Revista ARACÊ
ISSN: 2358-2472

# ANTHROPOLOGY, HEALTH AND DISEASE - THE HEALTH TRANSITION AMONG THE INDIGENOUS POPULATIONS OF VANUIRE[1]

https://doi.org/10.56238/arev7n2-120

**Submitted on:** 01/11/2025 **Publication date:** 02/11/2025

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## ABSTRACT

Most chronic health problems, such as obesity, are associated with the transition from lifestyles linked to tribal livelihoods to urban, city-like styles. And health problems come, notably, from changes in diet, levels of physical activity, among other factors. The central question of this article, in fact, is to know whether in the transitional framework in which the Amerindian populations of the Vaunire Indigenous Land find themselves, the rates of overweight and obesity of the adult population would express this transition in lifestyles. The hypothesis is that non-infectious diseases, such as obesity, would be more prevalent in localities with a more urban lifestyle, and less prevalent where traditional indigenous subsistence activities and lifestyles predominate. The objective is, therefore, to present and analyze the nutritional profile of adult indigenous people from the Vanuire Indigenous Land, aged 20 to 60 years, registered in the database of the Food and Nutrition Surveillance System (SISVAN), in the municipality of Arco-íris, State of São Paulo. From the methodological point of view, this is a descriptive research that uses bibliographic data and official databases: SISVAN and the Brazilian Institute of Statistics and Geography (IBGE). The results found clearly show the trend of increasing obesity, especially in its most severe degrees, clearly confirming the hypothesis of the article.

**Keywords:** Medical Anthropology. Health Transition. South American Indians. São Paulo.

[1] Article resulting from the participation, as a researcher, between 2018 and 2020, of the Project Center for Science, Technology and Innovation for Food and Nutritional Sovereignty and Security – Interssan (Interssan/MCTIN N. 821825/2015), registered at the Department of Education – Institute of Biosciences, UNESP - Botucatu Campus.

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## INTRODUCTION

The Amerindian groups living in Brazil are impacted by major changes in the environment, ecology, social and economic organization from the fifteenth century to the present day. The country, therefore, is a unique stage to study how these groups adapt their lifestyle historically characterized by subsistence, to another more "westernized" style. The reference taken to evaluate this change is the health and disease process, characterized as one of the faces of a broader system in which individuals interact with different environmental and sociocultural variables during their day-to-day routine. Social and cultural factors mediate the relationships between individuals and the environment, in the sense of favoring or preventing individuals or parts of the population from getting sick. The epidemiological profile of a population, therefore, can be studied as a result of interactions between biological, environmental and sociocultural factors.

The profound socio-cultural changes that the Amerindian groups have undergone are largely due to official policies to develop and economically integrate the regions farthest from the center-south of Brazil, policies that have been accentuated since the eighteenth century. In certain cases, for usurping territories, making subsistence difficult or unfeasible. In other cases, because the groups are persecuted, they suffer serious violence causing the death of individuals from entire populations. And, what is usually the main cause, when it comes to Brazil, the intrusion of pathogens that have caused serious epidemics.

More recently, at the turn of the twentieth century into the twenty-first, other challenges to indigenous health have emerged: the growth of chronic non-communicable diseases and conditions, environmental contamination, difficulties in food sustainability, etc. (Coimbra Jr., Santos and Escobar 2005, p. 13), therefore, the health and disease process reveals itself as an important record that allows the evaluation of the quality of adjustments and population responses to these new realities (Silva 2006).

Nevertheless, the epidemic profile of Brazilian indigenous populations is precariously known. The reasons for the lack of knowledge can be attributed to the scarcity of studies on the subject, the few surveys, censuses, and the immense deficiency of information systems on indigenous population morbidity and mortality. Any evaluations of the health and disease process of indigenous populations, in addition to considering the epidemic and demographic dynamics, also require that the extensive sociocultural diversity of these groups be taken into account, as well as the diversity of historical trajectories of

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interaction with the expansion fronts of national society (Coimbra Jr., Santos and Escobar 2003, p. 13).

The current data available make it impossible to construct a satisfactory epidemiological picture regarding Brazilian indigenous groups, since, as highlighted, there is a lack of quantitative demographic data and data on morbidity and mortality that support comprehensive and satisfactory analyses (id. p. 13). Despite the difficulty, based on the scarce data available, it would be possible to affirm that the health conditions of Brazilian indigenous groups are precarious, and that these populations are in even more critical conditions than those of other segments of national society (Coimbra Jr. and Santos 2000; Coimbra Jr. et al., 2002; Funasa, 2002; Santos and Coimbra Jr., 1994; Santos & Escobar 2001).

The *1st National Survey on Health and Nutrition of Indigenous Peoples*, carried out between 2008 and 2009, ratified this precarious situation (Funasa 2010). The *Survey* described the dietary and nutritional status and the determining causes of this state, in indigenous children under 60 months of age, and in indigenous women, whose ages ranged from 14 to 49 years. The data presented showed a prevalence of 32.7% of anemia in non-pregnant indigenous women, and a rate of 35.2% in pregnant women. Among women aged 14 to 49 years, the prevalence of overweight is around 30.2%, and for obesity[3] it is around 15.7%. The *Survey* revealed, in relation to children under 5 years of age, a deficit of 26% height by age.

The impact of sociocultural, economic and environmental changes resulting from the demographic and economic expansion fronts can be perceived and analyzed from four perspectives: 1) in the epidemiological profile; 2) demographic; 3) nutritional (subsistence and nutritional security); 4) and therapeutic resources. Each of these four perspectives can be studied separately. However, approaching them from a systemic perspective reveals how interconnected they are.

If an increase in the incidence of a disease is taken as an example, which represents an epidemiological change, the death rate among children may be higher than in other age groups, thus leading to a demographic change (McElroy & Towsend 1996b, p. 287). Depending on the disease whose incidence increases, the shaman's treatment and

[3] Obesity is defined by the degree of fat stored in the body and associated with health risks due to its relationship with various metabolic complications (Brasil, 2006). "Obesity is a multifactorial problem originated, in most cases, by energy imbalance, when the individual consumes more energy than he spends (WHO, 1995), and this positive energy imbalance results in weight gain" (Brasil 2014, p. 25).

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the use of home remedies may not be effective, leading individuals and the population to resort to other treatments, resulting in changes in the use of therapeutic resources (id. p. 287).

Historically, in Brazil, as in other parts of the Americas, infectious diseases have been prevalent among the indigenous population. Although they remain persistent, there are strong indications that non-communicable health problems, such as obesity, hypertension and *diabetes mellitus*, have grown, configuring a picture of overlapping epidemiological profiles (Coimbra Jr., Santos and Escobar 2003, p. 08). The hypothesis for this phenomenon points to changes in indigenous lifestyles: increased consumption of processed foods, which implies a more caloric diet, rich in sodium and sugar, and low in fiber. Changes in eating habits associated with lower levels of physical activity favor weight gain (obesity), cardiovascular and metabolic diseases (Coimbra Jr. 2009; Fialho, Moreno and Vieira 2012, p. 78). In addition, some studies indicate the existence of indigenous susceptibility to obesity, dyslipidemia and diabetes (McElroy & Towsend 1996b, p. 233; Fialho, Moreno and Vieira 2012, p. 78-79).

