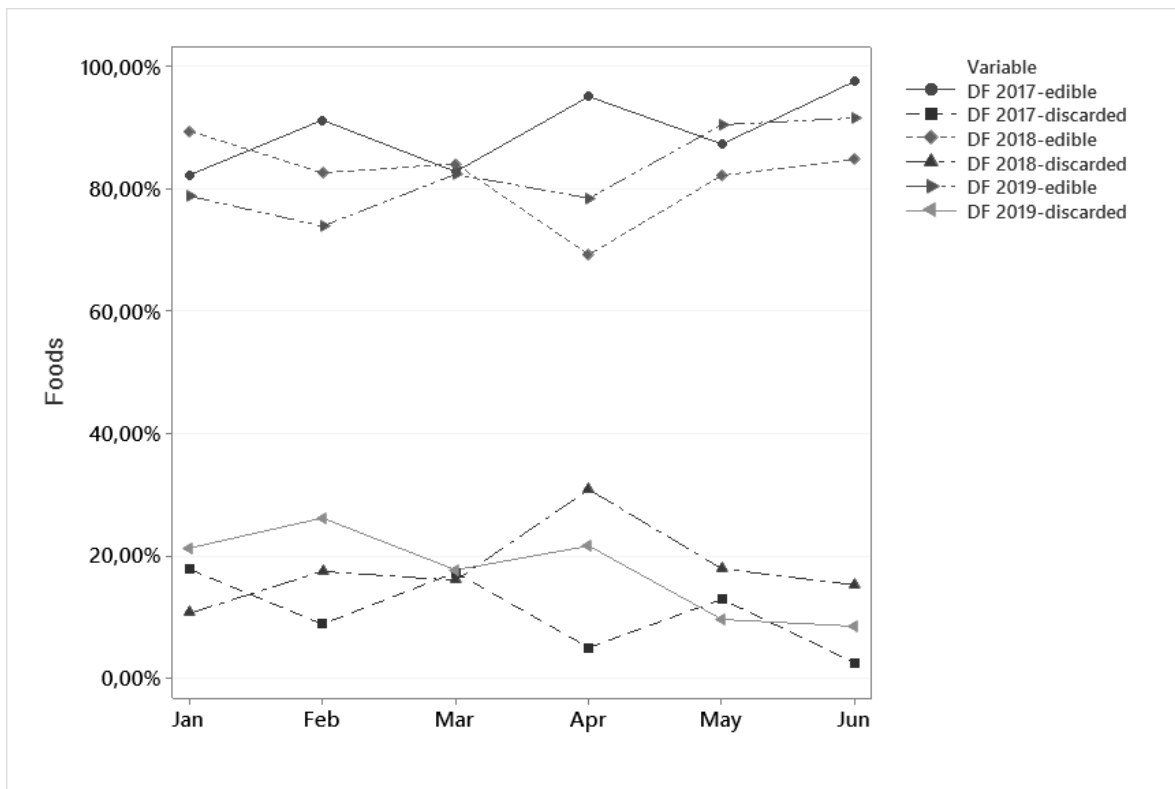


Figure 4. Comparison of the edible and discarded foods in the Food Bank of Brasilia-DF in the 1st half of the years of 2017, 2018 and 2019.

There are increasing projection lines for edible food. We did not find a projection study in relation to the edible foods in the BA in existing literature. However, according to FAO (2019) an estimated 60% increase in food production by the

year 2050 may increase the entry of food into the BA along with programs created to ensure guarantee of meals, hunger eradication goals and humanist awareness actions (NASCIMENTO, 2018).

The values of edible and discarded foods in 2019 were related to the data of the first half, comparing the same period with the years of 2017 and 2018; it is noticeable that the behavior of the data is similar. We highlight a common result comparing the three years of the semester, referring to the month of March where the values were approximately 82%, however this pattern is not repeated in the other months of 2017 (Figure 4).

Given the result found in this study, the importance of BA is observed; all food still proper to human consumption that would be wasted is sent to philanthropic organizations and aims to ensure adequate food to needy individuals. However, to improve BAs in Brazil it is necessary to publicize the work done in a general for the population and to implement a voluntary system to collect.

Conclusion

It was not possible to establish a complete flow between origin and destination of food in the BA due to the scarcity of data over the entire collection chain. There are also other limitations in the execution of this study such as the resistance in the disclosure of data and the absence of data regarding the use and waste of food in institutions that are benefited through the BAs.

It is suggested that new research should analyze the amount of food used and discarded in entities that acquire food from BAs, with the intention of checking if there is waste on their part.

Even in the face of these limitations, there is the important function of BAs, foods still fit for human consumption, which would be discarded, are intended for philanthropic entities and used in social actions. Food considered unfit for human consumption is intended for composting and / or animal feed contributing to reduce food and nutritional insecurity.

Measures should be implemented to increase the knowledge of the population regarding the benefits of donation and contribution to BA. In this context, the nutritionist with a training that includes nutritional knowledge inserted in the social reality of our country can contribute to the improvement of BA aiming at reducing food waste, sustainability and especially food and nutritional security.

In relation to the entities it is necessary actions such as food handling training for the staff responsible for the preparation of meals, nutritional interventions through lectures and dynamics emphasizing food and nutritional education in order to raise awareness of the people involved and present the various modes of integral use of food. Because this understanding can influence in a positive way, avoiding waste generated in organizations.

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