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Housing conditions and coverage of the Family Health Strategy in Brazil: a comparison of the results of the National Health Survey 2013 and 2019

Condições do domicílio e cobertura da Estratégia Saúde da Família no Brasil: uma comparação dos resultados da Pesquisa Nacional de Saúde 2013 e 2019

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ABSTRACT: ***Objective:*** This study sought to evaluate information about the characteristics of households and coverage of the Family Health Strategy (FHS), produced in the National Health Survey, and to describe the changes occurred between 2013 and 2019. ***Methods:*** Information on households and FHS coverage from the two editions of the National Health Survey (2013 and 2019) was used. Differences between proportions found were assessed, relating to the availability of basic supply and sanitation services, as well as the adequacy of materials used in the building of households, distribution of households' adequacy, and coverage by the FHS according to regions and census situation. The complex sampling design was considered in the analysis, so the t-test for independent samples was used to assess the statistical significance of differences between the proportions found in 2013 and 2019. ***Results:*** Upward trends were observed in the percentage of households with adequate finishing, as well as of households with piped water in at least one room, and with adequate basic sanitation (sewage and garbage). The FHS coverage also increased in the period. Regional differences prevail according to urban or rural situation of households. ***Conclusion:*** Despite the increases observed both in the adequacy of households, in the availability of basic services and water/sanitation supply and in access to primary health care, many challenges still persist when it comes to ensuring that such services reach the most vulnerable places.

Keyword: housing. water supply. house installations. family health strategy. health surveys. Brazil.

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RESUMO: ***Objetivo:*** este estudo buscou avaliar as informações referentes às características dos domicílios e de cobertura da Estratégia Saúde da Família produzidas na Pesquisa Nacional de Saúde e descrever as mudanças ocorridas no período entre 2013 e 2019. ***Métodos:*** utilizaram-se as informações sobre domicílios e sobre cobertura da Estratégia Saúde da Família das duas edições da Pesquisa Nacional de Saúde (2013 e 2019). Avaliaram-se as diferenças entre as proporções encontradas nas duas edições relacionadas à disponibilidade de serviços básicos de abastecimento e saneamento, bem como à adequação dos materiais utilizados na construção do domicílio e à distribuição da adequação dos domicílios e da cobertura da Estratégia Saúde da Família segundo regiões e situação censitária. Para a análise, foi considerado o desenho complexo de amostragem e utilizado o teste-*t* para amostras independentes para avaliar a significância estatística da diferença entre as proporções encontradas em 2013 e 2019. ***Resultados:*** foram observados aumentos no percentual de domicílios com acabamento adequado, bem como no percentual de domicílios com água canalizada em pelo menos um cômodo e com saneamento básico (esgoto e lixo) adequado. A cobertura da Estratégia Saúde da Família também mostrou aumento no período. Prevalecem as diferenças regionais e segundo a situação urbana ou rural dos domicílios. ***Conclusão:*** apesar dos incrementos observados tanto na adequação dos domicílios quanto na disponibilidade de serviços básicos e abastecimento de água e saneamento, e no acesso à assistência primária de saúde, muitos desafios persistem, principalmente para garantir que esses serviços cheguem aos locais mais vulneráveis.

Palavras-chave: Condições habitacionais. Abastecimento de água. Saneamento domiciliar. Estratégia Saúde da Família. Inquérito nacional de saúde. Brasil.

INTRODUCTION

The concept of health is understood as the result of a variety of aspects related to lifestyle, biological conditions, social standards of housing, sanitation, education, income and access to health care[1]. Housing condition directly affects the health and quality of life of people and is related to its geographic location and social locale, as well as materials used for its construction, building infrastructure and global context of its surroundings. This information allows us to assess the quality and direct implications of such services on the population's health and quality of life[2,3].