Taking into account the picture outlined so far, the central problem of this article is to know whether among the indigenous populations of Vanuire, the rates of overweight and obesity of the adult population are an expression of the westernization (Sponsel 1995) and *modernization* of the lifestyles of these populations (McElroy & Towsend 1996b, p. 334). The hypothesis is that it is, since non-infectious diseases are closely linked to diet and physical activity, and tend to be more prevalent in locations with more westernized lifestyles, which incorporate the habits of nearby cities, as well as integrate into their daily lives.

The relevance of the reflection proposed by the article can be summarized in two dimensions: one theoretical, by enabling the deepening of knowledge of the biological and cultural mechanisms of adaptation of human populations (Baker & Little 1976; Silva & Crew 1995; Coimbra Jr., Santos and Escobar 2003); and the other practical-interventionist, as it provides useful information for health actions aimed at the groups in question (McElroy & Towsend 1996b; Hahn 1999).

## HISTORY OF THE VANUIRE INDIGENOUS LAND

Much work has already been carried out in order to recover the history of contact between the colonizing fronts and the Kaingang in São Paulo, in order to assess how this

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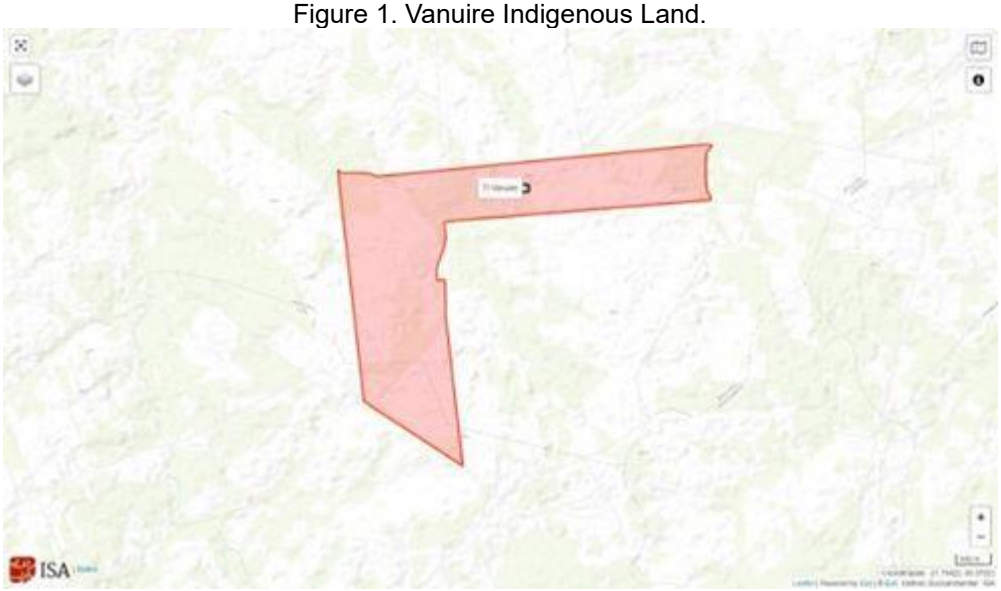
enterprise had an impact on the traditional social organization of this population, from the end of the nineteenth century to the beginning of the twentieth. Araribá, in the municipality of Avaí; Icatú, in the municipality of Braúna; and Vanuire, in the municipality of Arco-íris (Melatti 1976; Pinheiro 1992; Pinheiro 1999; Lourenço 2011).

Figure 1. Vanuire Indigenous Land.




Source: Socioenvironmental Institute (ISA 3).

The Araribá Indigenous Land has four villages, Kopenoti, Ekeruá, Nimuendaju and Tereguá, where approximately 557 people live, between Terena and Tupi-Guarani (Ñandeva) (Pro-Indian Commission 2019). It has an area of 1,930.3369 hectares and is homologated, RGE, CRI and SPU by Decree No. 308/1991 (ISA 2 2019).

The Icatú Indigenous Land has a homonymous village where approximately 141 people live between Kaingang and Terena (Pro-Indian Commission 2019). It has an area of 300.9625 hectares and is homologated, RGE, CRI and SPU by Decree No. 314/1991 (ISA 2 2019).

The Vanuire Indigenous Land has a single homonymous village where approximately 177 people live Kaingang, Terena, Krenak, Fulni-ô, Atikum, Kaingang-Krenak (Pro-Indian Commission 2019). It has an area of 708.9304 hectares and is homologated, RGE, CRI and SPU by Decree No. 289/1991 (ISA 2 2019).

The model of change implemented by the official expansion fronts aimed to integrate the Indian into the Brazilian nation, through his transformation into rural workers who produce for the sustenance of the village and, likewise, generate products for the agricultural market. It was also during the validity of the Indian Protection Service and

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Location of the National Worker (SPITLN) and the Indian Protection Service (SPI), between 1910 and 1967, that the current ethnic configuration of Vanuire began to be forged, since, between the 1930s and 1940s, the first Terena and Krenak began to arrive, coming, respectively, from the states of Mato Grosso do Sul and Minas Gerais, to join the Kaingang who already lived there.

At the end of the nineteenth century, the region of the center-west of São Paulo was still little explored economically. The image that was made of the region was of the great unexplored hinterland, inhabited by terrible savages: the Kaingang considered descendants of the Tapuia/Guaianá (Monteiro 1994). Despite the dangers of the hinterland, the economic interest inspired by the ideas of progress and positivist, typical at the time, for more land for the cultivation of coffee prevailed, and the advance to the west was unstoppable.

Melatti (1976, p.11) points to three major phases of expansion towards the center-west of São Paulo: 1) at the end of the nineteenth century, of migrants from Minas Gerais; 2) until 1929, the coffee era; 3) from 1930 onwards, the raising of cattle and other agricultural products.

The conflict between indigenous people and workers/colonizers became more intense from 1905 onwards, when the construction of the Northwest Railroad of Brazil (EFNB) began, which, by connecting, at the time, to the main railroads used to transport coffee production, Mogiana, Sorocabana, Araraquarense, intended to improve communication between the State of Mato Grosso do Sul and other regions. In São Paulo, after 1870, the municipalities of Botucatu, Lençóis Paulista, Jaú, Brotas, Jaboticabal, São Carlos and Araraquara became the poles of advance towards the west (Pinheiro 1999, p.40).

These conflicts had important impacts on the social disorganization of the Kaingang and it is not a negligible factor. Such conflicts fueled prejudices and the desire to eliminate the Indians once and for all, in view of the difficulties they represented for the conquest of the West. The words of Von Ihering, at the time, director of the Paulista Museum, could not be more explicit in this regard:

> The Indian actions of the State of S. Paulo do not represent an element of work and progress. As in the other states of Brazil, serious and continuous work cannot be expected from the civilized Indians, and as the wild Caingang are an impetus for the colonization of the regions of the hinterland that they inhabit, it seems that there is no other means that can be used than their extermination. The conversion of the Indians has not given satisfactory results; Those Indians who joined the Portuguese

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> immigrants only left an evil influence on the habits of the rural population. It is my conviction that it is essentially due to these circumstances that the State of S. Paulo is obliged to introduce thousands of immigrants, since it cannot be effectively and safely counted on the services of this indigenous population for the work that farming requires. (von Ihering, H. *Revista do Museu Paulista*, volume VII, 1907, p. 215).

