

## Quality of care for patients with hypertension and diabetes in the Northeast after the implementation of PMAQ-AB

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### Abstract

In order to improve health conditions, a program improving the quality of care in Brazil was created that encourages managers and teams to offer better quality health services to citizens of their territory by proposing strategies for training, monitoring, and evaluating the work of the health teams. The objective of this study was to analyze the morbidity and mortality indicators due to Systemic Arterial Hypertension and Diabetes Mellitus in the Northeast region of Brazil after the implementation of the first two cycles of the National Program to Improve Access and Quality of Primary Care. This is an ecological, retrospective study with spatial analysis, carried out in northeastern Brazil with data collected from the Informatics Department of the Unified Health System between the years 2012 and 2014. It was observed changes occurred in the spatial distribution areas concerning the hospitalization rates and the mortality rates, as well as the reduction of areas with high rates in 2014. When correlating with the Primary Care coverage, the areas with high rates of hospitalization and mortality also had high coverage of Primary Care. Thus, the effectiveness of implementing the aforementioned program reveals the need for plans that involve not only health promotion actions, but also professional training on how to integrate such actions into their daily activities, in order to ensure qualified and integral.

**Keywords:** Quality. Access and Evaluation of Health Care. Hypertension. Diabetes Mellitus. Morbidity and Mortality Indicators. Primary Health Care.

### INTRODUCTION

In the world, the main causes of death are related to chronic diseases which are responsible for 72% of the causes of mortality, which is of a considerably great magnitude<sup>1</sup>. There are estimates that, in the year 2020, they could possibly reach 80% of the disease burden in developed countries; however, mortality data for the year 2020 have not yet been made available<sup>1</sup>.

Brazil, in its respective regions, has demonstrated changes in the panorama of

general mortality, and in this sense, deaths due to chronic diseases have developed in public health managers the need for quality intervention in order to improve the health reality in their regions<sup>2</sup>. Among the chronic diseases, Systemic Arterial Hypertension (SAH) and Diabetes Mellitus (DM) they stand out as important causes of morbidity and mortality due to the ease of complications which, in most cases, are due to living conditions and eating habits<sup>2</sup>.

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DM is considered the fifth leading cause of death in the world. Projections for 2025 indicate that 5.4% of the world population, that is, 300 million people will have DM.[3] In Brazil, about 8% of the population aged between 30 and 69 years old have the disease<sup>3</sup>. On the other hand, SAH affects about 36 million Brazilian adults, and is the greatest risk factor for cardiac and cerebrovascular lesions as well as the third most frequent cause of disability<sup>2</sup>.

Complications resulting from these pathologies cause limitations, disabilities, hospitalizations, and deaths, which become costly for health systems. Due to the presence of a prolonged course of diseases, the tendency is that health services are widely used by patients with these chronic conditions<sup>4</sup>.

These pathologies have different distribution patterns in the regions of Brazil. Moreover, inequalities affect both communicable and non-communicable diseases and are even a problem in the wealthiest countries disproportionately affecting the poorest and most vulnerable populations. Facing these inequalities requires different technological concentrations, as they may or may not be associated with strategies that support lifestyle changes<sup>5,6</sup>.

SAH and DM very important concerning the emergence of initiatives that will follow, monitor, evaluate, and seek to deal with these chronic diseases, as they are associated with the similar risk factors, and have a considerably strong impact on morbidity and mortality<sup>7</sup>.

In Brazil, the health system is divided into three levels of health care to better meet the population's needs. Primary health care or basic care is considered the center and base of the health system. This first level directs and forwards patients to specialized care, which is the second level of health care. However, patients with complications

resulting from SAH and DM are directed to the third level of health care, which is hospitalization. A well-assisted patient at the first level with follow-ups by a specialized service will not need to use the third level of health care.

Thus, the quality of health care and patient safety are topics that are under constant discussion, always aiming to achieve the same goal, which is ensuring dignified health care and reducing the existing morbidity and mortality indicators. However, achieving this goal remains a challenge for managers and professionals involved in the work process<sup>8</sup>.

Therefore, the health work process was created by Mendes-Gonçalves in 1992, where this process is divided into five stages, namely: 1) the agent performs; 2) the object of work, where the work action will take place; 3) the product; 4) the instruments or means that are between the worker and the object of work; and 5) the purpose of the action<sup>9</sup>.