Historically, the great advances related to infant mortality, especially in cases resulting from infectious and parasitic diseases, result both from specific control measures such as immunization and outpatient care for cases, as well as from social interventions, like the expansion of infrastructure and access to water supply and basic sanitation services[4-6].

The organization of health services also plays a determinant role in improving health and reducing inequalities. The process of reforming the Brazilian health system over the last 40 years included the creation of the Unified Health System (SUS), increasing access to health services for a significant portion of the country's population. In the last 20 years, there have been other advances such as investments in human resources, science and technology, and particularly in primary care[7]. Several studies show that the expansion of the Family Health Strategy (FHS) has significantly contributed to the assessment of housing and sanitation conditions[8], driving the reduction of various causes of mortality and morbidity in the country, with important results in reducing infant and child mortality and in the monitoring and control of patients with chronic diseases[9-11].

Recognizing factors that influence health has evolved from the old knowledge of basic sanitation, aimed at preventing and controlling diseases, to the current situation, where the need for a strategy that incorporates biological risk and factors related to household and its surroundings is recognized, since it all influence the sociability and capacity of elderly people or individuals with limitations by chronic diseases to perform activities of daily living[8,12-14].

That being said, the objective of this study was to evaluate information regarding the characteristics of households, coverage of the FHS and frequency of visits by community health agents and agents of endemic diseases from the two editions of the National Health Survey (PNS 2013 and 2019), and to describe the changes occurred in the period between these studies.

METHODS

For this study, we used the information collected in the two editions of PNS, held in 2013 and 2019. The PNS is part of the Integrated System of Household Surveys (SIPD), which holds the master sample used in several surveys carried out by the Brazilian Institute of Geography and Statistics (IBGE). The target population of the research were people residing in permanent private households (PPH) across the national territory.

The selection of the PNS sample followed the same stratification as the master sample, whose strata were defined according to four criteria: administrative (Federal Units, FU), capitals, metropolitan regions, Integrated Economic Development Region (IEDR) and other FU sectors; geographic (subdivisions of capitals and other large municipalities in areas such as districts, sub-districts and neighborhoods); situation (urban and rural); and a statistical criterion, which subdivides the strata based on the three previous criteria into homogeneous strata, according to information on total household income and number of private households[15].

The sample was selected in three stages. First, the primary sampling units (PSU) were obtained by simple random sampling within each stratum of the master sample. Then, a fixed number of PPH in each PSU selected in the first stage was selected by simple random sampling. In the third stage, a resident of each household was randomly selected from a list of eligible residents. More details about sampling can be found in specific methodological publications[15].

The selection of households was made from the National Register of Addresses for Statistical Purposes (CNEFE) in its last update before the conclusion of this stage of the sampling plan. It is important to emphasize that, for the analysis of information about household characteristics, the PNS sampling plan had only the first two stages of selection[15].

The sample expansion factors were calculated by the inverse of the product of the selection probability at each stage, taking into account non-response rates and a calibration procedure to adjust the population totals according to sex and age group (from 15 to 17 years, from 18 to 24 years, from 25 to 39 years, from 40 to 59 years, and 60 years and over).

In 2018, the IBGE released a review of the population projection of Federation Units by sex and age for the period of 2010 to 2060. The population totals used for the calibration of PNS 2019 weights were removed from this projection, so in order for the two editions of the PNS to be compared, the IBGE released a new version of the 2013 PNS data, whose weights were calibrated again using the projection described above. In this study, data from the reweighted PNS 2013 were used.

The PNS questionnaire is divided into three parts: household information, information about all residents and information about a selected individual[16]. In this study, we will use the information from Module A – Housing Information, and from Module B – Home Visits by the Family Health Team and Endemic Agents, from the household questionnaire.

