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Multidimensional poverty: an analysis based on the functionings, dimensions and weights attributed by the families of the Ilha das Onças - Pará, Brazil

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ABSTRACT
Aiming to assess the multidimensional poverty of Ilha das Onças - Metropolitan Region of Belem, Pará, Brazil, we use Sen's Capabilities Approach, with the objective of defining the dimensions and functionings indicated as priorities by the studied population itself. We build a multidimensional poverty indexes (MPIs) adjusted according to the needs of the local population, using Alkire and Santos (2010) methodology. Field research was carried out during November and December 2018 interviewing 80 families. Four versions of the MPI were calculated. From the original version from Alkire and Santos (2010) to a version adjusted by the proposed dimensions and their respective weights attributed by the interviewees consulted in the field work, which we refer to as the MPI_{isle}. The results show that the inclusion of what people consider important, to be or to do, reveals deprivations not generally considered by indexes constructed from exogenously determined weights, as in synthetic indexes.

KEYWORDS
Multidimensional poverty, Territorial dynamics, Living conditions in the Amazon

Pobreza multidimensional: uma análise a partir dos funcionamentos, dimensões e pesos atribuídos pelas famílias da Ilha das Onças - Pará, Brasil

RESUMO
Visando avaliar a pobreza multidimensional da Ilha das Onças - Região Metropolitana de Belém, Pará, Brasil, utilizamos a Abordagem das Capacitações de Sen, com o objetivo de definir as dimensões e funcionamentos apontados como prioritários pela própria população estudada. Construímos índices de pobreza multidimensionais (IPMs) ajustados de acordo com as necessidades da população local, utilizando a metodologia de Alkire and Santos (2010). A pesquisa de campo foi realizada durante os meses de novembro e dezembro de 2018 entrevistando 80 famílias. Quatro versões do IPM foram calculadas. Da versão original de Alkire and Santos (2010) para uma versão ajustada com dimensões e pesos atribuídos pelos entrevistados consultados no trabalho de campo, a que nos referimos como IPMilha. Os resultados mostram que a inclusão do que as pessoas consideram importante, ser ou fazer, revela privações geralmente não consideradas pelos índices construídos a partir de pesos determinados exogenamente, como nos índices sintéticos.

PALAVRAS-CHAVE
Pobreza multidimensional, Dinâmica territorial, Condições de vida na Amazônia.

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1. Introduction

The Amazon region is known worldwide for its immense socio-environmental diversity and for containing the largest tropical rainforest on the planet. An invaluable source of environmental services, the Amazon rainforest has been a constant cause for concern among scientists, environmentalists and non-governmental organizations. These concerns stem from the recent rates of deforestation that are associated, to a large extent, with the advance of the agricultural frontier as well as logging and mining activities, within the forest (INPE, 2020; Walker et al., 2000; Barreto, 2008; Fearnside, 2008).

However, to a lesser extent, but no less importantly, the intense urbanization process that has been underway in the recent decades in the region has been carefully observed (Cardoso et al., 2015; Browder and Godfrey, 1997). Today, an estimated 80% of the Amazonian population lives in cities. Among the sub-areas of the Brazilian Amazon that has been most affected by the process of urbanization and growth in the number of people living in cities, the Eastern Amazon sub-region[1] stands out, being an area that is largely polarized and still overwhelmingly influenced in terms of urban centrality by the growth of the Metropolitan Region of Belem (Cardoso et al., 2015).

Also, as a reflection of this broader urbanization process, the expansion of the Metropolitan Region of Belem (MRB) in recent decades has led to an immense process of population concentration in its surroundings. Today, this population represents around 30% of the entire population of the State of Pará (one of the largest and most populous states in the region), with approximately 2.5 million inhabitants. Encompassing, in addition to the municipality of Belem, several other municipalities and an immense archipelago of river islands.

Furthermore, there is an important industrial area in the neighbouring municipality of Barcarena; which, together with the growth of the MRB, represents a very clear expression of the importance of the recent urbanization process underway throughout the region of the Amazon River estuary[2]. An area that, therefore, while preserving a territorial identity linked to typical features of lowland areas, rivers and forests in the Amazon, is, at the same time, suffering the direct and indirect effects of the growing and ongoing urbanization across the region of the estuary that makes up the Brazilian East Amazon sub-region.

Thus, just in the surroundings of the city of Belem, in its immense archipelago,

[1]The sub-region includes the States of Pará, Amapá, Tocantins, Maranhão and Mato Grosso.

[2]Specifically, linked to the case of the vicinity of the MRB, there is the mouth of the huge Amazon River, which on the south bank of the Marajó Island archipelago forms the Guajará Bay. The topography of which is dominated by islands, pools and waterways, and which today encompasses countless small urban centres whose main axis of centrality is the Metropolitan Region of Belém (Trindade Júnior, 1998; Cardoso et al., 2015; Guerra, 2003). In general, the "island region of Belem" (located close to the city centre) is mainly inhabited by a population whose main activity is the extraction of açaí and the fishing of shrimp and fish, both for commercial purposes as well as for own consumption.

there are approximately 39 islands, constituting 65% of the total area of the municipality, all suffering direct and indirect impacts from the wider process of recent urbanization in the region. This characteristic is reproduced in the other municipalities within the metropolitan region, and in its immense island hinterland, which includes 10% of the municipality's population[3].

In a complementary phenomenon to the ongoing urbanization process, several municipalities neighbouring the MRB have become independent in recent decades, incorporating some of the islands in the Amazon estuary. Outstanding among those islands, the Ilha das Onças, which today is part of the municipality of Barcarena, is one of the largest and most important islands within the MRB. Therefore, it represents a very particular object of analysis, when seeking to assess the living conditions of the region's riverside populations.

Hence, we can say that the Ilha das Onças is an island area displaying Amazonian territorial, urban and rural features (Cardoso et al., 2015) due to its proximity to and the influence of the radiated urbanization processes of both the metropolitan centre of Belem and the industrial area of Barcarena. Thus, it experiences strong impacts of the broader urbanization process in the entire Amazon region.

Therefore, in view of its relationship and proximity to both dimensions (rural and urban) that characterize the territorial space of the islands near Belem, the Ilha das Onças thus represents an important object of study when assessing the most immediate impacts of the urbanization process and territorial changes on the living conditions of the Amazonian riverside populations in the vicinity of its large urban centres. For, while preserving some characteristics typical of Amazonian rural regions, the population increasingly aspires to more urban lifestyles. According to recent studies, which are seeking to deep the analysis on the conditions of social vulnerability of traditional populations in the Amazon, the relationship between poverty and urbanization must be evaluated in the specific context in which territorial transformations have historically taken place in a given region. It all depends on how the process of transition and guarantee of rights and guarantees of access to land takes place. This very division between urban and rural is questionable as a starting point for the discussion.

Taking the specific territorial features of the Ilha das Onças into account, this study seeks to assess the multidimensional poverty among its riverside population, as well as to investigate the aspirations and perceptions of the residents in relation to their deprivation. To do so, the theoretical and methodological tools of the Amartya Sen's capabilities approach (2018) are used, which in recent decades has proposed methods for assessing the multidimensional aspects of poverty that value the dimensions or functionings considered to be priority by the investigated population.

To assess the development of the human capabilities considered relevant by the

[3]In general, the "Belem Island" region (located close to the city centre) is largely inhabited by a population whose main activity is the extraction of açaí and the fishing of shrimp and fish, both for commercial purposes as well as for own consumption.

resident population in seeking to have a good life, field research-based qualitative and quantitative analyses were conducted using a questionnaire designed and applied to assess the living and territorial conditions that effectively permit or limit the expansion of the substantive freedoms that people are able to obtain from the place where they live (Sen, 2018).