More than the conflicts between the indigenous people and the expansion fronts, however, what contributed most to the sharp and rapid decrease in population were infectious diseases. According to estimates presented by Melatti (1976, p.23), in 1912, the Kaingang population was around 1200 people. By 1916 this number had fallen to 200, and by 1921 to 100 persons. This data is important for the purposes of this article because it is precisely in these first contacts that the epidemiological picture of infectious diseases prevalent among Brazilian indigenous populations is forged. In any case, what has occurred in recent decades, as will be seen below, is the formation of an epidemiological picture in which non-communicable diseases overlap with infectious diseases, as highlighted in the introduction.

Whether it is the conflicts, the reports of violence suffered by the Kaingang of São Paulo, but also in other parts of the country, such as among the Krenak in the Rio Doce valley (MG), or the deaths caused by diseases, the fact is that these news began to swarm in the press. Thus, it was in such a context that, by Decree No. 8,072, of June 1910, the Service for the Protection of the Indian and Location of the National Worker (SPILTN) was created, with Marshal Cândido Rondon being its first director. The objective of the agency was to pacify relations between indigenous people and the expansion fronts, through their protection and integration into the national communion by establishing agricultural colonies that would use the indigenous labor found by official expeditions (ISA 2019).

In this scenario, the milestone of the Kaingang pacification of western São Paulo is the year 1912, as it was when the first group of 12 Kaingang peacefully visited a SPILTN camp (Melatti 1976, p.14). The indigenous interpreters played a crucial role in this process, as was the case of the Indian Vanuire, a Kaingang lady already old at the time, considered the crucial pacifying agent of the Kaingang of São Paulo. Numerous reports refer to him singing songs in his native language in order to appease his relatives and make them docile to the objectives of the Indian Protection and Location of the National Worker Service (SPILTN)[4] (Lança 2014, p.16). Of uncertain origin and controversial performance,

[4] From 1918 onwards, the SPILTN was designated only the Indian Protection Service (SPI) (Brasil 2019).

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the truth is that the memory of the Vanuire Indian is highly valued and honored in the region. In the municipality of Tupã/SP there is a museum founded in 1966 in his honor: India Vanuíre Historical and Pedagogical Museum. His last days were spent in the Icatú Indigenous Land, in the municipality of Braúna/SP, where his remains rest.

As Pinheiro (1999, p.127) clarifies,

> The Kaingang of the West of São Paulo, together with the Botocudos of Minas Gerais, the Xocleng of Santa Catarina and the Parintintin of the Madeira River, constituted the first pacification experiences managed by the SPILTN, through which a type of "guide" was set up in the 1940s to guide the employees of the Service in the "attraction" and "pacification" of the different indigenous groups in Brazil.

The economic interests of the lands where the so-called "Kaingang Village" was located, on the Ribeirão dos Patos River, pressured the regional Inspectorate of the SPILTN to transfer them to an area 4 leagues away from the EFNB, in 1916. The workers of the Railroad considered the area the most dangerous, as it was where the last refuges of the Kaingang were located in the center-west of São Paulo. They were thus transferred to the banks of the Aguapeí River, close to where the Penápolis road is currently located, at the height of the city of Braúna/SP (Lança 2014, p.18). The head of the Post, at the time, Manuel Bandeira de Mello, was opposed to the transfer. He had been very important in the Kaingang pacification, however, his opposition was not enough to prevent the change. In addition to having his request denied by his superiors, Manuel Bandeira de Mello had ended up being transferred to the Araribá Indigenous Post, which had already been created in 1910 (Melatti, 1976, p. 14).

In any case, due to the factional tensions of the *Charin*, *Kenkrá* and *Iakri subgroups*, the Kaingang had to be relocated again. These tensions tended to be alleviated when they lived according to the norms of their traditional social organization in the forest. But, in a context of village, they were intensifying.

Thus, in 1916, part of the Kaingang, *Kenkrá*, was transferred to the Icatú Indigenous Post. Another part, *Iakri*, for India Vanuire village. And a third part, *Charin*, for the Araribá Indigenous Post, which had existed since 1910 (id. p. 14).

From the 1960s onwards, the arrival of other ethnic groups in the Vanuire village intensified; the process of transferring Indians to the center-west of São Paulo, Posto de Vanuire, Icatú, Araribá, however, dates from the 1930s. Brought from Cachoeirinha/MS to work in the peanut field, the Terena are the first to arrive. In some cases, the Indians went

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to work only during the peanut season, then returned (Lança 2014). Some have taken up residence in Icatú, where they are currently the majority.

In Vanuire, part of those who took up residence were due to marriages (Pinheiro 1999, p. 204). The first Krenak to arrive in Vanuire, in the 1960s, had already spent a period of eight years (1937 to 1945), in Icatu, to serve his sentence, given that this Post, at the time, was a penal village of the SPI. This Krenak met a Kaingang, whom he married and, after the end of his sentence, they moved to Vanuire (Lourenço, 2011, p. 75-6).

As Lourenço (2011, p. 76-7) clarifies,

> Since the 1940s, different people in charge have been committed to transforming the village into a model farm, forcing the Indians into a regime of semi-slavery; While the Indians raised cattle for trade and watched the leasing of their land by land grabbers, the inspectors rose in their careers.
> (...) The entry of the Krenak into Vanuíre is part of a period of true exhaustion of ancient life, the end of a three-decade sequence in which the Kaingang were progressively unable to speak their language, to divide into groups and subgroups, to perform marriages and separations in their own way, to initiate their children and to pay homage to the dead in *Veingreinyã*, taking care of their gardens, forests and rivers, among other practices.

Kaingang from São Paulo, Terena from Mato Grosso do Sul and Krenak from Minas Gerais, as well as other groups that have taken up residence in the village in recent decades, have gone through historical processes throughout the twentieth century, which resulted in: expropriation of their ancestral lands; Persecutions; submission to the tutelage of the State in small spaces. And this was, so to speak, the language through which the Vanuire Indigenous Land was constituted. This language produces, among the groups that reside in the I.T., relations of alliance and weeds. The way in which such changes in the relationships of the groups with the environment, in the use of technologies, in the survival strategies, in the internal and intergroup social organization impact on the health of the population is, therefore, as highlighted, the main objective of this reflection.

## OBJECT AND OBJECTIVES

The object investigated in the article is the epidemic profile of non-communicable diseases (obesity). The general objective is to evaluate how Amerindian populations respond to social, cultural and environmental changes based on the profile of this non-communicable disease. Most chronic health problems, such as obesity, are associated with the transition from tribal subsistence lifestyles to city styles, and largely result from changes in diet and physical activity levels.

