Urban family's food insecurity, Mozambique, 2015.

Ganhão C,[1] Sperandio N,[2] Pires P,[1] Santos A,[1] Boaventura C,[1] Lopes S,[2] Oliveira B,[2] Priore S,[2] Salavessa J,[1] Bressan J.[2]

[1]Faculty of Health Sciences, Lúrio University, Nampula, Mozambique.
[2] Federal University of Viçosa, Viçosa, Minas Gerais, Brazil.

Email address of corresponding author, Paulo Pires – druidatom@gmail.com

Abstract

Context: Nampula is the third largest city in Mozambique, under a strong rural – urban migration. Here is Mutauanha neighbourhood, highly populated with several weak urban, demographic and social factors associated with food insecurity. Surrounding Lúrio University Health Sciences Faculty facilities, made it eligible to develop a research and health education program, "One student, one family". Its main objective is students' interaction with local communities, providing close and continuous contact throughout the students' training process, with the community's daily problems, following 350 families. In Mozambique, there is not a validated method to assess food insecurity, but international methods can be adapted successfully to evaluate food insecurity, allowing an accurate assessment (prevalence and determinants) in urban families living in Nampula.

Methods: descriptive, cross-sectional study with informed consent of 103 families, followed by undergraduate students in 3rd year Nutrition Course, duly guided and accompanied. We applied the American Food Security Scale to determine food insecurity and a structured interview about social and economic information. To evaluate food insecurity determinants, Chi-square tests were used for categorical and Pearson correlation for numerical variables. A significance level of 5 % was adopted.

Results: food insecurity attains 65 % of families in Nampula city. Average families' monthly income per capita was 697.52 Meticais (± 10 US$, 0,33 US$ / day). Children under five years of age low weight, chronic undernutrition and overweight prevalence were 5.2 %, 24.2 % and 20.7 % respectively.

Discussion: food security was associated with domestic food production ($p < 0.05$) and use of treated water for food preparation ($p < 0.05$). Correlation test regarding numerical variables showed that the lower the yield, the greater the food insecurity ($r = -2.92$; 0.01). The most important determinant of food insecurity was low household income per capita.

Conclusion: we demonstrate a high prevalence of food insecurity among urban families in Nampula, Mozambique. Low family income may be the main barrier to access adequate food.

Key words: family, food insecurity, hunger, nutrition, poverty, undernutrition, urban.

1. Introduction.

Food and nutrition security means accomplishing everybody´s right to physical, economic and sustainable access to adequate, harmless, nutritious and acceptable food, in a cultural context, to meet food needs and preferences to lead an active and healthy life. [1] Hunger and undernutrition are main manifestations of food insecurity, and the inability to

access food resulting from poverty is the main determinant of food insecurity (not having regular access to adequate food).

Estimates indicate that 805 million people (one in nine of the world's population) were chronically undernourished in the 2012 - 14 biennium, lacking food for an active and healthy life. Most people with hunger live in developing regions. There was a 42 % reduction in undernutrition prevalence comparing 1990 - 92 biennium with 2012 - 14. However, one in eight people, about 13.5 % of the population, remain chronically undernourished in these regions. [2]

The African continent presents insignificant results to reduce undernutrition and Sub-Saharan Africa is home to more than a quarter of the world's population with undernutrition, due to an increase of 38 million people suffering this problem since 1990 - 92 biennium.

Mozambique Health and Demographic Survey 2011 (MHDS 2011), estimated moderate chronic undernutrition or short stature for age at 43 % in children under five years of age, and 20 % severe chronic undernutrition. Acute malnutrition or low weight for height affected 8 % of children, 6 % with moderate acute undernutrition and 2 % with severe acute undernutrition. Low moderate weight affected 15 % of children and severe low weight 4 %. [3]

Population's undernutrition rate and distribution depends on many factors: political and economic situation, level of education (especially of woman or child care provider), clime, food production, family income, occupation, household size, culture, eating habits, breastfeeding, housing, access to safe drinking water, sanitation, prevalence of infectious diseases, existence and effectiveness of nutrition programs and the availability and quality of health services. [4, 5]

Mozambique has a young population, low school level (mainly women), worst in rural areas, without access to safe water and basic sanitation, low family income, large families with many children, the main occupation being subsistence agriculture and fishing. Access to health services is weak, with high maternal and children up to five years old mortality rates. Infectious diseases as malaria, tuberculosis, acute diarrhoea, acute respiratory infections and HIV are the most common killers.