Several studies conducted in accordance with Sen's multidimensional poverty perspective have sought to assess the level of poverty using synthetic indicators built from fixed dimensions. In a supplementary way, in this study, the dimensions, functionings and choices made by people in their own living environments are compared with the dimensions conventionally used in the literature on multidimensional poverty. The main hypothesis underlying this approach is that the deprivation of basic conditions of existence depends on the effective conditions that people find in the territories and places where they live (such as electricity, drinking water, schools, safety, etc.). In this way it should be possible to characterize a situation of poverty that is specific to the territory. In such specific situations, income deprivation alone or personal attributes related to the levels of human capital of the individuals are often found to be secondary in relation to other aspects.

Accordingly, the present study proposes to build an adjusted multidimensional poverty index (MPI_{isle}) for a specific region of the Amazon estuary, which has a series of specific territorial features. To this end, Sen's capabilities approach and suggestions for assessing the valued functionings considered relevant by the resident population will be adopted. The basic calculation procedures are inspired by (Alkire and Foster, 2009). However, the other stages involved in constructing the index will be defined based on the data collection and the elements identified in the interviews with the local population.

Therefore, in this article, the original theoretical proposal from Sen (1985, 1988, 1993, 1995, 2018) is used as rigorously as possible to measure poverty. The aim being to construct more effective instruments to assess the substantive freedom of the population located on the Ilha das Onças, who at the same time contribute to the identification of the dimensions and determining their respective weights[4]. With this, it is intended to identify and describe the dimensions most strongly affected by the recent territorial dynamics in the region, as well as those that are prioritized as the most important by the local population.

To achieve these objectives, in a first part of the article, the central theoretical aspects fuelling the debate on the conditions of multidimensional poverty are discussed in the light of Sen's capabilities approach. In the second part, there is a review of the literature on the territorial characteristics of the region under study. This is followed by a description of the empirical methodology adopted in this study. And, finally, the

[4]The universe of people living in these families comprises a total of 335 people who were sampled to investigate the influence of the territorial dimension and the degree of deprivation and choice of priority dimensions that the people of the island value.

results and final considerations of the study are presented and discussed.

2. Theoretical-Methodological Framework

Poverty, through the lens of Sen's capabilities approach, Sen (1981, 1985, 1988, 1993, 1995, 2018), is seen as a state of deprivation of individuals in which the capability of individuals to be and do is taken into account. In other words, it does not represent a state of deprivation of means (such as income) alone, but consists of a state of deprivation of "capabilities" (substantive freedoms) to carry out the "functionings" (ends) that people are right to value.

The term "functionings", however, has two important connotations for the capabilities approach, which should be explained to facilitate the theoretical understanding of the problem posed here. First, the achieved functionings have the purpose of assessing the effective state of things that people can have, be or do (for example: having health, education, security, employment; or being an economist, lawyer, doctor; or even, walking cycling, doing sports, cooking). In a second sense, there are the "valued functionings", which refer to what people want or consider to be priorities or relevant to their lives. In this sense, the term "functionings", has the objective, which is extensively explored in this study, of representing states of affairs that people consider important, in addition to assessing whether or not they are capable of effectively achieving them, (Sen, 1981, 1993, 1995).

In line with Sen's capabilities approach (1993,1995) towards assessing inequality and well-being, we emphasize the assessment of the state of deprivation of the individuals and their levels of quality of life and broader functionings. In adopting this strategy, we seek to assess the ends, not only the means to achieve the valued functionings. With this purpose in mind, we combine several dimensions, thus broadening the informational space to facilitate the direct assessment of substantive freedom.

Thus, in order to assess the real condition of poverty of a population, according to Sen (1981, 1993, 1995), one must observe all those aspects that are important (both constitutively and instrumentally) for those people, as well as the institutional conditions of the local environment that influence the right of access to resources (entitlements) that they need to maintain their fundamental livelihoods (Sen, 1981). The set of these elements and concepts - developed over the course of the theoretical elaboration of the capabilities approach -, and the methodological choices available and developed from then on, must be able to assess to what extent people are really individually and socially capable of achieving the functionings they desire or have reason to value (Sen, 1988; Nussbaum, 2000). Thus, it may be that people with the same levels of achieved functionings may have different levels of freedom of choice in relation to the achievement of those same functionings. Which, from the point of view of the approach adopted here, can represent different levels of poverty or conditions of substantive freedom.

Therefore, it is necessary to bear in mind that income and other available means are instruments for promoting well-being and the real potential of using these means, and the interest in doing so must be assessed as an important dimension to be observed; being a measure of the degree of substantive freedom that individuals are able to exercise from the effective ownership and right of access to those means. In this context, the availability of the means must always be assessed considering their conversion into achieved valued functionings or that can be universally considered as basic components of their level of well-being (NUSSBAUM, 2000). This expands the notion of poverty, rather than restricting it to income or means, in general, as a generator of capabilities. This also implies addressing the issue of how to approach the absolute and relative aspects of poverty, which must be dealt with very carefully[5].

According to Nussbaum (2000), the capabilities approach has the merit, therefore, of focusing on the real opportunities and freedoms that individuals have to carry out their basic and desired functionings. In this sense, her version of the capabilities approach involves discussions of the functionings that would be particularly central to human life, while always seeking to emphasize issues related to human dignity. Thus, the essence of Nussbaum's (2000) approach is that the human being should be seen as a free being who shapes their own life, and is not only passively shaped by different circumstances, over which they have no control.

On the other hand, Nussbaum (2000) defends the idea that it is possible, through a vast cross-cultural consensus, to gather information about functionings that might be universally considered basic, based on several different views of what would be a good life. And thus, form a list of the central capabilities and functionings that different people, in different societies and contexts, seek as conditions of fundamental interest for existence. Thereby, reinforcing the argument for the possibility of absolute aspects for poverty, although from within the capabilities approach.

The list offered by Nussbaum (2000) stems from years of cross-cultural discussion and, according to her, is always open to new contributions and/or challenges[6]. The idea is that to some extent the list will better defined or specified according to each context. In this sense, the "human capabilities" approach, in Nussbaum's view, reflects the idea of a basic social minimum so that people are really able to be what they think is important; but for that, people need somehow to have access to information to understand what it would be like to have a minimally dignified life. A condition that is not always present in communities living in peripheral regions, such as that analysed in this study.

In this sense, starting from the theoretical debate originally proposed by Sen, the

[5]According to Hagenaars and De Vos (1988), the definition of poverty in terms of absolute poverty is that which is related to consumption, where the individual is considered poor if he is below a minimum standard defined objectively; relative poverty that is related to social life, that is, the way the individual sees himself in society, in which being poor is having less consumption power compared to other citizens.

[6]The ten capabilities in Nussbaun's list are: life; Bodily health; Bodily integrity; Senses, imagination, thought; Emotions; Practical reason; Affiliation; Other species; Play; Control over one's environment

research agenda in this field has moved towards the search for the construction of qualitative and quantitative measures (absolute and relative) that are capable of enabling the operationalization of indicators that respond to the theoretical and methodological challenges imposed by this new analytical perspective on poverty and development. This study is part of that perspective.