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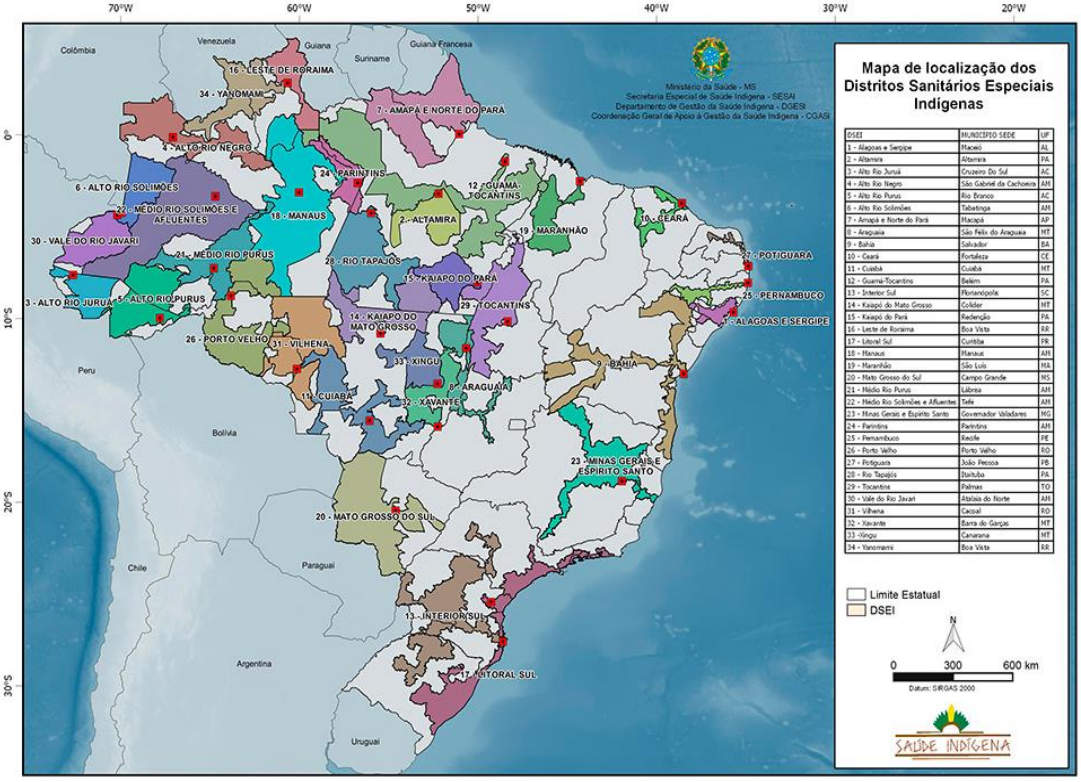
The specific objectives are to verify the biannual evolution, between 2008 and 2018, of the six categories used by the Food and Nutrition Surveillance System (SISVAN) to classify the nutritional status of the Amerindian population in the municipality of Arco-íris/SP, which is part of the Indigenous Sanitary District (DSEI) Interior Sul, number 12 in Figure 2. These six categories are as follows: underweight; adequate or eutrophic; overweight; grade I obesity; grade II obesity; obesity grade III.

Figure 2. 34 Special Indigenous Sanitary Districts




Source: Brazil 1 (2019).

## THEORETICAL FOUNDATION

The expression medical anthropology was coined in the 1960s to encompass research on human health within an anthropological approach. It is a designation notably used in countries such as the United States, England, Canada, and, according to authors such as Buchillet (1991, p.22), Langdon (1994, p.8), Fabrega (1972), Genest (1978), McElroy & Towsend (1996b, 64-69), it encompasses different theoretical currents. Buchillet (id. p.22), for example, subdivides the field of medical anthropology into four different strands. Langdon (id. p.8), in three. And McElroy & Towsend (id. pp.64-9) also subdivide it into four strands.

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Observing the three ways of classifying the field of investigation of medical anthropology presented above, it is noted that complementarity between them predominates. Rather than excluding each other, the classifications proposed by Buchillet (1991), Langdon (1994) and McElroy & Townsend (1996b) broaden and enrich the understanding of approaches in medical anthropology.

According to Buchillet (1991), therefore, there are four lines: 1) in which studies on the incidence and distribution of epidemic or endemic diseases and environmental and/or sociocultural variants are inserted; 2) which includes studies on medical institutions and the relationships between health professionals and patients; 3) which represents the studies of health problems of specific populations such as the elderly, women, children, homosexuals, etc.; 4) represented by the so-called ethnomedicine studies: which deal with the practices, beliefs and therapeutic knowledge related to the etiologies, diagnostic methods and treatments of diseases produced by autochthonous populations that are not affiliated with the conceptual framework of biomedicine.

Langdon (1994) organizes the field of medical anthropology into three lines: 1) studies focused on specific health services and problems; 2) ecologically-oriented studies, or medical ecology, in which theoretical developments and interests of ecological and biological anthropology converge applied to issues of health, disease and adaptation; 3) studies in which the hermeneutic perspective, also called ethnomedicine, in which the search for the meaning of the experience of illness predominates.

McElroy & Townsend (1996b), in turn, identify four lines: 1) studies that prioritize the meaning of the experience of the disease to the detriment of scientific explanations; 2) work that focuses on identifying social, economic, and political factors as determinants of health and disease as experience; 3) biocultural and ecological studies, which see health and disease as resulting from the interaction of the human species with the various ecosystems of the surrounding environment; 4) studies called political ecology, whose emphasis falls on the ecological variables of the experience of the disease, vis-à-vis historical, social and political facts that dynamize the ecological landscape.

Considering the above classifications, this article is part of the first line of research presented by Buchillet (1991): investigations concerned with the incidence and distribution of diseases and environmental and sociocultural variables. As highlighted, the three ways of classifying the field of medical anthropology are more complementary than exclusive. In this sense, in relation to Langdon (1994), the article is inserted in the second line, which

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groups interests of ecological anthropology and biology applied to issues of health, disease and adaptation. And, in relation to McElroy & Townsend (1996b), the article is linked to the third strand, biocultural and ecological studies, in which health and diseases are seen as gauges of the good or bad interaction of the human population with its environmental and ecological environment.

A common criticism that is usually directed at studies linked to this biocultural and ecological aspect is that they accept biomedical data as incontestable. To this criticism, the response of McElroy & Townsend (1996b, p. 67), also accepted here in this article, is that he sees no problem in admitting that biomedical knowledge is not a natural fact that cannot be contested. The authors admit the historicity of biomedical knowledge and the fact that this knowledge is subject to continuous improvement. Nevertheless, they distance themselves from approaches that intend to reduce medical diagnoses and laboratory analyses to the "ethnomedicine of Western culture", because biomedicine does have cross-cultural and universal applicability when it reflects biological and natural realities:

> "Perhaps the most general cristicism of biocultural theories is that they "accept biological and biomedical data as an assemblage of incontestable natural facts" (Lindenbaum and Lock 1993:x). While biocultural theories are not unaware that scientific kwowledge is culturally and sociallly constructed, it is true that biocultural theories *do* privilegie the finding of biomedical science. These finding are by no mean "incontestable" and they are subject to continuous testing and correction. Evem so, medical diagnoses and laboratory analyses are something more than just the ethnomedicine of Western culture. Biomedicine has cross-cultural, universal applicability when it accurately reflects natural and biological reality. Whatever its weaknesses, it is better basis for theory and treatment than theories that reject the natural sciences" McElroy & Townsend (id. p. 67).[5]

## METHODOLOGY

The nature of the research is descriptive, as it seeks to record, analyze and relate facts or phenomena, without prior intention of manipulating, controlling or interfering in the possible variables of the occurrence studied (Bernard 2002, p. 516). In addition, it had the support of documentary research, especially data available in the Food and Nutrition

[5] Translation: "Perhaps the most general criticism of biocultural theories is that they 'accept the biomedical and biological datum as a collection of incontrovertible facts' (Lindenbaum and Lock 1993:x). Although biocultural theories are attentive to the fact that scientific knowledge is culturally and socially constructed, it is true that they privilege the findings of the biomedical sciences. These findings are by no means incontrovertible and are subject to continual testing and correction. Still, medical diagnoses and laboratory analysis are something more than ethnomedicine of Western culture. Biomedicine has cross-cultural and universal applicability when it reveals biological and natural realities. Whatever its weaknesses, it is a better basis for theories and treatments than theories that reject the natural sciences" McElroy and Townsend (id. p. 67).