North provinces have the worst developmental conditions and Nampula and Cabo Delgado have the highest prevalence of chronic undernutrition, 55 % and 53 %, respectively. Nampula province (the most populous in the country), in rural areas, has agriculture and fishing as the livelihood of families, depending on whether they are inland or on the coast. In cities like the province capital (Nampula) it is mainly the informal market supporting population' subsistence. General education level is low, as well as family income, households are numerous, with low water supply, scarce basic sanitation and solid waste treatment almost non-existent. Nampula city has grown at an unprecedented rate, expanding all its neighbourhoods, with an underestimated annual population growth rate of 2.4 %. [6]

All these factors contribute to food insecurity throughout the country, at high costs, affecting social and economic trends at family and national levels. At family level, health costs and low productivity increase greatly, affecting the most vulnerable, including women and children. At national level, social, political, juridical and investment risks are high demotivating investors and increasing unemployment. According to current data on

malnutrition (43 %) there is a loss of productivity of 2 – 3 % of gross domestic product, equivalent for the country to 300 - 500 million US dollars per year. [7]

Mutauanha is one of the most populated Nampula's neighbourhoods, with low access to drinking water, basic sanitation and others. Located around Health Sciences Faculty (HSF) facilities, this neighbourhood is a target to implement the "One student, one family" Program (One-SF), the Community Health discipline field activities aiming to promote health education in local communities. Many families here are followed by HSF students, including Nutrition course students.

The national nutrition health sector, has not developed yet a valid scale to assess food insecurity in the country. Nevertheless, scales created internationally can be adapted and used to estimate food insecurity prevalence.

Our research goal is to evaluate family's food insecurity and malnutrition prevalence and its association with demographic and social factors. Our study may contribute to target One-SF Program effective strategies on health education and to be a step for further research in the province.

2. Methods.

Descriptive cross-sectional study, carried out from February to March 2015, in families included in the One-SF Program living in Mutauanha, Nampula city. The sample was calculated using the *STATCALC* program of *EPI-INFO 6.04*, according to a prevalence of 55 % of chronic undernutrition, with a level of significance of 95 % and a maximum error of 5 %: 168 subjects, representative of the study population. Families that did not agree to participate, those which were not found in residences at the time of the interview and those whose family responsible was not present during data collection, were excluded.

To evaluate chronic undernutrition prevalence, a child under five years old was chosen in each family, if there was one, and if there was more than one, only one was randomly selected. Data collection was done at families' households and used a semi-structured questionnaire, with open and closed questions, adapted to local reality and language.

Anthropometric evaluation.

Family´s children and adult members anthropometric evaluation were performed with weight and height scales, daily calibrated, following World Health Organization (WHO) norms. [8] To evaluate children, height / age and body mass index (BMI) / age indices were used. Children's weight, length and height were classified using software *Antro® WHO*. They were expressed in Z score and compared with the reference population. [9] The index used for adults was BMI, and the cut-off points were those recommended by WHO. [10] Initially, it was intended to evaluate all household members, but not everyone agreed to do so or were not at home at the time of the interviewers' visit.

Food insecurity assessment (American Food Insecurity Scale).

We evaluated "Food insecurity" using the United States Department of Agriculture's (USDA) Food Security Scale short version, with six questions to the responsible for home feeding in the 12 months prior to the interview. This scale generates a score from zero to six. Depending on the answers, zero or one point should be given, generating a score calculated summing the points. Families are considered safe if they have score 1, unsafe without hunger with a score between 2 and 4 and

insecure with hunger with a score of 5 or 6.

A pilot study was carried out in the community to adapt data collection instrument, to screen question's understanding problems and the need to withdraw or increment information.

We used *Statistical Package for Social Sciences 20.0* (SPSS) software for data analysis. To verify determinants of food insecurity we used Chi-square tests for categorical variables and Pearson correlation for numerical variables. A significance level of 5 % was adopted.