Specifically regarding the search for the means to operationalize a synthetic index that takes into account both the components of relative and absolute poverty, as proposed by Nussbaum (2000), several approaches have been proposed. According to Alkire and Foster (2009) and Alkire and Santos (2010), the choice of dimensions capable of reflecting poverty is quite wide and includes health, education, standard of living, empowerment, conditions of employment and work, environment, protection against violence, and social and cultural relationships, among others, which are generally taken into account when discussing the possible aspects to be considered in an assessment of basic functionings inspired by a multidimensional perspective of poverty.

Setting out from the methodology developed by Alkire and Foster (2009) and Alkire and Santos (2010) and the theoretical framework of Sen's capabilities approach, it is possible to calculate both the incidence and the intensity of poverty, thus capturing a joint distribution of deprivations, since Alkire and Foster's (AF) set of measures are axiomatic and satisfy several desirable properties. Moreover, it is also functional, as it uses an intuitive headcount and takes into account the way in which deprivations are distributed to identify the poor in multidimensional terms.

In formal terms, there is an identification function $\rho_k : R^d_+ \times R^d_{++} \to [0,1]$ that maps the achievements of the unit of analysis i in the vector $Y_i \in R^d_+$ of the cutoff z in R^d_{++} for each indicated variable. Since ρ_k assumes a value of 1 when $c_i \geq k$ e $\rho_k(Y_i, z) = 0$ when $c_i < k$. Thus, the calculation of the index will only focus on the units that are classified as poor (1), censoring the others. This is followed by the aggregation step.

Once all the identification steps have been completed, the headcount is performed to determine the proportion of people who were identified as multidimensionally poor among the population (H)[7]

$$H = \frac{q}{n} \tag{1}$$

Where:

q is the number of multidimensionally poor people.

n is the total population.

The intensity of average poverty shared among the poor, which implies adding up

[7]Alkire and Santos (2010) point out that the Headcount is not sensitive to the number of deprivations the poor face.

the deprivation scores of the poor and dividing by the total number of poor people

$$A = \frac{\sum_q^1 c}{q} \tag{2}$$

Where:

c is the headcount of the needs experienced by the poor.

The next step is to calculate the M_0 measure which summarizes the incidence and intensity of poverty[8]. The Adjusted Headcount Ratio (M_0), reflects the proportion of weighted deprivations that the poor experience in relation to the total number of deprivations that the population could experience if all the people were poor and deprived in all the dimensions considered in the analysis.

$$MPI = A \times H \tag{3}$$

The contribution of each dimension j to multidimensional poverty is:

$$Contrib_j = \frac{(\sum_q^1 c_j)/n}{IPM} \tag{4}$$

In the case of the present study, we will seek to adapt the methodology proposed by Alkire and Foster (2009, 2011), in view of the objective of evaluating the dimensions of valued functionings - originally proposed by Sen - and comparing them with the state of functionings effectively achieved by the riverside population living in the vicinity of a large metropolitan region in the Brazilian Amazon, namely the Ilha das Onças region near the MRB. Therefore, here, the main study objective will be to identify, from a theoretical and empirical point of view, which dimensions seem to influence the levels of poverty and quality of life of this population when assessed using different systems of weighing and choosing which dimensions are priorities. At the same time, we aim to assess how the territorial specificities influence their levels of poverty, guided by an analysis of the specificities and priorities pointed out by the local population itself.

3. Materials and methods

3.1 Territorial features of the object of this study: The Ilha das Onças

The Ilha das Onças lies within the municipality of Barcarena, which is located in the estuary of the Amazon River, close to the Metropolitan Region of Belem (MRB). According to the 2010 IBGE Census, the municipality had 122,294 inhabitants, and

[8]The incidence of poverty would therefore be the proportion of poor people in a region. The intensity of poverty would be a measure to indicate how poor they are based on the total number of dimensions in which the poor presented deprivation divided by the number of multidimensionally poor people.

is considered an important industrial hub in the state of Pará. It also has the largest port in the state: the "Porto do Vila do Conde", located a few kilometres from the city centre of Belem[9].

In addition to these demographic, economic and territorial features, the territory of Barcarena has several islands, including Ilha das Onças, the object of this study (See Figure 1). The Ilha das Onças, covering 96 km², is the third largest island located close to the Metropolitan Region of Belem (Schallenberger, 2010). Located on the left bank of Guajará Bay and opposite the northwest corner of the city centre, it is accessed exclusively by river transport, which ensures highly specific territorial features, with the predominance of a vast riverside population, as well as difficult access to public services, such as: electricity via the main grid, the water and sewage networks, garbage collection, transportation system, and wider access to the public health and education systems.

According to 2010 census data with regard to the sanitary conditions of the total number of permanent private households, only 22 have water supply via the general network, the other households used alternative ways to obtain drinking water. When it comes specifically to sanitary sewage, the situation inadequacy is evident when only 28 households have their drainage considered adequate (via the general network or rainwater and septic tank), while via rudimentary cesspool, ditch and river corresponds to almost the entire drain of waste. In the case of garbage disposal, only 26 households dispose of garbage properly, the others burn, bury or throw it in the river.

The situation regarding access to electricity is precarious. Still according to the 2010 census, 268 households do not even have access to electricity, while the rest almost entirely obtain energy from private sources. In terms of income, according to the IBGE, the per capita monthly household income for almost all residents of the territory under analysis is between 1/8 and 1 minimum wage, only 2 households have a per capita household income of 5 to 10 minimum wages , including 8 households with no per capita monthly income.

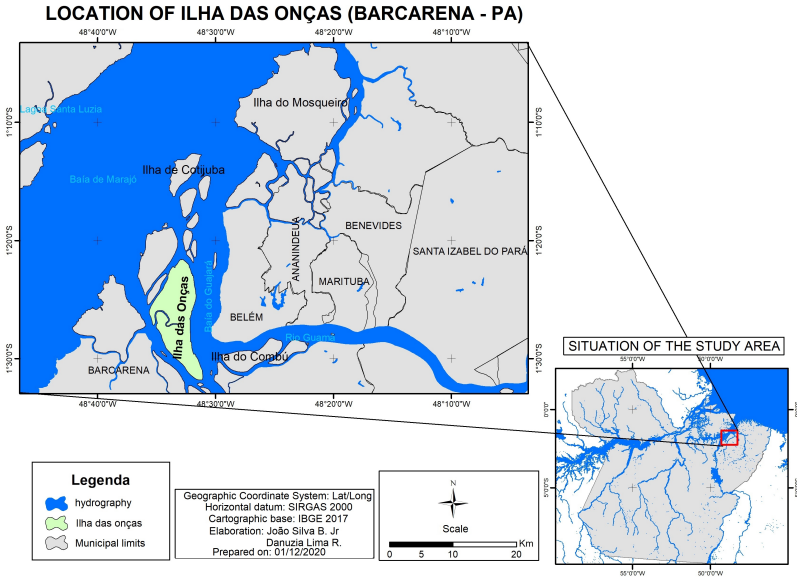
According to census IBGE (2010), the resident population on the Ilha das Onças was estimated at 4,801 inhabitants. Most of whom form a riverside population whose main economic activity is the extraction and handling of açaí. According to recent studies, shrimp fishing remains the second most important extractive activity in the region (Schallenberger, 2010).