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Surveillance System (SISVAN), World Health Organization (WHO), National Health Foundation (Funasa), linked to the Ministry of Health, Socioenvironmental Institute (ISA) and Pro-Indian Commission, and bibliographic research in the Scientific *Electronic Library Online – Scielo*, *Google Scholar* databases and Latin American Center for Health Science Information – Bireme, through the following descriptors: Health Transition; South American Indians; Midwest-São Paulo.

Regarding SISVAN, the data presented in tables 2 to 9 were generated from the following terms:

Report Type:
Nutritional status.
Year and Month of Reference/Geographic Unit:
Even years: 2008 to 2024.
Month: All.
Grouped by: Municipality.
State: São Paulo.
Municipality: Arco-íris.

Other Filters:
Region: All.
Life Stage: Adult.
Gender: Everyone.
Race/Color: Indigenous.
Recorded Follow-Ups: All.
People Community: Everyone.
Education: All.

Figure 3. Formula for calculating BMI.

$$IMC = \frac{Peso\ kg}{(altura\ m)^2} = \frac{0}{0} = 0\ Kg/m^2$$

Source: Brazil (2008).

The data presented in the Results section take into account height and weight measurements for the calculation of the Body Mass Index (BMI), which is often used to classify the nutritional status of adults between 20 and 60 years of age (WHO 1995). This index is obtained by dividing the weight by the square of the height, as shown in Figure 3, and the distribution of the results can be seen in Table 1. Results lower than 18.5 kg/m2 are diagnosed as low weight. Between 18.5 kg/m2 and 24.9 kg/m2 are diagnosed as normal. Between 25 kg/m2 and 29.9 kg/m2 the diagnosis is overweight. Between 30 kg/m2 and 34.9 kg/m2 the diagnosis is class I obesity. From 35 kg/m2 to 39.9 kg/m2, class II obesity.

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Table 1. Reference Values.

| WHO CLASSIFICATION OF WEIGHT STATUS | |
|---|---|
| **WEIGHT STATUS** | **BODY MASS INDEX (BMI), kg/m²** |
| Underweight | <18.5 |
| Normal range | 18.5 – 24.9 |
| Overweight | 25.0 – 29.9 |
| Obese | ≥ 30 |
| Obese class I | 30.0 – 34.9 |
| Obese class II | 35.0 – 39.9 |
| Obese class III | ≥ 40 |

Source: WHO (1995).

## RESULTS

Regarding the nutritional status of adults (20 and 60 years old), between 2008 and 2010, respectively, tables 2 and 3, the data found were as follows: increase in overweight in the municipality of Arco-íris, from 30.77% to 40%; in the State of São Paulo, from 27.24% to 28.53%; in the Southeast region, from 26.80% to 28.67%; and, in Brazil, from 30.33% to 33.31%.

Table 2. Amount and percentage of BMI of adults (20-60 years), reference year 2008.

| BMI | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Region | Code FU | FU | Code IBGE | Municipality | Low weight | | Adequate or Eutrophic | | Overweight | | Grade I Obesity | | Grade II Obesity | | Grade III Obesity | | Total |
| | | | | | Amount | % | Amount | % | Amount | % | Amount | % | Amount | % | Amount | % | |
| SOUTHEAST | 35 | SP | 350335 | ARCO-IRIS | 0 | - | 5 | 38.46% | 4 | 30.77% | 3 | 23.08% | 1 | 7.69% | 0 | - | 13 |
| **TOTAL STATE OF SAO PAULO** | | | | | **9** | **3.5%** | **108** | **42.02%** | **70** | **27.24%** | **47** | **18.29%** | **13** | **5.06%** | **10** | **3.89%** | **257** |
| **TOTAL SOUTHEAST REGION** | | | | | **115** | **5.29%** | **1.126** | **51.84%** | **582** | **26.8%** | **235** | **10.82%** | **79** | **3.64%** | **35** | **1.61%** | **2.172** |
| **TOTAL BRAZIL** | | | | | **2.345** | **8.26%** | **13.336** | **46.95%** | **8.616** | **30.33%** | **3.027** | **10.66%** | **799** | **2.81%** | **281** | **0.99%** | **28.404** |

Source: Brazil 2 (2025).

Grade I obesity, in the same period, in the municipality, in the state, in the region and in Brazil, showed a trajectory with an upward trend, except for Arco-íris, which reduced the rate from 23.08% to 13.33%. In the State of São Paulo, the rate rose slightly from 18.29% to 19.90%. In the southeast region, there was an increase from 10.82% to 12.20%. In Brazil, the increase was from 10.66% to 13.15%.

In relation to grade II obesity, the trajectory of the rates increased in the same period, and considering the same geographic cuts, municipality, state, region and country. In São Paulo, the growth went from 5.06% to 6.54%. In the southeast region, from 3.64% to 4.05%. In Brazil, from 2.81% to 3.50%. Regarding the Rainbow, as there is no data available in 2010, table 2, it is not possible to make an inference.

With regard to grade III obesity, the percentages revealed varied, but quite discrete, trajectories. In the State of São Paulo, there was an increase from 3.89% to 3.93%. In the southeast region, there was a drop from 1.61% to 1.58%. In Brazil, the increase was from

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0.99% to 1.17%. Regarding the Rainbow, as there is no data available in 2008, table 1, it is not possible to make an inference.

Regarding eutrophic weight, there was a reduction in all four geographic areas. In relation to Arco-íris, the drop was from 38.46% to 33.33%. In the state, from 42.02% to 38.22%. In the region, from 51.84% to 49.92%. In Brazil, from 46.95% to 45.86%.

The low weight, in the state, fell from 3.5% to 2.88%. In the region, it fell from 5.29% to 3.58%. In Brazil, the decreasing change was from 8.26% to 3.01%. Regarding the rainbow, there are no data available in 2008 and 2010, table 1 and table 2, so it is not possible to make inferences.

Table 3. Amount and percentages of BMI of adults (20-60 years), reference year 2010.

| BMI | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Region | Code FU | FU | Code IBGE | Municipality | Low weight | | Adequate or Eutrophic | | Overweight | | Grade I Obesity | | Grade II Obesity | | Grade III Obesity | | Total |
| | | | | | Amount | % | Amount | % | Amount | % | Amount | % | Amount | % | Amount | % | |
| SOUTHEAST | 35 | SP | 350335 | ARCO-IRIS | 0 | - | 5 | 33.33% | 6 | 40% | 2 | 13.33% | 0 | - | 2 | 13.33% | 15 |
| TOTAL STATE OF SAO PAULO | | | | | 11 | 2.88% | 146 | 38.22% | 109 | 28.53% | 76 | 19.9% | 25 | 6.54% | 15 | 3.93% | 382 |
| TOTAL SOUTHEAST REGION | | | | | 113 | 3.58% | 1.576 | 49.92% | 905 | 28.67% | 385 | 12.2% | 128 | 4.05% | 50 | 1.58% | 3.157 |
| TOTAL BRAZIL | | | | | 1.134 | 3.01% | 17.266 | 45.86% | 12.541 | 33.31% | 4.952 | 13.15% | 1.317 | 3.5% | 440 | 1.17% | 37.650 |

Source: Brazil 2 (2025).