To analyze household conditions, four indicators were constructed based on questions from Module A of the household questionnaire. The first assesses the housing's finishing adequacy based on the following questions: "What was the main material used in the building of the external walls of this house?", "What is the predominant material of the roof of this hose?", "What is the predominant material of the floor of this house?". Households that had an external wall made of coated masonry, clad rammed earth or wood suitable for construction; with tile, concrete slab or wood suitable for construction on the roof; and ceramics, flagstones, stone, carpet or wood suitable for construction, such as parquet or plank, on the floor, were considered housings with adequate finishing.

Regarding water supply, the question "Does this household have piped water in at least one room? (Yes/No)" was used in the 2013 edition. In 2019, the question was a little different: "The water used in this the household is: (Piped in at least one room/Piped only on the land or property/Not piped). The household having piped water in at least one room was considered an indicator.

Households were considered adequate in terms of sanitary sewage drainage if they answered "General sewage network", "rainwater network" or "Septic tank" to the questions: "How is the draining of bathrooms or toilets done?" in the 2013 edition, and "Where does the sewage from the bathroom, the toilet or the waste hole go?" in the 2019 edition.

The destination given to household garbage was evaluated based on the following question: "What is the (main) destination given to garbage?". If the answer was "Garbage collection carried out directly" or "From a dumpster by cleaning services", the household would be considered as having proper garbage disposal.

The characterization of households according to type (Adequate/Not adequate) took into account the four indicators of household conditions. The household that presented adequate finishing, piped water in at least one room, adequate sewage drainage and adequate garbage disposal was considered adequate.

The coverage of the FHS, as well as the frequency of visits by community health agents and agents of endemic diseases, were based on the following questions from Module B of the household questionnaire: "Is your household registered in the family health unit?", "In the last 12 months, how often has your household been visited by a community health

worker or a member of the family health team?" and "In the last 12 months, how often has your household been visited by an endemic agent?".

To compare the estimates obtained in both editions of the PNS, the complex sampling design was taken into account and, to verify whether the differences found in indicators calculated with the PNS data from 2013 and 2019 were statistically significant, a t-test of hypotheses for independent samples was applied and the p-value of the estimate was evaluated.

RESULTS

The total number of households assessed in PNS 2013 was 64,348. The PNS 2019 was a little more comprehensive, with 94,114 households.

Regarding household conditions, the indicator for the percentage of households with adequate finishing increased between the editions of the survey, from 72.1% in 2013 to 80.2% in 2019. As for census situation, the most expressive percentage of increase occurred in rural areas, 12.6% (Table 1).

Table 1. Indicators related to household conditions according to census status. National Health Survey. Brazil, 2013 and 2019.

Percentage of households	PNS 2013	PNS 2019	p-value
Adequate finishing*			
Total	72.1 (71.3–72.9)	80.2 (79.6–80.7)	< 0.001
Urban	77.1 (76.2–78.0)	84.5 (83.9–85.1)	< 0.001
Rural	40.3 (38.6–42.1)	52.9 (51.3–54.4)	< 0.001
Piped water in at least one room			
Total	93.7 (93.3–94.1)	96.7 (96.4–96.9)	< 0.001
Urban	97.3 (96.9–97.6)	98.9 (98.8–99.1)	< 0.001
Rural	71.4 (69.0–73.6)	82.5 (81.1–83.7)	< 0.001
Adequate sanitary drainage system**			
Total	76.1 (75.1–77.0)	81.6 (80.8–82.2)	< 0.001
Urban	83.5 (82.5–84.4)	88.1 (87.4–88.8)	< 0.001
Rural	29.3 (26.5–32.4)	40.1 (37.8–42.4)	< 0.001
Adequate garbage disposal***			
Total	89.3 (88.7–89.9)	91.4 (91.1–91.8)	< 0.001
Urban	98.2 (97.9–98.5)	99.1 (99.0–99.3)	< 0.001
Rural	33.2 (30.1–36.5)	42.9 (40.6–45.3)	< 0.001

*Households with external walls made of coated masonry, clad rammed earth or trimmed wood; with tile, concrete slab or trimmed wood roof; and ceramic, tile, stone, carpet or wood trimmed floor; **Households with general sewage or rainwater system or septic tank; ***Households with garbage collection by cleaning service (directly or in a dumpster).