Source: Elaborated by the authors

From the point of view of the infrastructure, housing and water quality, there are considerable problems related to the lack of an electricity distribution network and generalized problems of lack of sewage system and contamination of the waters of the rivers that bathe the region (Rocha and Almeida, 2003; Almeida et al., 2003; Silveira

[9]In the vicinity of the Port of Vila do Conde is one of the largest industrial enterprises in the mining sector in the Amazon is located: The Albrás-Alunorte project

Figure 1. Map of the study area and surroundings: Ilha das Onças, municipality of Barcarena, PA.



et al., 2003). Specifically, with regard to water quality, a study by Almeida et. al. (2003) that assessed groundwater quality conditions on the islands of Belem and Barcarena, indicated high levels of faecal coliforms and the presence of the bacterium Escherichia coli in the basin of the rivers Tucunduba (near the river Guamá) and Paracuri rivers (near Guajará Bay), both of which strongly influence the waterways that intersect the Ilha das Onças and the Icoarací district in Belem (Almeida et al., 2003).

From the point of view of biological diversity and the availability of fishing and forest resources, the region stands out as having a great variety of species of lowland vegetation and wide diversity of fish. A situation that, in recent years, however, has been changing quite quickly, with the loss of forest diversity and, mainly, in a reduction in the variety of fish found in the rivers of the region.

In general, it can be said the Ilha das Onças is an island area, close to a large metropolitan region, with a great diversity of aquatic flora and fauna that, despite suffering considerable threats in recent years, remains a space of great ecological diversity close to a large metropolitan centre in the Amazon. On the other hand, its population suffers from serious problems in terms of the lack of infrastructure and logistics for mobility and transport, which are very specific territorial conditions that significantly influence the living conditions of its population. These will be further investigated below.

3.2 Identifying the general research universe, the sample calculation method and questionnaire application strategies

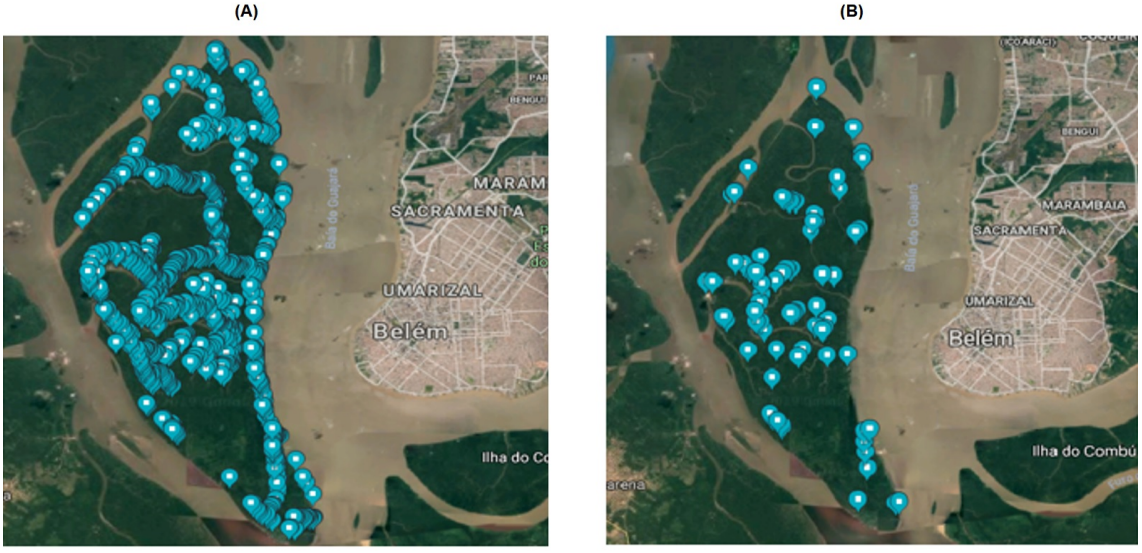
In calculating the sample, the criterion adopted for (p) was the proportion of the island's household sample (980) in relation to the universe of 24,833 households iden-

tified in the municipality of Barcarena. This means the total number of households on the Ilha das Onças corresponds to 3.94% of the households in Barcarena, therefore, with (p) equal to 0.0394 and using a margin of error of 5% and a confidence level of 95 %, the sample indicated was, at least, 58 questionnaires to be applied throughout the territorial extension of the island[10].

The spatial distribution of the universe of the identified population was taken into account when preparing the sampling plan. To do so, using satellite images made available by Google Maps, Google Earth and Apple Maps (See Figure 2), 980 households were identified across the entire length of the island, which were marked according to their latitude and longitude. The references were subsequently plotted in a database and submitted to a selection routine using R software that randomly selected 80 households. Parts (a) and (b) of Figure 2 show the pins marking, respectively, the universe and the sample of households interviewed.

In the sample composition, it was observed that 60% of the household composition were women, of which only 27.5% were heads of the household. The average age of the residents was 25 years old, while the average age of the household heads was 40 years old. Something that stood out was the low level of education of the residents, which did not reach an average of 2 years of schooling (1.75 years). The main occupation of the interviewees was related to the Açaí activity, with 26.82% of the residents making a living from it.

Figure 2. Map of the study area with the universe and sample of identified residences.



Source: Google Maps. Prepared by the authors

[10]The formula used to calculate the sample size was $n = \frac{Nz^2p(1-p)}{z^2p(1-p)+e^2(N-1)}$

3.3 Data collection

The survey was conducted using a semi-structured questionnaire designed to identify three fundamental aspects for the construction of the index: the valued functionings, the deprivations faced, and the importance (weights) attributed to them by people residing on the Ilha das Onças. This made it possible to identify the order of priority attributed by the interviewees to the different dimensions identified and considered relevant in the study. The aim of this procedure was to build a hierarchisation criterion, based on the priority given by the interviewees to what they consider important to achieve a good life, as well as to guarantee an adequate future for their children.

Taking into account the five methods indicated by Alkire (2013) for selecting dimensions, which are: availability of data, assumptions, public consensus, participatory processes, and empirical evidence on people's values, it was observed in the research that the database was constructed from a questionnaire composed of three parts[11]. The first part captures control variables such as gender, age, and education, the second part captures what the interviewee considers to be most important to guarantee a good life (which refers to participatory aspects). The third part consists of questions about the dimensions of the MPI_{isle}, such as Education, Health, and Living Conditions, linking existing conventions and public consensus on what is universally indicated by research involving the AF method.

The interviews and application of the questionnaire were carried out between November and December 2018. In total, 80 semi-structured questionnaires were applied to the residents of the homes selected using the sampling method[12]. After tabulating the questionnaires and organizing the database, R software was used to read and systematize the available information. The adjusted MPI method was then applied to assess the multidimensional poverty on the Ilha das Onças (MPI_{isle}). The method will be presented in the next section.

4. Method used to calculate the adjusted Multidimensional Poverty Index for the Ilha das Onças (MPI_{isle})

The indicator constructed for the analysis of multidimensional poverty on the Ilha das Onças is based on Alkire and Foster (2009) mathematical structure presented above. However, the composition of all the dimensions and variables comprising the index were selected and constructed using the collected primary data, the items of which seek to reflect what the people mentioned is important to be or do in order to have a good life. Based on these questions, the functionings were spontaneously indicated and ranked by the interviewees themselves.

[11] For more details on the questionnaire, please refer to Annex A of the thesis (Rodrigues, 2019) at:`http://repositorio.ufpa.br:8080/jspui/handle/2011/15426`

[12] The average number of people per household is four.

4.1 Defining the dimensions

The field research sought to identify the particular features of the way of life, the valued functionings, the deprivations faced by the people and the weights they attribute to each dimension. The main results and the procedures adopted for building the multidimensional poverty index of the Ilha das Onças are described below.