When considering the period between 2010 and 2012, table 3 and table 4, it is noted that the rates of overweight fell in Arco-íris, falling from 40% to 26.32%. In the State of São Paulo there was also a retreat, from 28.53% to 26.23%. In the southeast region, there was a slight increase, from 28.67% to 28.91%. And, in Brazil, the growth went from 33.31% to 34.74%.

Grade I obesity, in the same period, in Arco-íris, rose from 13.33% to 21.05%. In São Paulo, it went from 19.9% to 24.36%. In the southeast region, from 12.2% to 14.15%. In Brazil, from 13.15% to 14.98%.

Grade II obesity varied upwards from 6.54% to 8.90% in São Paulo. From 4.05% to 4.87%, in the southeast region. From 4.49% to 4.66% in Brazil. In Arco-íris, in 2010, table 2, there are no data, so it is not possible to make inference.

And grade III obesity, in Arco-íris, fell from 13.33% to 5.26%. In the State of São Paulo, it went from 3.93% to 2.58%. In the southeast region, it rose from 1.58% to 1.76%. And in Brazil it rose from 1.17% to 1.64%.

Regarding the eutrophic weight, in Arco-íris, the change was upward, from 33.33% to 36.86%. In the state, the oscillation was decreasing, from 38.22% to 34.89%. In the region, the drop was from 49.92% to 47.1%. And, in Brazil, there was also a drop, from 45.86% to 41.72%.

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The low weight, in the State of São Paulo, changed from 2.88% to 3.04%. In the region, from 3.58% to 3.2%. In Brazil, from 3.01% to 2.42%. In Arco-íris, as there are no data for 2010 and 2012, it is not possible to make inferences about the behavior of low weight ratios.

Table 4. Amount and percentages of BMI of adults (20-60 years), reference year 2012.

| BMI | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Region | Code FU | FU | Code IBGE | Municipality | Low weight | | Adequate or Eutrophic | | Overweight | | Grade I Obesity | | Grade II Obesity | | Grade III Obesity | | Total |
| | | | | | Amount | % | Amount | % | Amount | % | Amount | % | Amount | % | Amount | % | |
| SOUTHEAST | 35 | SP | 350335 | ARCO-IRIS | 0 | - | 7 | 36.84% | 5 | 26.32% | 4 | 21.05% | 2 | 10.53% | 1 | 5.26% | 19 |
| TOTAL STATE OF SAO PAULO | | | | | 13 | 3.04% | 149 | 34.89% | 112 | 26.23% | 104 | 24.36% | 38 | 8.9% | 11 | 2.58% | 427 |
| TOTAL SOUTHEAST REGION | | | | | 109 | 3.2% | 1.605 | 47.11% | 985 | 28.91% | 482 | 14.15% | 166 | 4.87% | 60 | 1.76% | 3.407 |
| TOTAL BRAZIL | | | | | 1.058 | 2.42% | 18.213 | 41.72% | 15.175 | 34.76% | 6.538 | 14.98% | 1.961 | 4.49% | 714 | 1.64% | 43.659 |

Source: Brazil 2 (2025).

Considering the period between 2012 and 2014, table 4 and table 5, in Arco-íris, overweight decreased from 26.32% to 23.53%. In the State of São Paulo, the growth was from 26.23% to 33.21%. In the southeast region, the growth was from 28.91% to 30.42%. And, in Brazil, a slight drop from 34.76% to 34.39%.

Grade I obesity, in Arco-íris, rose from 21.05% to 35.29%. In São Paulo, it fell from 24.36% to 22.63%. In the southeast region, it rose from 14.15% to 15.64%. And, in Brazil, the growth was from 14.98% to 15.78%.

Grade II obesity, in Arco-íris, was at 10.53% in 2012 and fell to 5.88% in 2014. In the state, the change was decreasing: from 8.9% to 6.02%. In the region there was a slight drop: from 4.87% to 4.72%. And, in Brazil, there was also a slight increase: from 4.49% to 4.66%.

Grade III obesity in Arco-íris was at 5.26% in 2012 and rose to 5.88% in 2014. In the same period, in the state, it was at 2.58% and went to 5.11%, in the region, it was at 1.76% and went to 2.24%, and, in Brazil, it remained practically unchanged: it was at 1.64% and, very discreetly, rose to 1.65%.

The eutrophic weight, in Rainbow, was at 36.84% in 2012 and fell to 29.41% in 2014. In the same period, in the State of São Paulo, the change was decreasing: from 34.89% to 31.02%. In the southeast region, the decrease was from 47.11% to 43.67%. And, in Brazil, the change was also slightly decreasing: from 41.72% to 41.14%.

And the low weight, in São Paulo, fell from 3.04% to 2.01%. In the region, it rose from 3.2% to 3.32%. And, in Brazil, the decrease was from 2.42% to 2.37%.

In Arco-íris, in the period, table 4 and table 5, there are no available that allow inferences.

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Table 5. Amount and percentages of BMI of adults (20-60 years), reference year 2014.

| BMI | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Region | Code FU | FU | Code IBGE | Municipality | Low weight | | Adequate or Eutrophic | | Overweight | | Grade I Obesity | | Grade II Obesity | | Grade III Obesity | | Total |
| | | | | | Amount | % | Amount | % | Amount | % | Amount | % | Amount | % | Amount | % | |
| SOUTHEAST | 35 | SP | 350335 | ARCO-IRIS | 0 | - | 5 | 29.41% | 4 | 23.53% | 6 | 35.29% | 1 | 5.88% | 1 | 5.88% | 17 |
| TOTAL STATE OF SAO PAULO | | | | | 11 | 2.01% | 170 | 31.02% | 182 | 33.21% | 124 | 22.63% | 33 | 6.02% | 28 | 5.11% | 548 |
| TOTAL SOUTHEAST REGION | | | | | 135 | 3.32% | 1.776 | 43.67% | 1.237 | 30.42% | 636 | 15.64% | 192 | 4.72% | 91 | 2.24% | 4.067 |
| TOTAL BRAZIL | | | | | 1.441 | 2.37% | 24.994 | 41.14% | 20.897 | 34.39% | 9.590 | 15.78% | 2.831 | 4.66% | 1.003 | 1.65% | 60.756 |

Source: Brazil 2 (2025).

Regarding the period between 2014 and 2016, table 5 and table 6, in Arco-íris, overweight increased from 23.53% to 25.93%. In the State of São Paulo there was also growth: from 33.21% to 34.39%. In the southeast region, the change oscillated upwards, going from 30.42% to 31.7%. And, in Brazil, the growth was 34.39% to 34.94%.

Grade I obesity, in the same period, in Arco-íris, fell from 35.29% to 29.63%. In São Paulo, the decrease was from 22.63% to 20.58%. In the southeast region, there was an increase from 15.64% to 16.22%. And, in Brazil, the growth went from 15.78% to 16.54%.

Obesity grade II, in Arco-íris, grew from 5.88% to 14.81%. In the state, the growth was from 6.02% to 10.64%. In the region, the increase was from 4.72% to 5.86%. And in Brazil, class II obesity also oscillated upwards, going from 4.66% to 4.88%.