Moreover, it is possible to highlight categories of technologies implemented in the health work process, which are: hard (material), light-hard (immaterial - knowledge and knowledge), and light (immaterial - interpersonal relationships). Currently, the implementation of such technologies in a structured way in Health Care Networks has been increasingly sought. Hard technology is centered on the disease and light and light-hard technology are used for problem solving through teamwork, with the purpose of ensuring the quality of care<sup>10</sup>.

The Primary Care covers the percentage of people who are accessing the health service, which in many states is a percentage below the expected 80% of the population. Thus, to improve the quality of care and access to primary care, the National Program for Improving Access and Quality of Primary Care (*Programa Nacional de Melhoria do Acesso e da Qualidade da Atenção Básica* -

PMAQ-AB) was implemented by the Ministry of Health, through the encouragement of managers and family health teams. There have already been 3 cycles of this program implemented in the years 2012, 2014, and 2018.

This study aimed to analyze morbidity and mortality indicators due to Systemic Arterial Hypertension and Diabetes Mellitus in the Northeast region of Brazil, after the implementation of the first two cycles of the PMAQ-AB.

## METHOD

This was an ecological, retrospective study with spatial analysis. The place chosen for the study was the northeast of Brazil, which is comprised of 9 states, namely: Alagoas (AL), Ceará (CE), Bahia (BA), Maranhão (MA), Paraíba (PB), Pernambuco (PE), Piauí (PI), Rio Grande do Norte (RN), and Sergipe (SE). Since the Northeast was the first place where the PMAQ-AB was implemented, this study site was chosen.

The study included 5,559 Primary Care teams in cycle 1 (2011-2012) and 10,678 teams in cycle 2 (2013-2014). There was an increase in the number of teams participating by state between the first and second cycle, namely: Alagoas (339/698), Bahia (1534/2625), Ceará (910/1626), Maranhão (112/660), Paraíba (625/1211), Pernambuco (1009/1845), Piauí (371/865), Rio Grande do Norte (247/862), and Sergipe (247/376).

The years considered for the analysis of mortality and morbidity rates due to Systemic Arterial Hypertension and Diabetes Mellitus were those ending cycles I (2011-2012) and II (2013-2014) of the National Program for Improving Access and Quality of Primary Care (PMAQ-AB).

Morbidity and mortality data from Systemic Arterial Hypertension and Diabetes Mellitus were obtained from the Information Technology Department of the Unified Health System (UHS; DATASUS), of the Ministry of Health of Brazil. The classification of diseases

was defined according to the ICD-10. The data collected regarding Primary Care coverage was retrieved from the UHS Department of Primary Care; this was the independent variable of this study. Data were collected and analyzed in 2017; at the time of data collection and analysis, cycle III data had not been released. In addition, data were collected according to place of residence, allowing for a general analysis of the studied region.

To calculate the morbidity and mortality rates (the dependent variables), the number of hospitalizations and deaths, respectively, were divided by the population of the same year considered and were adjusted to the rate for 10,000 inhabitants. The years 2012 and 2014 were used.

The collected data were stored in a Microsoft Excel® worksheet for cleaning and organizing the database. Then, they were transferred to the Statistical Package for Social Sciences (SPSS) software, version 22 (serial number 10101141047), with rate calculations and descriptive statistics. Then the data were transferred to the TerraView and GeoDa geoprocessing software, to proceed with statistical analysis.

TerraView is an open-source Geographic Information Systems tool that allows for the spatial analysis of the studied data to verify the values of Clusters, not only as a set of data, but also in relation to their neighbors. To assess spatial dependence, Moran's

global autocorrelation coefficient was used, in which this spatial autocorrelation may be considered weak, medium, or strong. A weak autocorrelation has a Moran index with values below 0.50, a medium autocorrelation has index values from 0.50 to 0.75, and a strong autocorrelation has an index above 0.75<sup>11</sup>.

The colors were expressed according to the proximity matrix generated for the northeast region. Thus, figures were generated where it was possible to analyze the formation of High-High, Low-Low, High-Low, and Low-High clusters, as well as the statistical significance of these autocorrelations. The correlation of morbidity and mortality rates due to the analyzed chronic diseases and the coverage of Primary Care services was also performed by the same system.