When asked to list the four most important dimensions in order of importance, health was identified as the single most important by 44% of the interviewees, then came education, mentioned by 24%, employment by 14% and safety by 11%. Regarding the second most important dimension (see Table 1), again health appears with 25%, thus also being the second most important functioning. In other words, health can be considered the first and second most important dimension by the interviewees. Which reinforces the idea that health represents a basic and priority functioning for the local population. In the case of the population living on the Ilha das Onças, the data show that this dimension would be indicated among the 4 most important dimensions by 89% of the local population.

Something similar happens with the other dimensions, although on a smaller scale. After health, appear education, safety and employment, representing the dimensions considered priorities for the purpose of assessing the people's quality of life. Likewise, it is worth highlighting the fact that only 14% of the total responses indicated income as being important to guarantee a good life. An empirical observation that is highly relevant considering the more detailed analytical approach to poverty provided by the multidimensional perspective, insofar as it reinforces the idea that income cannot be considered the only attribute when assessing the conditions necessary to have a good life, in the view of the interviewees. Furthermore, it becomes clear that having an income above the poverty line does not necessarily mean the individual is automatically capable or will be able to convert that income into ends that he desires or values[13].

As can be seen from the results in Table 1, in addition to the six dimensions mentioned by more than 20% of the interviewees, other dimensions appear to be important for a small number of people. It is worth noting that only two dimensions that are not in the six most indicated, namely income and peace, were considered the number one priority.

4.2 Defining the weights

A recurrent limitation in aggregated multidimensional indexes is the impossibility of discriminating weights according to the importance dimensions have in people's lives and their specific contexts. With the hierarchisation of the preferences indicated

[13]Poverty lines are parameters established to identify people in poverty. In this sense, a person is considered poor if he or she is below the poverty line value. In multidimensional terms, it is possible to specify cut-off parameters for each dimension and the person will be considered poor if he does not reach at least one of the established cut-off parameters (Bourguignon and Chakravarty, 2003)

Table 1. Hierarchisation of the choice of functionings and dimensions considered most relevant by the interviewed population, according to a sample population residing on the Ilha das Onças, Pará, Brazil

Demands	**1 Order**	**2 Order**	**3 Order**	**4 Order**	Σ%
Health	35	20	12	4	89
Education	19	17	20	3	74
Electrical Power	3	10	9	25	59
Safety	11	10	8	17	58
Employment	9	10	13	8	50
Water	1	6	6	6	24
Income	1	3	2	5	14
Good house	-	2	2	2	8
Transport	-	1	2	3	8
Food	-	-	2	1	4
Peace	1	-	-	2	3
Family harmony	-	-	2	-	3
Sanitation	-	-	1	1	3
Own house	-	-	-	2	3
Land	-	1	-	-	1
Small Businessperson	-	-	1	-	1
Infrastructure	-	-	-	1	1
Total	**80**	**80**	**80**	**80**	**-**

Source: Field research.

by people according to their priorities, it was possible to build a multidimensional poverty index specifically for Ilha das Onças, here called the MPI_{isle}-NLC-wts. Notably, this indicator overcomes this limitation and represents an advance in the literature because it was calculated based on the dimensions listed as endogenous, with weights attributed by the interviewees themselves.

For the purposes of comparison in terms of the method adopted in the construction of the MPI_{isle}-NLC-wts, as well as to point out the validity of its robustness by showing the advantages this implies, the index was also replicated using homogeneous weighting, as adopted in most studies. This procedure enabled the identification and comparison of the different indexes in relation to the benefits of hierarchisation according to each of the specific contexts in which they were applied.

In addition to the weights, another difference between the indexes is the addition of a "secondary" dimension that, a priori, does not appear listed among the dimensions chosen as priority by the interviewees. However, during the interviews, it was noted that this dimension appears indirectly in the perception of what people live and feel, that is, the inclusion of a sixth dimension resulted from the researchers' perception and sensitivity regarding the people's manifestations. Thus, although the dimension referred to as "Living conditions" (LC) does not appear in the list of important demands and has not been ranked (as shown in Table 1), it permeates the discussion as a deprivation arising from the functionings the interviewees mentioned were important, such as, for example, the valued functioning "electricity".

Thus, it was decided to build two scenarios, the first built from the MPIs composed

only of the dimensions valued by the interviewees (1-A and 1-B) and the second scenario from the expanded MPI, which included the "living conditions" dimension (2-A and 2-B). Furthermore, in both scenarios, two weighting structures were adopted: A) one based on the homogeneous distribution of weights between dimensions; and B) one based on the weight structure based on the choices made by the interviewees.

As shown in Table 2, the first scenario includes two types of the index, according to the chosen weight distribution, taking into account 5 dimensions for the MPI_{isle}: Scenario (1-A), where the weights of MPI_{isle}-NLC-wts (without living conditions) were distributed according to the preferences expressed by the interviewees and Scenario (1-B) where the weights of MPI_{isle}-NLC were distributed homogenously among the five dimensions.

The same occurred in relation to the second scenario, the difference being that beside the 5 most cited dimensions ranked by the interviewees, a sixth dimension, indirectly indicated by them and captured during the interviews, was considered.

Table 2. The MPI_{isle} scenarios and types, based on the different dimensions and weights considered relevant by the interviewees.

Scenario	Type	Nº of dimensions	Weights
1	(1-A) MPI_{isle}-NLC-wts	5	Endogenous
	(1-B) MPI_{isle}-NLC	5	Homogeneous
2	(2-A) MPI_{isle}-wts	6	Endogenous
	(2-B) MPI_{isle}	6	Homogeneous

Source: Prepared by the authors

The selected final indexes (here called MPI_{isle}-NLC and MPI_{isle}-NLC-wts), thus include 5 dimensions, namely: health, education, safety, energy and employment. The MPI_{isle} and MPI_{isle}-wts contain the same dimensions plus the living conditions dimension, while both vary according to the weights assigned to each dimension[14].

When identifying the weights, the unit of analysis considered will be the household, and it is also possible to identify the number of individuals living in multidimensionally poor households. Tables 3 and 4, below, summarize what is referred to here as the dimensions, indicators, cut-off points and weightings structure of the MPI_{isle} in all the scenarios.

Based on the methodology used to calculate the MPI_{isle}, the results and analysis of the living conditions and poverty of the riverside population of Ilha das Onças, Pará, Amazonia are presented below.

[14] MPI_{isle}-NLC (Island multidimensional poverty index without "living conditions" and with homogeneous weights).
MPI_{isle}-NLC-wts (Island multidimensional poverty index without "living conditions" and with endogenous weights).
MPI_{isle} (Island multidimensional poverty index with "living conditions" and homogeneous weights).
MPI_{isle}-wts (Island multidimensional poverty index with "living conditions" and endogenous weights).

