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The *Xavante* indigenous population in Mato Grosso: health-related sociodemographic characteristics

A população indígena Xavante em Mato Grosso: características sociodemográficas relacionadas à saúde

La población indígena Xavante en Mato Grosso: características sociodemográficas relacionadas con la salud

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ABSTRACT

Objective: To compare *Xavante* sociodemographic indicators from six indigenous lands with the non-indigenous population residing in rural areas of four adjacent microregions. **Method:** This is an ecological cross-sectional study, with comparative analyzes between indigenous and non-indigenous residents in the state of Mato Grosso, Brazil. Age and sex structure, literacy rate, income, household sanitation conditions and mortality were compared. **Results:** A total of 14,905 *Xavante* people and 78,106 non-indigenous people (white, black, yellow and brown) residing in rural areas were characterized. The age structure revealed divergent patterns, 40.0% of *Xavante* were under 10 years old, against 15.0% of non-indigenous people in the same age group. Regarding non-indigenous people, the *Xavante* had a higher illiteracy rate (31.3% vs. 9.9%), and 84.1% of the households did not have a bathroom or toilet, 39.6% of *Xavante* people did not declare an income against 6.5% for the non-indigenous. **Conclusion and implication for practice:** Data on ethnicity, collected for the first time by a census, are essential for demographic analyzes of specific segments of the population, and in the case of the *Xavante*, they reveal inequalities in relation to non-indigenous people.

Keywords: Indigenous Peoples; Xavante; Demographic Census; Health.

RESUMO

Objetivo: Comparar indicadores sociodemográficos dos Xavante de seis terras indígenas com a população não indígena residente em áreas rurais de quatro microrregiões adjacentes. **Método:** Estudo seccional, do tipo ecológico, com análises comparativas entre indígenas e não indígenas residentes no estado de Mato Grosso, Brasil. Compararam-se os seguintes indicadores: estrutura etária e por sexo, taxa de alfabetização, renda, condições de saneamento dos domicílios e mortalidade. **Resultados:** Foram caracterizadas 14.905 pessoas Xavante e 78.106 pessoas não indígenas (brancas, pretas, amarelas e pardas) residentes em domicílios de área rural. A estrutura etária revelou padrões divergentes, 40,0% dos Xavantes tinham menos de 10 anos de idade, contra 15,0% dos não indígenas na mesma faixa etária. Em relação aos não indígenas, os Xavantes apresentaram maior taxa de analfabetismo (31,3% vs. 9,9%) e 84,1% dos domicílios não possuíam banheiro ou sanitário, 39,6% das pessoas Xavante não declararam renda, contra 6,5% para os não indígenas. **Conclusão e implicação para a prática:** Os dados sobre etnia, coletados pela primeira vez por um censo, são essenciais para análises demográficas de segmentos específicos da população, e, no caso dos Xavante, revelam desigualdades em relação aos não indígenas.

Palavras-chave: Povos indígenas; Xavante; Censo Demográfico; Saúde.

RESUMEN

Objetivo: Comparar los indicadores sociodemográficos del Xavante pertenecientes a seis tierras indígenas con la población no indígena residente en áreas rurales de cuatro microrregiones adyacentes. **Método:** Estudio seccional, tipo ecológico, con análisis comparativo entre indígenas y no indígenas residentes del estado de Mato Grosso, Brasil. Se compararon los siguientes indicadores: estructura de edad y sexo, tasa de alfabetización, ingresos, condiciones de saneamiento y mortalidad inadecuadas. **Resultados:** La muestra estuvo conformada por 14.905 personas Xavante y 78.106 personas no indígenas (blancos, negros, amarillos y morenos) que viven en hogares rurales. La estructura por edades reveló patrones divergentes, siendo el 40,0% de los Xavante menores de 10 años, frente al 15,0% de los no indígenas del mismo grupo de edad. En comparación con los no indígenas, los Xavante tenían una tasa de analfabetismo más alta (31,3% vs.9,9%) y el 84,1% de los hogares no tenían baño ni inodoro, el 39,6% de los Xavante no declaraban sus ingresos frente a 6,5% para personas no indígenas. **Conclusión e implicación para la práctica:** Los datos sobre etnicidad, recopilados por primera vez mediante un censo, son fundamentales para el análisis demográfico de segmentos específicos de la población y, en el caso de los Xavante, revelan desigualdades en relación con los no indígenas.