GeoDa is also open-source software,

developed by Luc Anselin in 2013 to facilitate knowledge of data analysis, exploring and modeling spatial patterns. The program performs exploratory spatial analysis, spatial autocorrelation, and basic spatial regression analysis (points and polygons). Furthermore, a bivariate correlation can be performed with the presentation in scatter plots, in addition to performing Moran's tests (global or local) with a Cluster map. With this software, the spatial correlation was observed within the period between the variables: mortality rate, hospitalization rate, and Primary Care coverage.

With regards to ethical aspects, this study appropriated secondary data from the public domain, thus it did not require the consideration of the Research Ethics Committee.

## RESULTS

Figure 1 shows the spatial distribution of mortality and morbidity rates in the northeastern region of SAH in both cycles, and it is possible to observe that there was a reduction in both hospitalization and mortality rates. As for the spatialization of the hospitalization rate, there was a reduction in areas with higher rates in 2014, when compared to 2012, and the same occurred with mortality rates.

When hospital morbidity and autocorrelation between the areas were evaluated, a weak and statistically significant hospital admission rate for SAH was obtained in both studied cycles. The same can be seen in the autocorrelation between areas of

mortality due to SAH.

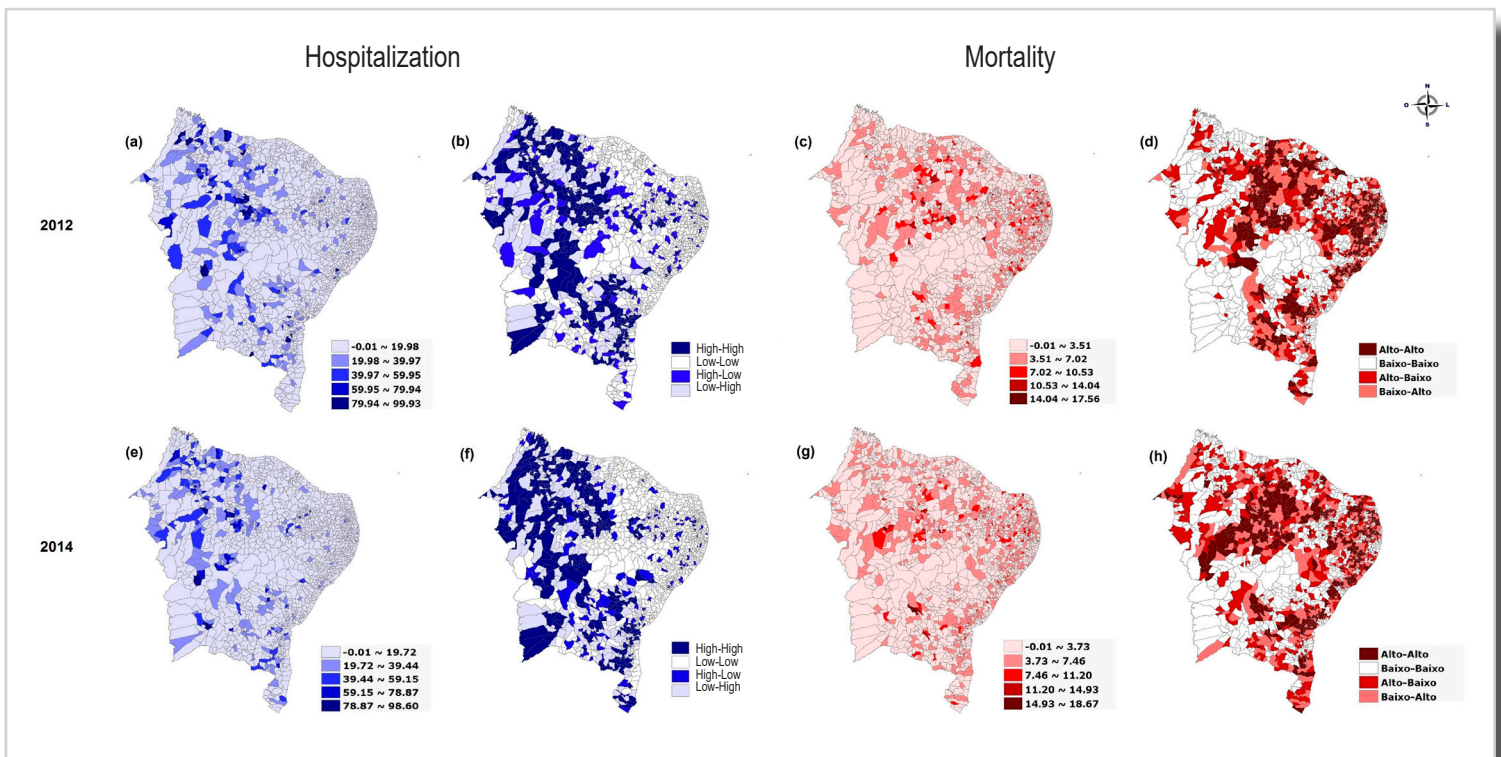
Regarding DM (figure 2), for the hospitalization rate, the autocorrelation was weak and significant in both cycles. Observing DM mortality, a weak and significant autocorrelation was also observed. In other words, the autocorrelation, in both cycles for both studied pathologies, shows that there is no statistical significance of spatial dependence among the municipalities in the northeast region, as the formation of clusters did not display a strong significance.