The percentage of households with piped water in at least one room increased from 93.7% in 2013 to 96.7% in 2019. It is worth mentioning the significant increase of 11.1% in rural areas (Table 1). The North and Northeast regions had the highest percentages between editions, with increases of 8.2% and 6.9%, respectively, reaching more than 90% of households in 2019 in all regions. The South Region, which already had a high percentage of households with piped water in at least one room, did not present a significant difference in the period (Table 2).

The percentage of households with sanitary drainage considered adequate was 76.1% in 2013, and increased by 5.5% in 2019. In urban areas, this increase was of 4.6% and in rural areas, 10.8% (Table 1). In the North Region, 57.3% of households had adequate sewage drainage in 2019, while in the Southeast Region, this percentage was 93.5%. It is interesting to note the 11.6% increase in the South Region and the 12.8% increase in the Center-West Region, between 2013 and 2019 (Table 2).

The percentage of households with adequate waste disposal increased from 89.3% in 2013 to 91.4% in 2019. The urban area stands out with a high percentage of adequate garbage

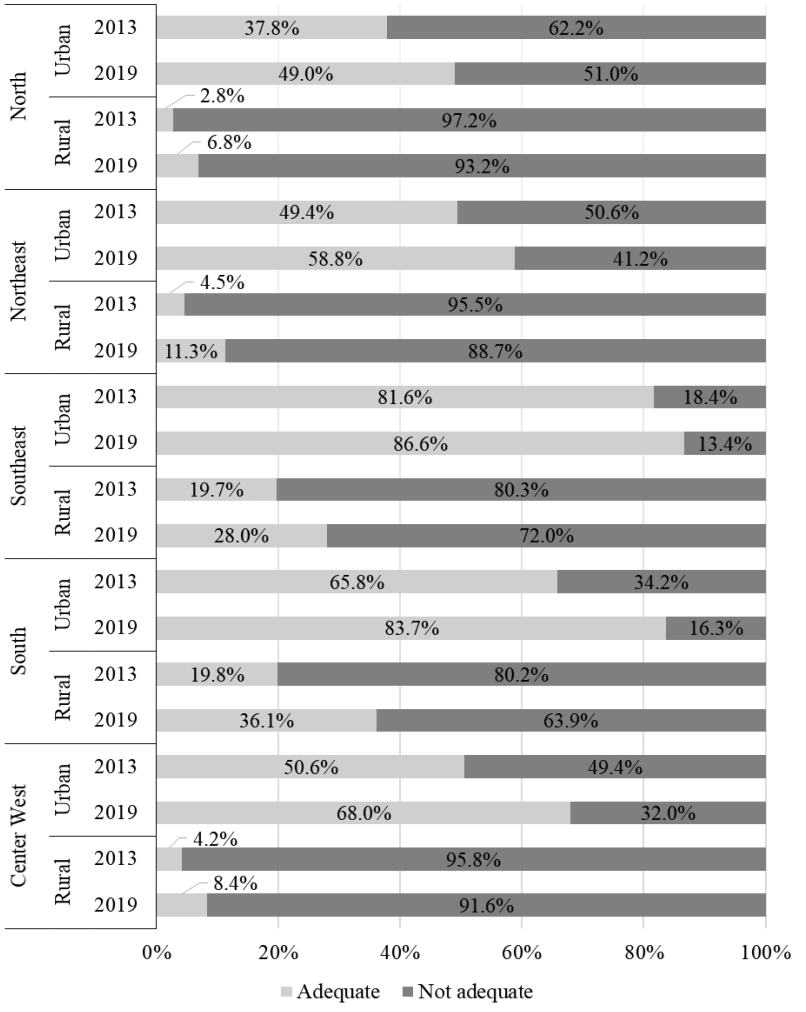
Table 2. Sanitation indicators according to major regions. National Health Survey. Brazil, 2013 and 2019.