Palabras chave: Población Indígena; Xavante; Censos Demográficos; Salud.

INTRODUCTION

Sociodemographic characteristics of a population can be understood through indicators that summarize aspects related to the demographic structure and dynamics, patterns of spatialization in different territories, in addition to living conditions, including health conditions. In many contexts, as in the case of indigenous people living in Brazil, the understanding of the main sociodemographic characteristics is relatively recent and involves numerous particularities, especially regarding ethnic sociodiversity, present throughout the national territory.[1,2]

Among the data sources that seek to support public policies in the various areas of collective interest, including in the field of health, population censuses are, unequivocally, one of the most relevant tools. In the case of the last Brazilian censuses, items related to the ethnic and racial sociodiversity of the population were included, covering the entire territorial extension and reaching places that only the censuses investigate.[3,4]

The last three censuses carried out in Brazil (1991, 2000 and 2010) progressively invested in the collection of specific data on indigenous peoples, and some analyzes have shown that, over the last few decades, there have been important variations in the population contingents of indigenous people, with emphasis on the increase in volume in urban contexts.[5] Regarding the 2010 census, for the first time, characteristics about specific ethnic belonging were investigated, revealing that in Brazil there are more than three hundred indigenous peoples, including the *Xavante*, present mostly in midwestern Brazil.[6]

The *Xavante* indigenous people are recognized as one of the ethnic groups with diverse reports and studies in the fields of anthropology, demography and health, in particular the population of the indigenous land (IL) *Pimentel Barbosa*, which has investigations carried out since the 1950s, being accompanied through studies in the same fields mentioned until the present moment.[7-11] Based on the results of the 2000 Census, observed for the *Xavante* population of six IL, compared to the same data from a second source (Indigenous Health Information System – SIASI (*Sistema de Informação a Saúde Indígena*)), the authors considered the population size and its distribution in age groups and sex to be consistent, being located primarily in indigenous reserves, in the rural area of the encompassing municipalities.[9,12]

The *Xavante*'s demographic dynamics involve recognized population growth in contexts of high infant mortality rates. Compared to other indigenous contexts present in Brazil, migration processes and increased ethnic self-recognition bear little relation to the increase in population growth rates.[13]

In this way, population studies that describe characteristics of specific ethnic groups from large national databases remain scarce in Brazil, aspect that is largely related to the paucity of data collected by state agencies that guarantee relative legitimacy in comparisons with the rest of the population.

Based on data from the 2010 Census, this study aimed to compare demographic and socioeconomic characteristics of the population of six *Xavante* IL with the non-indigenous rural population of four microregions (as classified by the Brazilian Institute of Geography and Statistics – IBGE (*Instituto Brasileiro de Geografia e Estatística*)), located adjacent to these *Xavante* IL, in eastern Mato Grosso, Brazil.

METHOD

A cross-sectional, ecological study was carried out, with comparative analyzes between indigenous and non-indigenous (white, black, brown and yellow, considered together) residing in the eastern portion of the state of Mato Grosso, Central-West region of Brazil. Six IL inhabited exclusively by indigenous people of the *Xavante* ethnicity were selected: *Parabubure*, *São Marcos*, *Pimentel Barbosa*, *Areões*, *Sangradouro*/*Volta Grande* and *Maraiwãtsédé*.

The analyzed data come from the universe of the 2010 Census carried out by the IBGE and were accessed through the Multidimensional Statistics Database (BME/IBGE) (www.bme.ibge.gov.br). It is a tool that provides grouped data, therefore unidentified, for most of the surveys conducted by the IBGE. Among the numerous stratifications allowed by this tool, data can be aggregated for specific geographic contexts (large regions, federation units, micro-regions).

According to the IBGE, within the scope of the 2010 Census, IL were "[...] the set of lands that were declared, homologated, regularized and in the process of being acquired as an indigenous reserve until December 31, 2010 [...]"[3:301]. All six IL included in this study were entirely located in rural areas.