Grade III obesity, in Arco-íris, grew from 5.88% to 11.11%. In the State of São Paulo, the decrease was from 5.11% to 3.04%. In the region, the growth was from 2.24% to 2.38%. And, in Brazil, there was growth from 1.65% to 1.85%.

The eutrophic peso, in Rainbow, retreated from 29.41% to 18.52%. In the state, there was a slight decrease from 31.02% to 30.39%. In the region, the drop was 43.67% to 41.06%. And, in Brazil, the drop was from 41.14% to 39.52%.

Regarding low weight, in the State of São Paulo, the drop was from 2.01% to 0.97%. In the Southeast region, the decreasing change was from 3.32% to 2.78%. And, in Brazil, the very slight drop was from 2.37% to 2.32%.

Table 6. Amount and percentages of BMI of adults (20-60 years), reference year 2016.

| BMI | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Region | Code FU | FU | Code IBGE | Municipality | Low weight | | Adequate or Eutrophic | | Overweight | | Grade I Obesity | | Grade II Obesity | | Grade III Obesity | | Total |
| | | | | | Amount | % | Amount | % | Amount | % | Amount | % | Amount | % | Amount | % | |
| SOUTHEAST | 35 | SP | 350335 | ARCO-IRIS | 0 | - | 5 | 18.52% | 7 | 25.93% | 8 | 29.63% | 4 | 14.81% | 3 | 11.11% | 27 |
| TOTAL STATE OF SAO PAULO | | | | | 7 | 0.96% | 222 | 30.41% | 248 | 33.97% | 152 | 20.82% | 78 | 10.68% | 23 | 3.15% | 730 |
| TOTAL SOUTHEAST REGION | | | | | 125 | 2.77% | 1.872 | 41.46% | 1.423 | 31.52% | 724 | 16.04% | 258 | 5.71% | 113 | 2.5% | 4.515 |
| TOTAL BRAZIL | | | | | 1.637 | 2.35% | 27.569 | 39.59% | 24.314 | 34.91% | 11.461 | 16.46% | 3.367 | 4.83% | 1.292 | 1.86% | 69.640 |

Source: Brazil 2 (2025).

Between 2016 and 2018, table 6 and table 7, overweight in Rainbow was reduced from 25.93% to 16.67%. In the State of São Paulo, there was a slight decrease from

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34.39% to 34.04%. In the southeast region, there was an increase from 31.7% to 32.86%. And, in Brazil, there was an increase in overweight rates from 34.94% to 36.49%.

Grade I obesity behaved in Arco-íris, in the same period, rising from 29.63% to 36.67%. In the state, the upward change was from 20.58% to 23.74%. In the region, there was also growth, although slight, from 16.22% to 16.78%. And, in Brazil, the growth went from 16.54% to 18.17%.

Obesity grade II, in Arco-íris, fell from 14.81% to 10%. In the state, it fell from 10.64% to 9.71%. In the region, it rose from 5.86% to 6.04%. And, in Brazil, it rose from 4.82% to 5.42%.

Grade III obesity fell from 11.11% to 10%. In São Paulo, it rose from 3.04% to 3.36%. In the southeast region, it rose slightly from 2.38% to 2.46%. And, in Brazil, it very discreetly rose from 1.85% to 1.89%.

The eutrophic weight, in Rainbow, rose from 18.52% to 26.67%. In São Paulo, it fell from 30.39% to 27.94%. In the southeast region, it fell from 41.06% to 39.81%. And, in Brazil, it fell from 39.52% to 36.37%.

In relation to low weight, there was an increase from 0.97% to 1.2%. In the region, the decrease was from 2.78% to 2.05%. And, in Brazil, the drop was from 2.32% to 1.66%.

Table 7. Amount and percentages of BMI of adults (20-60 years), reference year 2018.

| BMI | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Region | Code FU | FU | Code IBGE | Municipality | Low weight | | Adequate or Eutrophic | | Overweight | | Grade I Obesity | | Grade II Obesity | | Grade III Obesity | | Total |
| | | | | | Amount | % | Amount | % | Amount | % | Amount | % | Amount | % | Amount | % | |
| SOUTHEAST | 35 | SP | 350335 | ARCO-IRIS | 0 | - | 8 | 26.67% | 5 | 16.67% | 11 | 36.67% | 3 | 10% | 3 | 10% | 30 |
| TOTAL STATE OF SAO PAULO | | | | | 11 | 1.29% | 242 | 28.37% | 289 | 33.88% | 199 | 23.33% | 82 | 9.61% | 30 | 3.52% | 853 |
| TOTAL SOUTHEAST REGION | | | | | 110 | 2.05% | 2.135 | 39.7% | 1.776 | 33.02% | 900 | 16.73% | 323 | 6.01% | 134 | 2.49% | 5.378 |
| TOTAL BRAZIL | | | | | 1.276 | 1.65% | 28.059 | 36.39% | 28.158 | 36.52% | 13.968 | 18.12% | 4.175 | 5.41% | 1.471 | 1.91% | 77.107 |

Source: Brazil 2 (2025).

Between 2018 and 2022[6], tables 7 and 8, overweight, in Arco-íris, increased from 16.67% to 26.67%, practically returning to the 2016 rates. At the state level, from the southeast region to Brazil, the indexes remained stable, respectively, ranging from 33.88% to 32.33%, from 33.02% to 32.44% and 36.52% to 36.37%.

Class I obesity in the municipality showed a slight reduction in the same period from 2018 to 2022, ranging from 36.67% to 33.33%. In relation to the state, the region and Brazil, this degree of obesity also showed stability, respectively, ranging from 23.33% to 23.16%, 16.73% to 18.34% and 18.12% to 18.84%.

[6] Most likely due to the covid-19 pandemic, the data in relation to Arco-íris are zero in the year 2020.

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Grade II obesity grew from 10% to 13.33% in Arco-íris. In turn, the state, the southeast region and Brazil showed slight increases in rates, respectively: 9.61% to 10.14%; 6.01% to 7.46%; and 5.41% to 6.02%.

Grade III obesity fell from 10% to 6.67% at the municipal level. In the State of São Paulo, in the southeast region and in Brazil, it grew slightly: 3.52% to 5.3%; 2.49% to 3.8%; and 1.91% to 2.25%.

The eutrophic weight in Rainbow dropped from 26.67% to 20%. In the State of São Paulo, it remained practically stable, as it varied from 28.37% to 27.3%. In the region, it fell from 39.7% to 35.13%. And in Brazil it reduced very little, going from 36.39% to 34.56%.

As for low weight, in Arco-íris, the number remained 0.0 (zero) between 2018 and 2022. In the state, in the region and in Brazil, it remained stable, respectively, going from 1.29% to 1.77%, 2.05 to 2.83 and 1.65 to 1.97%.

Table 8. Amount and percentage of BMI of adults (20-60 years), reference year 2022.

| BMI | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Region | Code FU | FU | Code IBGE | Municipality | Low weight | | Adequate or Eutrophic | | Overweight | | Grade I Obesity | | Grade II Obesity | | Grade III Obesity | | Total |
| | | | | | Amount | % | Amount | % | Amount | % | Amount | % | Amount | % | Amount | % | |
| SOUTHEAST | 35 | SP | 350335 | ARCO-IRIS | 0 | - | 3 | 20% | 4 | 26.67% | 5 | 33.33% | 2 | 13.33% | 1 | 6.67% | 15 |
| TOTAL STATE OF SAO PAULO | | | | | 38 | 1.77% | 587 | 27.3% | 695 | 32.33% | 498 | 23.16% | 218 | 10.14% | 114 | 5.3% | 2.150 |
| TOTAL SOUTHEAST REGION | | | | | 223 | 2.83% | 2.772 | 35.13% | 2.560 | 32.44% | 1.447 | 18.34% | 589 | 7.46% | 300 | 3.8% | 7.891 |
| TOTAL BRAZIL | | | | | 2.167 | 1.97% | 37.968 | 34.56% | 39.960 | 36.37% | 20.702 | 18.84% | 6.611 | 6.02% | 2.467 | 2.25% | 109.875 |

Source: Brazil 2 (2025).