Table 3. Dimensions, indicators, cut-off points and weightings structure of MPI_{isle} scenario 1

Dimension**	Indicators	Cut-off point	Weight1	Weight2
Education	Incomplete elementary school	Existence of individuals over 18 years of age who did not study or did not study elementary school.	5%* (24.28)	5.5% (25.00)
	Technical course, training and guidance	Existence of individuals who have taken a technical course or received training or guidance	5% (27.50)	5.5% (29.85)
	School-age children not attending school	Existence of children aged 4 to 14 who are not being exposed to a learning environment	5% (0.77)	5.5% (0.80)
	Tacit knowledge	Existence of individuals who consider themselves experts in their area of activity.	5% (2.56)	5.5% (1.96)
Health	Health problem limiting the ability to perform activities	Existence of individuals who have a health problem that in some way limits their ability to perform daily activities compared to most people their age	4% (5.14)	5.3% (5.29)
	Nutrition	If there are people in the household who eat meat, chicken or fish at least twice a week and who consume at least 3 other food options	4% (0.01)	5.3% (0.01)
	Visits to the doctor regularly for routine tests or only when there is serious illness	If in the household there are individuals who only go to the doctor when they are sick	4% (13.37)	5.3% (15.40)
	Following the recommended treatment, after medical care	Existence of people who do not follow or only sometimes follow the treatment recommended by the doctor	4% (4.00)	5.3% (3.29)
	Access to drinking water	When the water is not suitable for consumption, coming directly from the river or being distributed by the municipal authority by boat.	4% (0.18)	5.3% (0.15)
Safety	Safety when walking alone in the area near your home during the day	If you feel very unsafe	10% (0.67)	9.52% (0.56)
	Safety when walking alone in the area near your home at night	If you feel very unsafe	10% (8.24)	9.52% (6.78)
Electrical Power	Electricity	If you do not have access to electricity via the grid	20% (12.28)	17.54% (10.10)
Employment	Work condition	If there are individuals in the household who are unemployed or who work outside the extractive activity on the family property.	20% (0.28)	14.93% (0.80)

Results
Headcounts, C (sum of each need multiplied by its weight)
The individual is considered poor if $C > 33\%$, that is, depending on the weights, if they are deprived in 3 variables of 11% each, then they will be considered multidimensionally poor.
* $(1/5) \div 4 = 5\%$; ** Without the Living Conditions dimension.
In parentheses is the contribution of each variable in the MPI_{isle} in %

Source: Field Research Questionnaire. Based on Nussbaum (2000), Sen (2018) and Alkire and Foster (2010)

5. Results

With the primary data in hand, it was possible to build and estimate the multidimensional poverty index for the Ilha das Onças (MPI_{isle}¬NLC-wts). The average value in the MPI_{isle}¬NLC-wts was 0.308. In other words, the multidimensional poverty index adjusted according to intensity showed about 31% of the population were living in a situation of multiple deprivations. Note that this panorama changes in relation to the established scenarios (Table 5). In the first comparative scenario, considering only the valued functionings listed by the interviewees, now, albeit with the weights evenly distributed, the multidimensional poverty index (MPI_{isle}¬NLC) pointed to an increase in the percentage of poor people adjusted by the intensity of poverty that was

Table 4. Dimensions, indicators, cut-off points and weightings structure of MPI_{isle} scenario 2

Dimension**	Indicators	Cut-off point	Weight1	Weight2
Education	Incomplete elementary school	Existence of individuals over 18 years of age who did not study or did not completed elementary school.	4.17%* (3.77)	4.97% (2.99)
	Technical course, training and guidance	Existence of individuals who have taken a technical course or received training or guidance	4.17% (12.04)	4.97% (6.68)
	School-age children not attending school	Existence of children aged 4 to 14 who are not being exposed to a learning environment	4.17% (9.87)	4.97% (10.02)
	Tacit knowledge	Existence of individuals who consider themselves experts in their area of activity.	4.17% (3.09)	4.97% (4.67)
Health	Health problem limiting the ability to perform activities	Existence of individuals who have a health problem that in some way limits their ability to perform daily activities compared to most	3.33% (24.22)	4.78% (21.53)
	Visits to the doctor regularly for routine exams or only when there is serious illness	people their age If in the household there are individuals who only go to the doctor when they are sick	3.33% (7.65)	4.78% (7.50)
	Following the recommended treatment, after medical care	Existence of people who do not follow or only sometimes follow the treatment recommended by the doctor	3.33% (4.17)	4.78% (4.48)
	Access to drinking water	When the water is not suitable for consumption, coming directly from the river or being distributed by the municipal authority by boat.	3.33% (3.77)	4.78% (3.77)
Living conditions	Waste destination	Absence of a municipal garbage collection service	2.78% (0.48)	1.63% (0.57)
	Internet access	If there is no internet access	2.78% (5.74)	1.63% (7.37)
	Piped water	Existence of households without running water	2.78% (0.12)	1.63% (0.16)
	Sewage system	Households without septic tank	2.78% (5.23)	1.63% (6.48)
	Habitation	If the accommodation is inadequate, the rooms are insufficient and more than 2 people sleep in one room	2.78% (1.04)	1.63% (1.29)
	Consumption of durable goods	If you do not have access to at least three of these items: Refrigerator, freezer, Gas stove, Wood stove, Television, Telephone/cell phone, Radio, Motor boat, Washing machine	2.78% (3.93)	1.63% (4.55)
Safety	Safety when walking in the area near your home during the day	If you feel very unsafe	8.33% (0.91)	8.59% (1.00)
	Safety when walking in the area near your home at night	If you feel very unsafe	8.33% (0.04)	8.59% (0.05)
Electrical power	Electricity	If you do not have access to electricity via the grid	16.67% (8.98)	15.82% (5.99)
Employment	Work condition	If there are individuals in the household who are unemployed or who work outside the extractive activity on the family property.	16.67% (4.95)	13.47% (10.88)

Results
Headcounts, C (sum of each need multiplied by its weight)
The individual is considered poor if $C > 33\%$, that is, depending on the weights, if they are deprived in 3 variables of 11% each, then they will be considered multidimensionally poor.
* $(1/6) \div 4 = 5\%$; ** Weight. 1 = considers even weights, the same as global MPI;
*** Weight. 2 = considers weights attributed by the interviewees themselves.
In parentheses is the contribution of each variable in the MPI_{isle} in %

Source: Field Research Questionnaire. Based on Nussbaum (2000), Sen (2018) and Alkire and Foster (2010)

over 37%.

This change becomes more evident with the incorporation of indicators not directly reported by people, but rather indirectly perceived by the researchers as the dialogues became deeper in the course of the interviews. In the second scenario, when the dimensions are attributed the level of importance endogenously captured in the survey, the index suggests about 35% of the sample population are living in

multidimensional poverty. However, this situation appears to worsen when, within this same perspective, the weights are evenly distributed among the dimensions. In this case, the percentage of families experiencing multidimensional poverty increases to 38%.

From Tables 3 and 4, it is possible to verify that the presence of individuals who do not study or have not completed their studies up to 18 years old, and the absence of technical courses weigh more heavily on the deprivations of these individuals (representing more than 50% of the deprivations), followed by visits to doctors (more than 13% depending on the weights) and the lack of electricity (more than 10% depending on the weights). Regarding scenario 2, this distribution was more balanced, where the variable indicating people with health problems weighed more heavily on the deprivations, reaching 24.22% depending on the weight.

These findings confirm the importance of, when measuring poverty, taking into account what it is that people value when it comes to ensuring a good life for them. The evidence shows that when applying Sen's (2018) capabilities approach, the indexes that considered the endogenously captured weight of the dimensions tend to show a decreased incidence of poverty, which seems to more closely reflect the way the people feel[15].

Likewise, other evidence can be seen when the indices are disaggregated. Note that the incidence of poverty (H_{Ave}) decreases in all the scenarios when the proportion of multidimensional poverty obtained with homogeneous weighting is compared with those calculated with endogenous weighting. For example, in the first scenario, the variation in the average proportion of multidimensional poor was 20%; that is, the number of poor people in multidimensional terms decreases from 75% (homogeneous weighting) to 55% (endogenous weighting). Which means that when one takes into account what people value or consider important to ensure a good life - according to the level of importance that each one attributed to each dimension - the number of people considered poor in multidimensional terms decreased (in the case of the sample used here, this number drops from 252 to 184 people). In the second scenario, when a new dimension defined by the researchers is included, the difference in the allocation of weights is also evident. The variation, in this case, was 10% and the percentage of multidimensional poor fell from 75% to approximately 65%.