Ethical considerations followed all Helsinki Declaration (2013) recommendations. To participate, the family head was explained and signed an Informed Consent Term. Children and adults identified as undernourished or obese were referred to the nearest health unit.

3. Results.

Target group.

We evaluated 635 individuals in 103 household (29.4 % of "One Student, one family" program followed families), including children, adolescents and adults. Only one person in each household answered the questionnaire, but all household members were included. Female were 50.4 % (n = 320). Children had a mean age of 4.06 ± 2.45 years, adolescents 13.85 ± 2.85 years, and adults and elderly 31.35 ± 8.35 years. Table I shows household responsible social status.

Table I: families' responsible.

Families' responsible characteristic (total subjects)		% (number)
Marital status (635)	Single	70.7 (447)
	Living together	21.8 (138)
Profession / occupation (628)	Unemployed	83.6 (525)
Education (341)	Completed primary education	58.4 (201)
Disease history (554)	Malaria	38.4 (213)

Housing.

Housing conditions are poor in this area of town, with large families, and more than 40 % have subsistence agriculture to access food. Table II resumes household's characteristics and table III shows households' food production and types.

Table II: households sample characteristics.

Households characteristics	% (number)
Number of family members.	(6 ± 2, minimum 2, maximum 10).
Cement houses, zinc-roofed, with latrine or exclusive fossa, mean number of divisions 3.	89.5 (92)
With water from public grid.	59.4 (61)
With electricity supply.	79.8 (82)
Not treating drinking water.	46.2 (48)
Not treating water for food preparation.	65.1 (67)
Using coal for cooking.	83 (85)
Garbage destination in the open.	54.3 (56)

Table III: household food production.

Characteristic	% (n)
Food production	
Yes	40,8 (42)
No	59,2 (61)
Total	**100,0 (103)**
Type of production	
Animal	2,4 (1)
Vegetable	90,5 (38)
Both	7,1 (3)
Total	**100,0 (42)**

Most household's production destiny is self-consumption (83.3 %, n = 35).
Food preservation was carried out mainly in sacks (20.6 %, n = 21) and in sacks inside a refrigerator or freezer (24.7 %, n = 25).

Nutrition.

We evaluated the nutritional status of 71 adults in 103 households and 58 children (households with at least one child under five years of age). Children birth weight data were collected from the Child Health Card, showing an average of 3,130 ± 0.56 kg. Table IV presents subject's nutritional status.

Table IV: food insecurity and malnutrition prevalence.

Variable		% (number)
Adults (71)	Under weight	49,3 (35)
	Normal weight	29,6 (21)
	Overweight	21,1 (15)
Children < 5 (58)	Under weight	5,2 (3)
	Chronic under nutrition	24,2 (14)
	Overweight	20,7 (12)

Regarding food insecurity, 69 % (n = 49) adults and 53.4 % (n = 31) children belonged to food insecure households. Chart 1 shows 65.1 % (n = 67) families were food insecure.
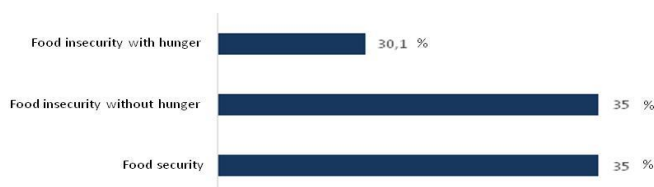

Chart 1: household's food insecurity prevalence.

Rent. Families' average monthly income is 4.185 *Meticais* (per capita 697.52 ± 652.79 *Meticais* about ± 10 US $), slightly over the national minimum salary (approximately

3.500 Meticais, about ± 56 US $). However, other families referred 16,000 Meticais monthly, about five times the national minimum wage. [11] Table V shows households' income average per capita in quartiles referring 78 respondent families.

Table V: quartiles distribution of *per capita* income average.

Per capita income	Total (n)	Mean	CI 95 %[*]
1st quartile	22	250.00	187.5 – 357.15
2nd quartile	13	464.30	37.,0 – 550.0
3rd quartile	29	1,000.00	770.84 – 1,250.0
4th quartile	14	2,405.00	1,500.0 – 2,683.3

[*]CI = Confidence interval.