The *Xavante* IL included in this study overlapped or adjacent to four microregions in Mato Grosso: *Canarana*, *Norte Araguaia*, *Tesouro*, and *Médio Araguaia*. In 2010, there were 22 microregions in this state. According to the document that describes the methodology adopted by IBGE[3:299]:

> The geographic microregions are sets of contiguous municipalities, defined as parts of the mesoregions that present specificities regarding the organization of space. Its delimitation takes into account, in addition to the dimensions that form the mesoregions, the life of relationships at the local level, due to the possibility of serving their populations, by the basic social sectors [...].

Figure 1 shows the units of analysis of the study, highlighting the six *Xavante* IL and rural areas with non-indigenous residents. Although nine *Xavante* IL were recognized and approved (in 2010), for reasons of confidentiality of information, the BME allows access only to six of them, in which 83.2% of the total *Xavante* people resided in Mato Grosso. As inclusion criteria, self-classified people were selected as "indigenous" in the question about color or race and as Xavante in the question about ethnicity, with the following distribution: *Parabubure* (N = 7,539 people or 50.6%), *São Marcos*/MT (N = 3,013 or 20.2%), *Pimentel Barbosa* (N = 1,740 or 11.7%), *Areões* (N = 965 or 6.5%), *Sangradouro*/*Volta Grande* (N = 882 or 5.9%) and *Maraiwãtsédé* (N = 766 or 5.1%), totaling 14,905 people (Figure 1). Among the non-indigenous,

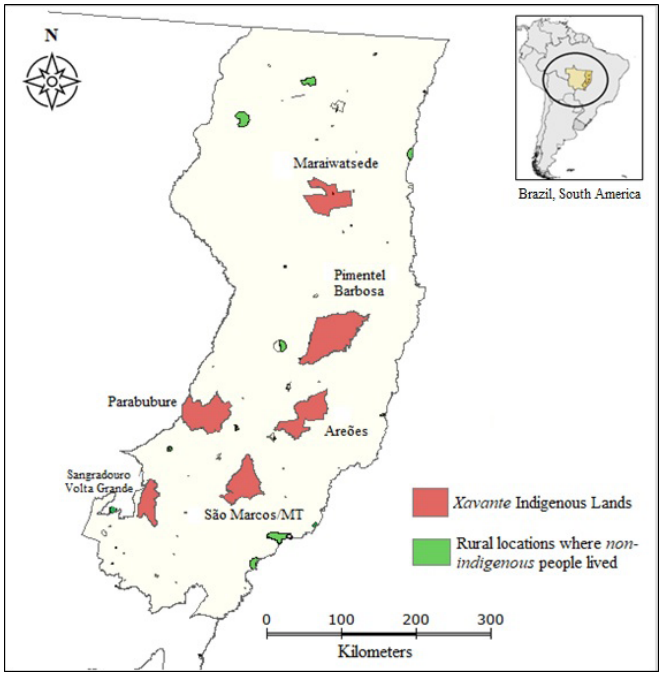

Figure 1 - Location of *Xavante* indigenous lands and locations of rural areas within the *Canarana, Norte Araguaia, Tesouro* and *Médio Araguaia,* Mato Grosso, Brazil, 2010.
Own elaboration based on data from the 2010 Brazilian Demographic Census.

people classified as brown (N = 45,309 or 58.0%), white (N = 26,100 or 33.4%), black (N = 5,676 or 7.3%) and yellow (N = 1,021 or 1.3%) were included, totaling 78,106 people living in households outside IL, located in rural areas of the four microregions that delimit the area indicated in Figure 1.

The two population segments (indigenous and non-indigenous) were compared according to sociodemographic indicators – aage structures and gender composition (age pyramids), literacy rates (research on people aged 5 and over who could read and write a simple note – including indigenous languages),[3] per capita income (derived from total income, considering residents of at least 10 years of age).[3] People were selected for whom no income was declared – no income.[3] Households were characterized according to the proportions of those without bathroom or toilet, without garbage collection, without supply of treated water, without electricity. From census data, the frequencies of deaths were described according to sex and age groups according to *Xavante* ethnicity and non-indigenous. Denominators related to deaths correspond to the frequency of households according to color or race and ethnicity (*Xavante*) declared by the people identified as responsible for the households.