Thus, the results show that the closer the index gets to the structure of weights and dimensions spontaneously chosen by people, the proportion of multidimensional poor people falls. Unlike when we choose to distribute the weights evenly and/or include variables in the index that the interviewed population did not directly mention as important for the composition of their well-being (even if they have deficiencies in these dimensions). Thus, it is as if we had considered them poorer than they really feel.

[15]In the interviews, few people said they considered themselves poor.

Table 5. Results according to MPI_{isle} type

TYPE	MPIisle_Ave	Nº families N_Pop	H_ Ave (%)
MPI_{isle}-NLC-wts	0.308	14	0.55
MPI_{isle}-NLC	0.370	10	0.75
MPI_{isle}-wts	0.348	13	0.65
MPI_{isle}	0.382	10	0.75

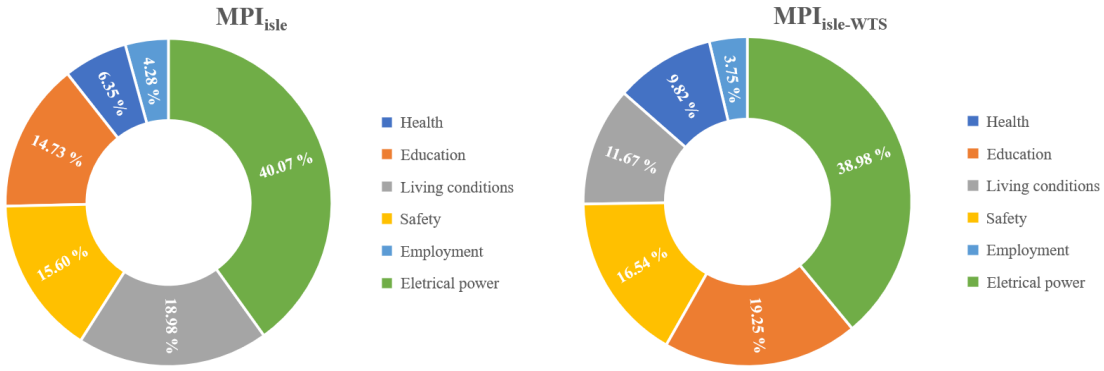
Source: Field Research

The variation in the intensity, on the other hand, can be measured using the level "A" of intensity. For all the scenarios, the average intensity of poverty was significant (approximately 42%), that is, the average level of poverty for most of those considered poor is intense and relatively concentrated in a large number of dimensions.

When the index is decomposed, according to the observed variables and dimensions that represent greater weight in each of the scenarios, it can be said that the dimension that most contributed to the formation of all the indexes was electricity.

Considering the second scenario, it is worth noting that the findings also reveal that, in addition to spontaneous responses, other dimensions not cited as priorities by the interviewees proved to be quite important in determining the value of the first index, the MPI_{isle}. The "living conditions" dimension, for example, provided the second largest relative contribution, with a weight of almost 19% in the final index, despite not having its variables identified as a priority by the interviewees in the spontaneous questioning. In this case, it is worth remembering that for this specific index, the weights between the dimensions were distributed homogeneously and, therefore, do not precisely reflect the level of importance the interviewees attributed to each dimension.

Figure 3. Average contribution of the dimensions to MPIisle with weights distributed evenly and unevenly (scenario 2).



Source: Field Research.

Figure 3 shows the decomposition of the indexes in their respective dimensions. Here, it is worth emphasizing once again that the variables that make up the dimension "Living Conditions", although they were not initially mentioned as priorities

by the interviewees, were included in the indexes; not only due to the researcher's observational sensitivity during the dialogues, but also because they are variables commonly used in the literature as basic dimensions and considered universally relevant to guarantee a good living condition in any situation (NUSSBAUM, 2000)[16]. This methodological choice proved to be important, considering its incidence and relevance in determining the final value of the MPI_{isle}.

When considering the same dimensions, but distributing the weights according to the interviewees' indications, the dimension 'electrical power' continues to be the one that most contributed to making the sampled people feel poor. It is worth mentioning that the lack of electrical power is highlighted by the residents as a very serious problem, as they do not even have a place to conserve food and importantly to store the harvested Açaí. In second place, education appears as the dimension that most contributed to the formation of MPI_{isle}-wts. The survey found that most of the residents on the Ilha das Onças had not completed elementary school, however, they valued education for the children.

Thus, considering the assessment of the individual indicators (by the contribution of each dimension in the formation of the MPI_{isle}), it can be said that the dimensions 'electricity' and 'living conditions' (which includes the garbage disposal, internet access, sewage, running water, housing and the consumption of durable goods) presented the worst results (Energy 0.40 and Living Conditions 0.19). This suggests the specific territorial conditions of the Ilha das Onças strongly influence the conditions of multidimensional poverty of its residents, regardless of the individual position of each one. In the second case, it can be seen the 'living conditions' dimension, which is related to aspects of the territory, was found to be less relevant, which may mean the residents are already used to these deprivations as they did not spontaneously point them out as being important for their quality of life.

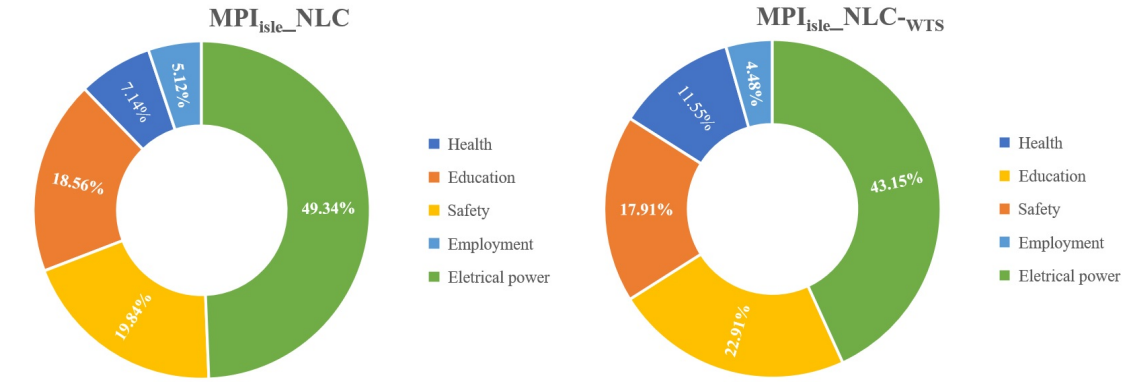
Finally, it is worth noting that when the dimensions are weighted according to the interviewees opinions, the reorganization of the dimensional contributions in terms of weight in the composition of the index changes and the MPI_{isle}-wts is much closer to the valuations attributed by the interviewees.

Source: Field Research.

When there is a scenario where only the dimensions chosen by the interviewees are included in the index (scenario 1), the results show that, when the weights are distributed evenly among the dimensions, the electrical power dimension still contributes most to the formation of the indicator (49.34%). While, when the 'living conditions' dimension is removed, the 'safety' dimension takes second place. It should be mentioned that safety is a constant concern among the residents of Ilha das Onças, as many interviewees reported they themselves or their relatives had been victims of

[16]Although the author indicates other dimensions, this work chose to maintain the dimensions associated with the AF method, in order to avoid generating significant distortions.