4. Discussion.

The 103 households study group is gender equivalent, most men work outside, and women stay at home.

The Mozambican population is very young, with a low degree of literacy and poor working conditions. The majority lives on their own food production or on their business in informal market.

Mutauanha population has a very similar profile and the fact they survive mainly with unstable incomes contributes to insecure households. Malaria is one of the most frequent diseases in Mozambique and the main cause of death. Households living with poor water and sanitation, who do not properly treat their waste neither use mosquito nets are more likely to get the disease. There are also other pathologies prevalent in Nampula, but many are not properly diagnosed, and subjects do not know they have them.

In Mozambican rural areas, most houses do not have running water, sewerage, electricity and are made of sticks with grass roof. In peripheral areas growing around cities, the closer they are to the city as Mutauanha, the better the housing, water and electric power supply, [12, 13] but garbage treatment, drinking water and cooking fuel issues are not ideal. Many studies show that populations with the above characteristics have a high prevalence of food insecurity. [14, 15, 16, 17]

In communities living in urban areas, many families do not have agricultural production, because they work in another activity or because they lack suitable land to seed. In Mozambique, families are mainly engaged in growing plant products in the "*machamba*" and animal production is not so frequent. As these families live close to Nampula city, with high demographic density, it is not easy to have land and conditions to raise animals. Families producing vegetables do it in "*machambas*" far from their homes in the city. Food producing families refer that most production is for own consumption. However, in Mozambique, the sale of these products is more frequent, disregarding immediate consumption and household food needs supply after production seasons. [18]

These urban peripheric areas have different households in terms of economic capacity: houses and land have a lower price, allowing families to have a little better purchasing power. Electricity access also makes it possible, together with purchasing power, allowing families to have refrigeration equipment to preserve food.

The Technical Secretariat for Food Security and Nutrition (SETSAN) baseline study in 2013 showed results in

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line with those previously found in the MHDS 2011: chronic undernutrition prevalence remains very high (43 %) in the country; Nampula is the province with the biggest problem with a prevalence of 55 %. In Mutauanha families, adult's undernutrition prevalence is 49,3 % and 50 % of children are eutrophic. Some families improved their living conditions and managed to reduce chronic malnutrition prevalence. According to SETSAN study, food insecurity is more prevalent in rural than urban households, declining from 35 % in 2006 to 24 % in 2013, [19] but its methods were different from those used in Nampula and this may lead to a prevalence discrepancy. In any case, the prevalence is high, especially chronic food insecurity.

Table V shows a low rent and heterogeneity in Mutauanha families' per capita income average in quartiles and the levels of earned family income.

Household food security (n = 103) is related to different demographic and social factors and we identified positive associations with domestic food production ($p < 0.05$) and the use of treated water to prepare food ($p < 0.05$). Regarding numerical variables, the correlation test showed that the lower the income, the higher the food insecurity (r = -2.92, 0.01).

Several studies show that households whose composition is single-parent, those in which one of the adult parents is illiterate, in which there is no formal work, in which the *per capita* monthly income is below the national minimum wage, whose household is large, where one of those responsible suffers from chronic illness and living in a more rural area, have a high food insecurity prevalence. [20] Some of these variables were not associated with food insecurity in our study, disagreeing other studies trends.

Study limitations.

We evaluated 103 households, 65 fewer than the calculated sample due to absent and non-volunteering household responsible. The sample is not representative of all One-SF Program families and some data could not be collected (anthropometric measures of most household' adults). Adults and children samples size are small to relate nutritional status to insecurity and we did not test association between variables. The scale used to evaluate food insecurity is not yet validated to Mozambican population, what may have influenced results. Other potential confounding determinants of food insecurity (disease, household responsible profession, religion, cultural aspects) were nor evaluated in this research.

5. Conclusion.

Mutauanha families show a trend to improve living conditions as housing, water and energy supply. However, these families have a vulnerable profile with a high prevalence of food insecurity. Inadequate access to food may be due mainly to low family income, since it was the low *per capita* household rent, the most important determinant of food insecurity.

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