Percentage of households	PNS 2013	PNS 2019	p-value
Piped water in at least one room			
North	83.0 (80.5–85.3)	91.2 (90.0–92.2)	< 0.001
Northeast	84.2 (82.8–85.5)	91.1 (90.3–91.8)	< 0.001
Southeast	98.5 (97.9–98.9)	99.5 (99.4–99.7)	< 0.001
South	99.1 (98.7–99.3)	99.4 (99.0–99.7)	0.084
Center-West	97.8 (97.2–98.2)	99.2 (98.6–99.5)	< 0.001
Adequate sanitary drainage system*			
North	48.3 (45.2–51.3)	57.3 (54.9–59.7)	< 0.001
Northeast	61.3 (59.0–63.5)	67.0 (65.3–68.6)	< 0.001
Southeast	91.7 (90.7–92.7)	93.5 (92.7–94.3)	0.005
South	77.0 (73.8–79.9)	88.6 (86.7–90.3)	< 0.001
Center-West	59.5 (56.5–62.4)	72.3 (69.3–75.1)	< 0.001
Adequate garbage disposal**			
North	78.8 (76.9–80.6)	80.5 (78.9–81.9)	0.173
Northeast	79.0 (77.5–80.4)	82.6 (81.5–83.6)	<0.001
Southeast	95.7 (94.9–96.3)	97.1 (96.7–97.4)	<0.001
South	92.4 (91.0–93.6)	95.1 (94.4–95.7)	<0.001
Center-West	91.4 (90.3–92.3)	92.7 (91.7–93.7)	0.061

*Households with general sewage or rainwater system or septic tank; **Households with garbage collection by cleaning service (directly or in a dumpster).

disposal (Table 1). By region, there was an increase of 3.6% in the percentage of households with proper waste disposal in the Northeast Region, while the North and Center-West did not present a significant difference in the period (Table 2).

The percentage of households considered adequate increased in all segments in 2013 and 2019. The South Region had the highest percentages of improvement in housing adequacy: an increase of 17.9% in the urban area and of 16.3% in the rural. The lowest percentage of adequacy is in the North Region, where less than half of urban households are considered adequate (Figure 1).



*Types of households: Adequate – households with adequate finishing, piped water in at least one room, adequate sanitary drainage and adequate garbage disposal; Not adequate – not even one of the above conditions.

Figure 1. Percentage of households by type*, according to major regions and census status. Brazil, 2013 and 2019.

The coverage of the FHS is analyzed in Table 3. 53.3% of households were registered in the Family Health Unit (FHU), according to the survey from 2013, increasing to 60.0% in 2019. The Northeast Region has the highest coverage, and the Southeast, the lowest, with just over half of its registered households. According to the type of household, the coverage was prioritized in inadequate households, especially in rural areas. Coverage was not significantly different in adequate rural households (Table 3).

The percentage of households registered in the FHU, which received monthly visits from community health workers or members of the family health team, slightly decreased when comparing the two editions of the survey and did not present significant differences according to the type of household and census situation (Table 4). The percentage of households that received at least one visit from agents of endemic diseases in the 12 months prior to the survey increased a little, being higher in rural areas and in non-adequate households. The difference found in the proportion of adequate rural households between the periods was not significant (Table 4).

Table 3. Coverage of the Family Health Strategy and frequency of visits by community health agents according to the type of household* and census status. National Health Survey. Brazil, 2013 and 2019.