Between 2022 and 2024, the last biennium to be considered in this article, tables 8 and 9, from 2022 to 2024, overweight in Arco-íris increased from 26.67% to 28.57%, remaining stable. At the state level, from the southeast region to Brazil, the indexes remained stable, respectively, ranging from 32.33% to 34.64%, from 32.44% to 33.35% and 36.37% to 35.67%.

Grade I obesity in the municipality showed a slight reduction in the same period from 2022 to 2024, ranging from 33.33% to 28.57%. In relation to the state, the region and Brazil, this degree of obesity showed a slight reduction, respectively, ranging from 23.16% to 22.72%, 18.34% to 20% and 18.84% to 19.78%.

Grade II obesity grew from 13.33% to 0%, in Arco-íris. In turn, the State, the Southeast Region and Brazil recorded stable rates, respectively: 10.14% to 9.22%; 7.46% to 7.9%; and 6.02% to 6.68%.

Grade III obesity grew from 6.67% to 42.85%, at the municipal level. In the State of São Paulo, in the southeast region and in Brazil, it remained stable: 5.3% to 4.89%; 3.8% to 3.99; and 2.25% to 2.64%.

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The eutrophic weight in Rainbow dropped from 20% to 0.0%. In the State of São Paulo, it remained practically stable, as it varied from 27.3% to 26.68%. In the region, it fell from 35.13% to 32.22%. And in Brazil it reduced very little, going from 34.56% to 33.37%.

As for low weight, in Arco-íris, the number remained 0.0 (zero) between 2022 and 2024. In the state, in the region and in Brazil, it remained stable, respectively, going from 1.77% to 1.84%, 2.83% to 2.55% and 1.97% to 1.86%.

Table 9. Amount and percentage of BMI of adults (20-60 years), reference year 2024.

| BMI | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Region | Code FU | FU | Code IBGE | Municipality | Low weight | | Adequate or Eutrophic | | Overweight | | Grade I Obesity | | Grade II Obesity | | Grade III Obesity | | Total |
| | | | | | Amount | % | Amount | % | Amount | % | Amount | % | Amount | % | Amount | % | |
| SOUTHEAST | 35 | SP | 350335 | ARCO-IRIS | 0 | - | 0 | - | 2 | 28.57% | 2 | 28.57% | 0 | - | 3 | 42.86% | 7 |
| TOTAL STATE OF SAO PAULO | | | | | 54 | 1.84% | 781 | 26.68% | 1.014 | 34.64% | 665 | 22.72% | 270 | 9.22% | 143 | 4.89% | 2.927 |
| TOTAL SOUTHEAST REGION | | | | | 238 | 2.55% | 3.012 | 32.22% | 3.117 | 33.35% | 1.869 | 20% | 738 | 7.9% | 373 | 3.99% | 9.347 |
| TOTAL BRAZIL | | | | | 2.280 | 1.86% | 40.948 | 33.37% | 43.763 | 35.67% | 24.273 | 19.78% | 8.195 | 6.68% | 3.243 | 2.64% | 122.702 |

Source: Brazil 2 (2025).

## DISCUSSION

The data presented in tables 2 to 9, 2008 and 2024, leave no doubt about the upward trajectory of class I obesity rates in Arco-íris, where the indigenous populations of Vanuire live, as they jumped from 23.08% to 28.57%: an increase of 23.79%. Grade II obesity rates went from 7.69% to 0%, decreasing by 100%. Grade III obesity rates, which were zero in 2008, rose to 42.82% in 2024, representing an increase of almost 43%.

The overweight rates in Arco-íris, between 2008 and 2024, fell from 30.77% to 28.57%, respectively tables 2 and 9, which represents a decrease of 7.7%.

What, at first, might seem like a promising fact, a drop in overweight rates of around 7.7% between 2008 and 2024, ceases to be so as this drop is accompanied by a 23.78% increase in the rate of grade I obesity.

In other words, the decrease in overweight and the 100% drop in grade II obesity reflect the worsening of the obesity profile, since grade III obesity grew by 42.82%.

Regarding the eutrophic weight, in the same period from 2008 to 2024, table 2 and table 9, there was a 100% decrease in the rates, respectively, from 38.46% to 0.0%. As for low weight, throughout the period, it remained zero.

## FINAL CONSIDERATIONS

The objective of the article presented above was to evaluate how the Amerindian populations of the Vanuire Indigenous Land respond to social, cultural and environmental changes based on the profile of a non-communicable disease called obesity. The

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hypothesis is that most chronic health problems, such as obesity, are associated with the transition from lifestyles linked to tribal subsistence to city styles and, to a large extent, result from changes in diet and levels of physical activity. This hypothesis is confirmed by the data previously presented.

In the period between 2008 and 2024, overweight rates retreated, but, as an expression of the growth in class I and grade III obesity rates, overweight fell by 7.7%, class I obesity grew by 23.79%, and class II obesity fell by 100%, as pointed out in the discussion section. In fact, the obesity profile has become more severe, given the 42.82% increase in grade III obesity rates.

The conclusion that the obesity profile has worsened is even more supported by the fact that, in the same period, the eutrophic weight rates fell from 38.46% to 0.0%: a regression of 100%. All of them have their weight changed upwards, and no one, in the entire period, presented low weight.

The results clearly show the trend of increasing obesity, especially grade I and grade III, accompanied by a decrease in overweight and eutrophic weight, among the Brazilian indigenous populations living in the municipality of Arco-íris, where the Vanuire Indigenous Land is located. The results also reveal the effectiveness of SISVAN in presenting one of the aspects of the indigenous health profile: the nutritional status of the population.

The quantitative data presented reveal a general profile of nutritional health, in this sense, ethnographic research is crucial in order to learn the social, cultural, symbolic and political dimensions of the phenomenon. The nutritional and epidemic profile of a population, to be the most complete, cannot be analyzed only with quantitative data and through a single variable such as the Body Mass Index (BMI). This index, for example, misses the composition of this mass: differences between the percentage of muscle mass, bone mass, adipose tissue, visceral fat and subcutaneous fat. Anthropometric measurements of hip and waist values are currently considered indispensable to assess the percentage of visceral and subcutaneous fat, data that are also indispensable for the diagnosis of metabolic syndrome[7].

[7] "... a complex disorder represented by a set of cardiovascular risk factors related to central fat deposition and resistance to insulin action (IR), and is associated with early mortality in non-diabetic individuals and in patients with type 2 diabetes mellitus (DM)" (Rodrigues, Canani and Gross, 2010, p. 134).

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Cultural, social and economic issues are equally seminal and need to be addressed through semi-structured questionnaires that capture information about people's diet, food preferences, and physical activities linked to subsistence, work and leisure.

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