The data were stored in spreadsheets and analyzed in SPSS version 23.0,[14] and the maps were made with the support of *TerraView* version 3,2,1.[15] The comparison between socioeconomic indicators was carried out through the calculation of parametric statistics (chi-square and Anova Test) and effect measures (Prevalence Ratio - PR), considering significant results with error probability lower than 5% (p-value<0.05).

The data source used in this study was the 2010 Demographic Census, carried out by the IBGE, whose access is free, with only the use of aggregated data being allowed according to geographic strata of interest (large regions, microregions, municipality, neighborhood, etc.).[3] Thus, this study was carried out through the use of secondary data, collected and made available by a government agency. The analysis was conducted in accordance with Resolution 466/2012 of the Brazilian National Council for Ethics in Research with Human Beings, which provides for non-obligation and assessment by the Research Ethics Committee in the case of use of public data.

RESULTS

The age and sex structure (age pyramids) of the population segments described reveal different characteristics through the formats outlined for the *Xavante* indigenous people and other people living in rural areas (Figure 2). Half of the population of the six *Xavante* IL is composed of children and adolescents, people over 50 years old correspond to approximately 7.1%. With inverted values, approximately 25% of the rural non-indigenous population of the 12 municipalities is composed of children and adolescents and more than 20% are over the age of 50 (Figure 2). The differences represented by the base and top of the age pyramid is also perceived in their trunk or body when comparing the two investigated populations, in which the non-indigenous population has approximately twice as many people over 25 and over 50 for both sexes (Figure 2).

Inequality between the *Xavante*s and the other segments of color or race can be seen in Figure 3, which presents indicators related to illiteracy rates and frequencies of people for whom household income was not declared (household income per capita). For these results, only people aged between 15 and 59 years (age control) were included, and the non-indigenous category represents the set of other categories of color or race, all living in rural areas. More expressive inequalities were described for *Xavante* indigenous people, with the illiteracy rate (15-59 years) being five times higher than that of whites in rural households, and almost twice as high for residents of black color or race (Figure 3).

In the case of people without income, a query carried out for the variable per capita household income, it was noted that approximately four out of 10 *Xavante* indigenous adults (15-59 years old) did not declare income. For the other categories of color or race, the values were less than 10% (Figure 3).

The information on household characteristics identified by the 2010 Census is detailed in Table 1. Thus, 1,973 households in the six *Xavante* IL were compared with 8,462 located in rural areas in the four selected micro-regions, where residents were classified into other categories of color or race (non-indigenous). It was noted that households without basic infrastructure (treated water,

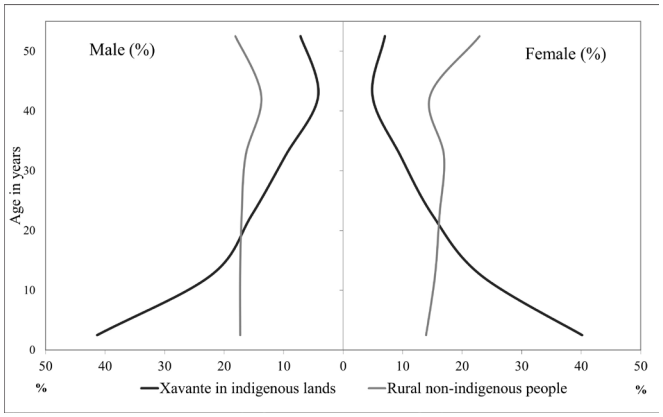

Figure 2 - Age and sex arrangement of the *Xavante* population residing in six selected indigenous lands (N = 14,905) and non-indigenous population residing in households located in rural areas (N = 78,106) in four microregions, Mato Grosso, Brazil, 2010.
*IL – indigenous land Source: 2010 Brazilian Demographic Census.