Percentage of households registered in the Family Health Unit	PNS 2013	PNS 2019	p-value
North	51.3 (48.8–53.9)	60.0 (58.1–61.9)	< 0.001
Northeast	64.8 (63.3–66.3)	71.2 (70.0–72.3)	< 0.001
Southeast	45.9 (43.5–48.2)	51.9 (49.7–54.0)	< 0.001
South	56.2 (53.0–59.3)	64.8 (62.7–66.9)	< 0.001
Center West	53.3 (51.0–55.6)	58.6 (56.4–60.8)	< 0.001
Total	53.3 (52.1–54.5)	60.0 (58.9–61.0)	< 0.001
Adequate	44.7 (43.1–46.4)	54.0 (52.6–55.3)	< 0.001
Urban	44.3 (42.6–45.9)	53.4 (52.0–54.8)	< 0.001
Rural	63.9 (56.6–70.7)	69.3 (64.9–73.3)	0.205
Not adequate	65.6 (64.2–67.0)	72.7 (71.6–73.8)	< 0.001
Urban	63.0 (61.3–64.7)	69.5 (68.0–70.9)	< 0.001
Rural	71.6 (69.0–74.0)	78.7 (77.1–80.2)	< 0.001

*Types of households: Adequate – households with adequate finishing, piped water in at least one room, adequate sanitary drainage and adequate garbage disposal; Not adequate – not even one of the above conditions.

Table 4. Visits by community health agents and agents of endemic diseases according to the type of household* and census status. National Health Survey. Brazil, 2013 and 2019.

Percentage of households	PNS 2013	PNS 2019	p-value
Households registered in the Family Health Unit that received monthly visits by community health agents or members of the family health team			
Total	24.5 (23.6–25.6)	22.7 (22.0–23.4)	0.003
Adequate	17.7 (16.5–18.9)	17.1 (16.3–17.9)	0.444
Urban	17.2 (16.0–18.4)	16.5 (15.6–17.3)	0.318
Rural	37.6 (29.2–46.8)	34.8 (31.0–38.8)	0.576
Not adequate	34.4 (33.0–35.8)	34.6 (33.5–35.7)	0.843
Urban	30.1 (28.5–31.7)	29.0 (27.7–30.4)	0.322
Rural	44.3 (41.7–47.0)	44.7 (42.9–46.5)	0.806
Received at least one visit from an endemic agent in the 12 months prior to the survey			
Total	43.8 (42.6–45.0)	45.7 (44.7–46.7)	0.016
Adequate	34.5 (33.0–36.1)	38.5 (37.2–39.7)	<0.001
Urban	34.1 (32.5–35.7)	37.8 (36.5–39.1)	<0.001
Rural	54.1 (45.6–62.3)	57.2 (52.7–61.6)	0.522
Not adequate	57.0 (55.5–58.5)	61.0 (59.8–62.2)	<0.001
Urban	53.3 (51.6–55.1)	56.4 (54.9–57.9)	0.011
Rural	65.5 (62.8–68.1)	69.5 (67.7–71.3)	0.015

*Types of households: Adequate – households with adequate finishing, piped water in at least one room, adequate sanitary drainage and adequate garbage disposal; Not adequate – not even one of the above conditions.

DISCUSSION

In this study, information from the PNS household questionnaire about household characteristics was analyzed (Module A). These questions followed the patterns of those from the Demographic Census and the National Household Sample Survey (PNAD), in addition to information on the coverage of the FHS and visits by community health and endemic disease agents. Both themes were included in the PNS for being closely linked to the population's health conditions.

In the general assessment of housing, there was a reduction in the percentage of houses without adequate finishing, with an increase in the use of adequate materials on external walls, roof and floor, especially in rural areas of Brazil. Precarious plastering of the walls

and floors made only with cement or dirt in a significant portion of households is considered a health risk[8]. The results show advances in this direction.

Although basic services are present in most Brazilian households, when it comes to access to the sewage system, the data show a less satisfactory situation than that of access to water. Piped water supply in at least one room is already present in more than 95% of Brazilian households, in almost all households in the Southeast, South and Center-West regions, with a significant expansion in rural areas. Sanitation services, on the other hand, despite the increase in the period, is still deficient in rural areas, with significant differences between regions. The same occurs with garbage disposal which, despite smaller regional differences, shows inequality in the comparison between urban and rural households.