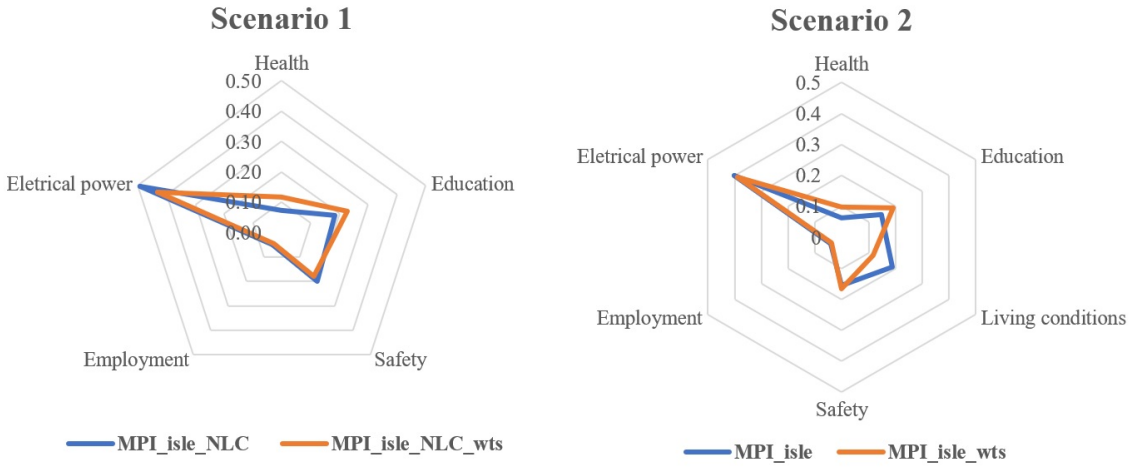
Figure 4. Average contribution of the dimensions to MPI_{isle} with weights distributed evenly and unevenly (scenario 1).



assault or theft. According to reports, with the increased sales of Açaí and the proximity of the region to the state capital, Belem, residents have become targets and live constantly in fear of violence.

When the weights are distributed as indicated by the interviewees, even without the 'living conditions' dimension, the contributions were very similar. Electricity continues to appear in first place. Of the other valued functionings and dimensions reported to be important by the interviewees in guaranteeing a dignified life, it is clear that education appears as the dimension that came second in the terms of the contribution to the index (22.91%). Safety (17.91%) and health (11.55%) also played a considerable role in the formation of the MPI_{isle}. Employment, on the other hand, was the item prioritized by the interviewees that least contributed in the indicator (See Figure 4).

Figure 5. Dimensional contribution to MPIisle in both the analysed scenarios.



Source: Field Research.

Finally, Figure 5 provides an overall view of the scenarios and how each of the contribution each dimension makes to the formation of the index. The results show that whichever type or scenario of the MPI_{isle} is analysed, the results point to practically the same situation.

Among the dimensions most valued by the sample of respondents, those with the greatest weights in the poverty index are: electrical power, education and safety. By contrast, among those with the lowest weights, are: health and employment. The dimension 'living conditions', has little impact on the weight structure of the index in the different scenarios. Its higher incidence in scenario 2, where the weights are distributed evenly among the dimensions (scenario 2-B), produces only a small variation in the overall incidence structure.

On the other hand, health has some notable elements, since the spontaneous indications show this dimension is a priority or the one they most value to guarantee a good life. Nonetheless, it can be seen that even though it was attributed the greatest weight by the interviewees, the data revealed it was not the dimension that most contributed to the formation of the island's multidimensional poverty index, in all the scenarios and types. Which seems to suggest difficulty in choosing indicators capable of capturing the restrictions in relation to this dimension.

6. Final remarks

With the aim of assessing the multidimensional aspects of poverty in a specific region of the Amazon (the Ilha das Onças, in the municipality of Barcarena), this study has sought to apply a method for calculating synthetic indicators, based on Sen's capabilities approach, adapted for the analysis of the aspects of the dimensions and priority valued functionings chosen by riverside populations living on the island.

Of particular note among the main questions assessed, is the significant differences between the calculation of the multidimensional index based on scenarios that took into account the homogeneous and/or weights chosen based on universal standards; and the scenarios based on the weights endogenously defined by the interviewees.

In several ways, the differences proved to be significant. Both in the values of the different types of the MPI_{isle}, and in the variations in the incidence of poverty between 75% and 65% (in the case of the version with 6 dimensions); and 75% and 55% (in the case of the t with 5 dimensions) and also based on the weight system rigorously equal to that chosen by the interviewees.

Another notable finding is the extremely high weight attributed to health, which, however, did not appear to contribute significantly to the formation of the decomposition of the indices. Given this apparent incongruity, we began to consider the possibility that the questions referring to health contained in the questionnaire, might not have accurately captured what the interviewees would really like to indicate as being important. Therefore, everything suggests that when citing health-related problems, the respondents were probably referring to the risks and difficulties in accessing health services, that is, problems with access to emergency health services, which were not, and are not well captured by the variables and indicators generally used to

assess this type of dimension.

During the survey, the respondents frequently referred to the need for an "ambulance-boat" to help them when a serious accident or emergency health problem occurred[17]. On the Ilha das Onças there is no fast and effective service for this type of event. Furthermore, there is the problem that some rivers and streams dry up completely with the ebb tide, which makes it impossible for any form of rapid motorboat-based emergency service[18].

Faced with this problem, it may well be the case that when the island's residents refer to health problems, they are, in fact, referring more directly to issues of mobility and accessibility to emergency health care services. Therefore, the problem may be more related to the risks, or vulnerability they face in the event of more serious accidents. This alternative interpretation proves to be important insofar as it signals how field observation can be a fundamental research component, insofar as it can help detect at which level of access to the resource, in particular, populations may consider themselves to be needy or vulnerable. In the same way, it allows us to better assess the type of deprivation that negatively affects their well-being.

Another important issue to highlighted here is the relatively small weight given by the interviewees to problems related to income. This might be explained by the fact the average per capita income of the island's population is relatively high (1,500 Reais) in comparison with the region's average income. By contrast, the official income poverty line in Brazil is currently R$178.00 (US$ 35.00) per month.

Nonetheless, the MPI_{isle} was able to detect that the population of the island suffers from the absence or is deprived of supposedly basic valued functionings: such as electricity and drinking water. In both scenarios (1 and 2) observed in the calculation of multidimensional poverty, it was observed how the lack of infrastructure weighed in the composition of the indicator. The lack of electricity weighing more than 40% in the composition of the MPIs can generate a cascading effect, as it hinders food storage, which can affect nutritional characteristics and, in turn, worsen the health condition of these individuals. It also prevents a night school shift from being made viable, making it impossible for young people and adults who work during the day to attend school, which impacts the educational dimension. This represents an important finding for any future broader research to be carried out in other locations with similar territorial features, as well as highlights the need for more specific public policies for riverside populations.

The study could have included islands from other municipalities besides Barcarena, such as Combú, Cotijuba, and Arapiranga. Cotijuba, for example, is more influenced by the Metropolitan Region of Belém and has tourist attractions that bring a different

[17]Ambulance-boat is a fast motor-boat equipped with a mini-ICU.

[18]According to the interviewees, there is a need for footbridges (made of wood) in order to facilitate the movement of people to the navigable part of the rivers and streams during the ebb tide, but the municipality of Barcarena does not always respond to the requests.

dynamic to the island's riverside communities. In comparative terms, this would help to better understand the region of the islands and broaden the analysis, but budgetary limitations ended up restricting the study. Therefore, the main recommendation for future studies is to expand such studies to other islands in other municipalities such as Igarapé-Miri, Abaetetuba, and measure how multidimensional poverty manifests itself in more remote riverside regions away from the influence of the Metropolitan Region of Belém.

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