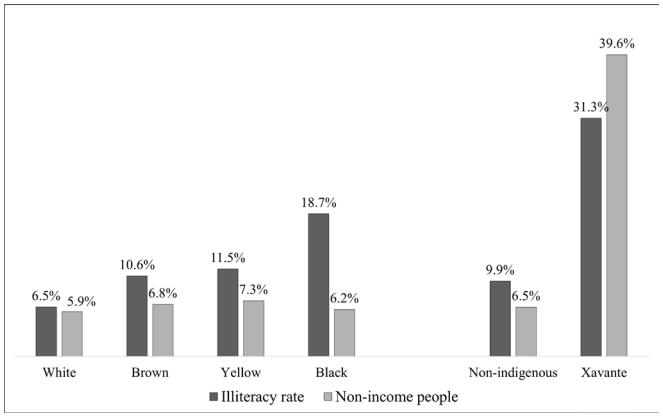

Figure 3 - Illiteracy rates and frequencies of people who did not declare income (15 to 59 years old) according to color or race categories and indigenous people of the *Xavante* ethnicity, living in households located in rural areas and indigenous lands, Mato Grosso, Brazil, 2010.
Source: 2010 Brazilian Demographic Census

bathroom, garbage collection and electricity) were significantly more frequent in IL, in addition to super high magnitudes, as demonstrated by the effect measures (prevalence ratio). In *Xavante* households, there were more residents (> 4) and just over half had water supply from a plumbing network provided by a public supply service. Almost all *Xavante* households had no toilets or toilets and there was no garbage collection. Six out of 10 *Xavante* households had no electricity (Table 1).

Table 2 shows the frequency of deaths in households for the two populations of this study by sex and age groups. In the *Xavante* indigenous population, males had twice as many deaths (68.3%) as females. In the rural non-indigenous population, males surpassed females by approximately 15% in terms of the frequency of deaths.

When analyzing the total number of deaths by age group (Table 2), great differences can be seen between the two populations, in which more than half (56.1%) of the deaths that occurred in *Xavante* households belong to the age group from 0 to 14 years, as opposed to 9.1% for the rural non-indigenous population for the same age group. Another significant difference is in the age group of 50 years and over, the rural non-indigenous population has approximately 60% of deaths in this age group and the *Xavante* population has only 12.2%.

DISCUSSION

Demographic censuses are considered fundamental for the formulation and implementation of public policies, serving as a basis for allocation of resources and government investments in sectors considered to be priorities or of greater fragility[16]. The 1991 Demographic Census was a landmark in indigenous demographics because it was the first to include the category "indigenous" on the question "what is your color or race". The 2000 Census revealed a large indigenous population growth and the need for better improvement in research on "race/color" (inclusion of the question in the Universe questionnaire and identification of ethnicity)[17].

The data collected by the 2010 Census allowed indigenous peoples to have greater visibility to issues such as ethnicity, language spoken at home, geographic location of IL and sociodemographic characteristics[17]. Pereira[2:427] points out that "the collection of information for indigenous people was similar to non-indigenous people, with no privilege for any population segment". The analysis of the 2010 Census results regarding indigenous peoples is necessary for the advancement and knowledge of a scenario marked by "harmful demographic and epidemiological invisibility"[18:131]

Among the indigenous peoples in Brazil, the *Xavante* have been one of the most studied from a demographic point of view, allowing for rare historical depth thanks to successive anthropological surveys and censuses carried out since the 1950s. According to Coimbra Jr. et al.,[7:120] "[...] the dynamics of the *Xavante* population over the last three centuries have been affected by the expansion of Western society towards Central Brazil." Historical sources reveal that, at least since the 18th century, the *Xavante* population inhabiting the region between the states of Mato Grosso, Goiás and Tocantins suffered successive displacements and migrations due to epidemics of contagious diseases that caused an important depopulation[7,19].

In the 1960s, as part of population genetics studies, population data, including composition by sex and age, were systematized in several *Xavante* communities[20,21]. In specific *Xavante* populations, such as the one currently located in the *Pimentel Barbosa* IL,

Table 1. Prevalence Ratio of household characteristics of the six *Xavante* indigenous lands and non-indigenous households in rural areas, Mato Grosso, Brazil, 2010.