In this study, households that had adequate finishing, piped water in at least one room, adequate sanitary drainage and proper waste disposal were considered adequate. There was an increase in all regions, regardless of the census situation. The existence of housings whose physical conditions favor the colonization of disease vectors in the periphery and within the house, the lack of water and basic sanitation are relevant factors for the proliferation of vector and waterborne diseases[17,18].

Adequate housing is considered a social right recognized in the Federal Constitution, and important public policies, such as the government program for acquiring houses "Minha casa, minha vida" (My home, my life)—implemented in 2009 with the purpose of providing access to housing for the low-income population—had, indeed, an impact on housing conditions, since there are large population groups in a state of exclusion from adequate minimum social services such as housing and urban infrastructure, especially those living on the outskirts of large cities and rural areas of the country[19-21].

However, the strong inequality that still prevails and the few advances in this regard on the public policy agenda in Brazil is notable, even though it is known that the integrated adoption of sanitation policies along with progress in education and health care contribute to the improvement of health conditions of the population[23].

As for health, the FHS deserves to be highlighted as a strategy to ensure equity in the provision of services based on the formal right to health, linking about 60% of the Brazilian population to primary care[24]. The FHS plays an essential role in the National Health Promotion Policy (PNPS) by impacting the risk factors to which the community is exposed, by monitoring the health condition of the population in the territory it covers, by promoting better household and personal hygiene conditions, as well as assessing access to water, sewage and waste disposal resources[25,26], considering the health condition of people closely linked to these social, political and economic dimensions aiming to provide services where access to them is poor[27,28].

Several studies show the positive impacts of the FHS on different health indicators and on access to health services, especially in the lower income strata[18,29,30]. Since its implementation, there has been a significant expansion of its coverage. In this study, after evaluating its distribution according to household adequacy, we can see an evident prioritization of rural areas and non-adequate households in terms of access to primary health services.

Despite the increase in FHS coverage between 2013 and 2019, according to PNS data, just over half of the households in the country are registered in a Family Health Unit. This expansion is uneven according to regions, and one of the reasons for slower expansion in the South and Southeast of the country may be the high turnover of health professionals, especially medical professionals in the family health teams[31,32]. The program "Mais Médicos" (more physicians), created in 2013, was an initiative to face challenges that conditioned the insufficient and poor distribution of physicians in primary care, especially in areas with greater need, as recommended by the National Policy for Primary Care (PNAB)[33-35].

With complete family health teams and all the necessary infrastructure for action, impacts on health indicators are expected in those that signal an increase in the supply of services and in those referring to health outcomes[36]. One of the extremely important activities is household visits, a function assigned to the community health agent that should be carried out with an average frequency of one visit per month; more vulnerable families should be visited more frequently[35]. Our results show that this has not been done properly by the teams, even in segments with reasonable coverage. Work overload and lack of programming were highlighted in the literature as difficulties for visits as recommended[37,38], and this has directly reflected in the perception of families who are dissatisfied with the low number of visits by community agents or other members of the team[39,40].

Like community agents, the endemic disease agents work in direct contact with the population and are responsible for carrying out surveillance, prevention and control activities for endemic and infectious diseases, as well as to promote health in accordance with SUS guidelines[41]. Despite strengthening health surveillance actions in conjunction with family health teams, the visit by the endemic disease agent occurs regardless of the household's registration in the FHU[42], and this study shows regional differences.

We must bear in mind the possible interference of other variables of a socioeconomic nature associated with housing conditions and access to basic services as a limitation of this study. The percentage increases in household condition indicators were sometimes small between editions of the survey; this was expected, as the percentages of adequacy in household conditions were already high in 2013. In these cases, the statistical significance for a small percentage difference stems from the large sample size.

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