Households (N)	*Xavante*	Rural non-indigenous	PR (Raw)	95% CI	
	1,973	**8,462**		Lower	Upper
More than 4 residents	78.8	14.1	22.5	19.9	25.4
No water supply by general network	43.0	15.7	4.0	3.6	4.5
No bathroom or toilet	84.1	4.4	114.7	97.8	134.5
No garbage collection	99.6	91.2	23.7	11.8	47.6
No electricity power	59.5	8.3	16.2	14.4	18.2

Source: 2010 Brazilian Demographic Census. *PR – Prevalence Ratio, **CI – Confidence Interval

Table 2. Frequencies of deaths (%) occurred in *Xavante* indigenous households and in non-indigenous households in rural areas, Mato Grosso, Brazil, 2010.

	Xavante indigenous people	Non-indigenous (rural)
Frequency of deaths in households	(N = 82)	(N = 275)
Sex		
Male (%)	68.3	57.8
Female (%)	31.7	42.2
Age groups		
0 to 14 years (%)	56.1	9.1
15 to 49 years (%)	31.7	32.7
50 years and over (%)	12.2	58.2

Source: 2010 Brazilian Demographic Census.

detailed analyzes were generated on the profiles of growth, mortality and birth, including interrelationships with aspects of social organization[7,22]. Based on data from the health services, complemented by surveys in the communities, in the 1990s and early 2000s, analyzes were produced on demographic indicators of the entire *Xavante* population[8,13,22]. Data on the *Xavante* obtained from national demographic censuses were also used in population analyses, focusing mainly on household-related issues and also the geographical distribution by municipalities, inside and outside IL, among others.[2,6,12]

For the total *Xavante* population in the six IL analyzed, the age structure is similar to that found from the 2000 Census results, in which approximately half of the population was composed of children under 15 years old. The format of an age structure can inform about better living and health conditions for a given population; this fact can be seen in the non-indigenous population residing in rural areas when compared to the population of the six *Xavante* lands. From an age pyramid that refers to a low level of fecundity, a higher level of aging and a wide body (people between 20 and 50 years old and over), it can be interpreted as a lower dependency ratio, showing at the end different processes of demographic and epidemiological transition.[23,24]

Information on income for indigenous populations based on a comparison between data from the 2000 and 2010 Census indicates difficulty in understanding and gathering this information, in addition to revealing that the vast majority receive less than one minimum wage.[5] In the present study, the results revealed a high frequency of *Xavante* indigenous households without income (39.6%), compared to non-indigenous households (6.5%). In this regard, it is worth noting that the 2010 Census gathered income from various sources, including government income transfer programs.[3]

Indigenous literacy in the mother tongue and Portuguese is guaranteed by law by the Federal Constitution of 1988

(articles 210 and 231) and by the Law of Guidelines and Bases (1996). Teaching occurs through schools located in the villages and, mostly, by bilingual or multilingual indigenous teachers.[25,26]

The IBGE, when carrying out the 2010 Census, researched the literacy rate through a person's ability to read and write a simple note, including indigenous languages.[3] The results found in this study indicate a significant difference in the literacy rate between the populations analyzed, being lower for the *Xavante*, especially for women. Literacy rates calculated from 2010 Census data for the indigenous population of different age groups (5 to 14 years old, 15 to 19 years old, and 20 to 39 years old) residing in the five regions of Brazil (North, Northeast, Southeast, South and Midwest), indicated significant disadvantages when compared to non-indigenous people.[17]

An important indicator in the assessment of health conditions and influencing the morbidity and mortality profiles of a population is basic sanitation, being a right guaranteed by the federal constitution of 1988, and reinforced by other international pacts to which Brazil is a signatory and which aim to guarantee sanitation and sustainable development.[27,28]

Our results indicated that the Xavante population of the six indigenous lands lives in households whose sanitation conditions are considered inadequate. Compared to non-indigenous households in rural areas, the Xavante household characteristics showed high magnitudes in terms of the absence of sanitary facilities. The association between inadequate sanitation conditions and the occurrence of diseases that cause diarrhea and skin infections is widely recognized and has been observed at endemic levels among the Xakriabá, an indigenous people in the interior of the Brazilian state of Minas Gerais.[29] According to the First National Survey of Indigenous People's Health and Nutrition made in Brazil in 2009, approximately 63% of households located in indigenous lands had a rudimentary pit latrine for destination of human waste, highlighting the absence of basic sanitation.[30]

It is recognized that ethnic, cultural and social issues are involved in explaining some results on household and sanitation characteristics, such as the higher number of residents and the absence of toilets or toilets. The occurrences extrapolate interpretations of demographic and epidemiological phenomena (odds above 20 and 100, respectively), and can be supported by hypotheses related to the social arrangements historically observed for the *Xavante* and other ethnic groups of the *Jê* group.[31] These are situations that cannot be identified in quantitative forms, such as census questionnaires, for example, since specific household arrangements are not investigated in contexts of sociocultural diversity present in the national territory.[31,32]

Mortality indicators are relevant sources of information on the health status of a population, with important and wide use in the area of public health. Analyzes conducted from census data have the advantage of being carried out using the same population base, rather than using different sources. For example, for the generation of information on infant mortality in Brazil, where the rates are calculated using data from two different sources: the Brazilian System about Mortality Informations (Sistema de Informações sobre Mortalidade – SIM, in portuguese) and the Brazilian System about Live Birth Informations (Sistema de Informações sobre Nascidos Vivos – SINASC, in portuguese).[33,34]

Information on deaths from the 2010 Brazilian Census is in line with mortality indicators generated from SIM, according to age composition and sex.[33] Our results indicated that in the Xavante households, the occurrence of deaths of people under 15 years of age was proportionally, five times higher than the records of non-indigenous households located in rural areas. The highest magnitude of mortality among indigenous people was reported by Other studies that analyzed data from the 2010 Census.[34,35]

Considering the households registered in Brazil in 2010, the occurrence of infant deaths (under five years old) among indigenous people was double that recorded in other households.[34] Likewise, for indigenous people under 20 years of age (without distinction of ethnicity), mortality levels were higher than those recorded for non-indigenous people in the same age group, regardless of sex, age, location of households (in urban or rural areas) and regions of Brazil.[35]

STUDY LIMITATIONS

Analyzes of sociodemographic characteristics did not independently investigate possible differences in other categories of self-classification of color in the rural non-indigenous population, such as whites, browns and blacks. Despite the recognized advances in census information that characterize the indigenous population residing in Brazil, the questionnaires need to deepen and improve the collection of information on housing diversity, kinship relationships, marriage patterns, productive activities, schooling processes, among other aspects.[36]

CONCLUSIONS AND IMPLICATIONS FOR PRACTICE

The data produced by IBGE through demographic censuses allow sociodemographic and health analyses through various extracts or population segments. From the 1991, 2000 and 2010 Censuses, there was an evolution and expansion of information gathering for the Brazilian indigenous population.

The two populations investigated are located in rural areas, but they experience different processes of demographic dynamics observed through the age pyramids, characterizing differences in birth, fertility, mortality and aging patterns.

The demographic and socioeconomic comparisons highlighted in this study for the *Xavante* population, represented by six IL, highlight the health, social, economic and ethnic inequalities experienced by many indigenous peoples in Brazil, demonstrating that even being in the same environment or area considered rural, two populations (indigenous and non-indigenous) have real chasms separating life and health conditions.

The sociodemographic results produced in this study portray a reality of 83.2% of the total *Xavante* population living in rural areas in the state of Mato Grosso. The population analysis encompassed by the six IL provides a better general characterization of this ethnic

group in understanding demographic issues. It also serves as a basis for developing health actions and public policies, through the construction of health indicators that use sociodemographic information. Moreover, the data presented here allow managers and multidisciplinary teams of indigenous health, responsible for this population, to carry out planning and health interventions based on actions that consider the demographic and socioeconomic profile, based on priorities or weaknesses, with more assertive health actions, in order to reduce existing inequity.

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AUTHOR'S CONTRIBUTIONS

Study design. Mauricio Viana Gomes de Oliveira. Gerson Luiz Marinho.

Data analysis and production plan definition. Mauricio Viana Gomes de Oliveira. Gerson Luiz Marinho.

Data analysis. Mauricio Viana Gomes de Oliveira. Gerson Luiz Marinho. Ângela Maria Mendes Abreu

Interpretation of results. Mauricio Viana Gomes de Oliveira. Gerson Luiz Marinho.

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