It is still possible to observe that the distribution of the highest hospitalization rates occurred in Midwestern areas, meanwhile the highest mortality rate was along coastal

regions, but when compared between cycles I and II, there was a reduction in both rates.

Figure 3 shows the correlation of the hospitalization and mortality rates due to DM with Primary Care coverage. Here it is

possible to observe an increase in areas with high correlations when compared between the years studied. The same is true for the correlation between the hospitalization rate and mortality due to SAH.



**Figure 1-** Autocorrelation of morbidity and mortality rates due to Systemic Arterial Hypertension in the years 2012 and 2014 in northeastern Brazil.



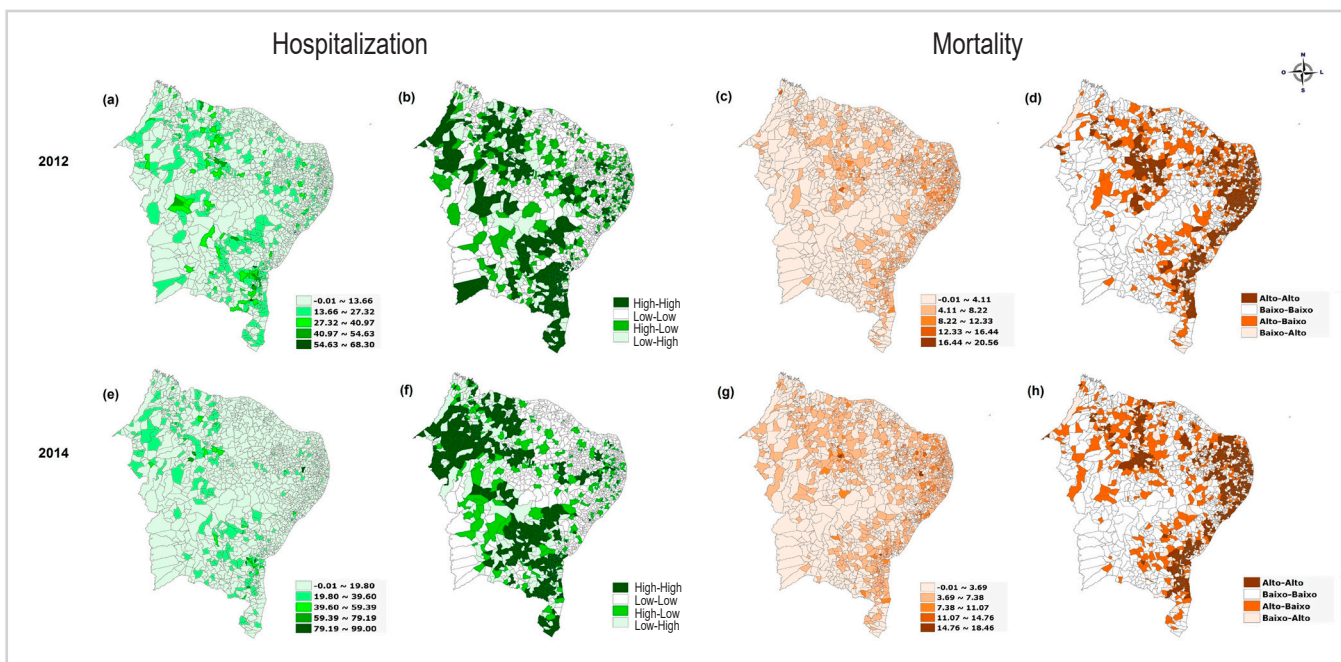


Figure 2- Autocorrelation of morbidity and mortality from Diabetes Mellitus in 2012 and 2014 in northeastern Brazil.

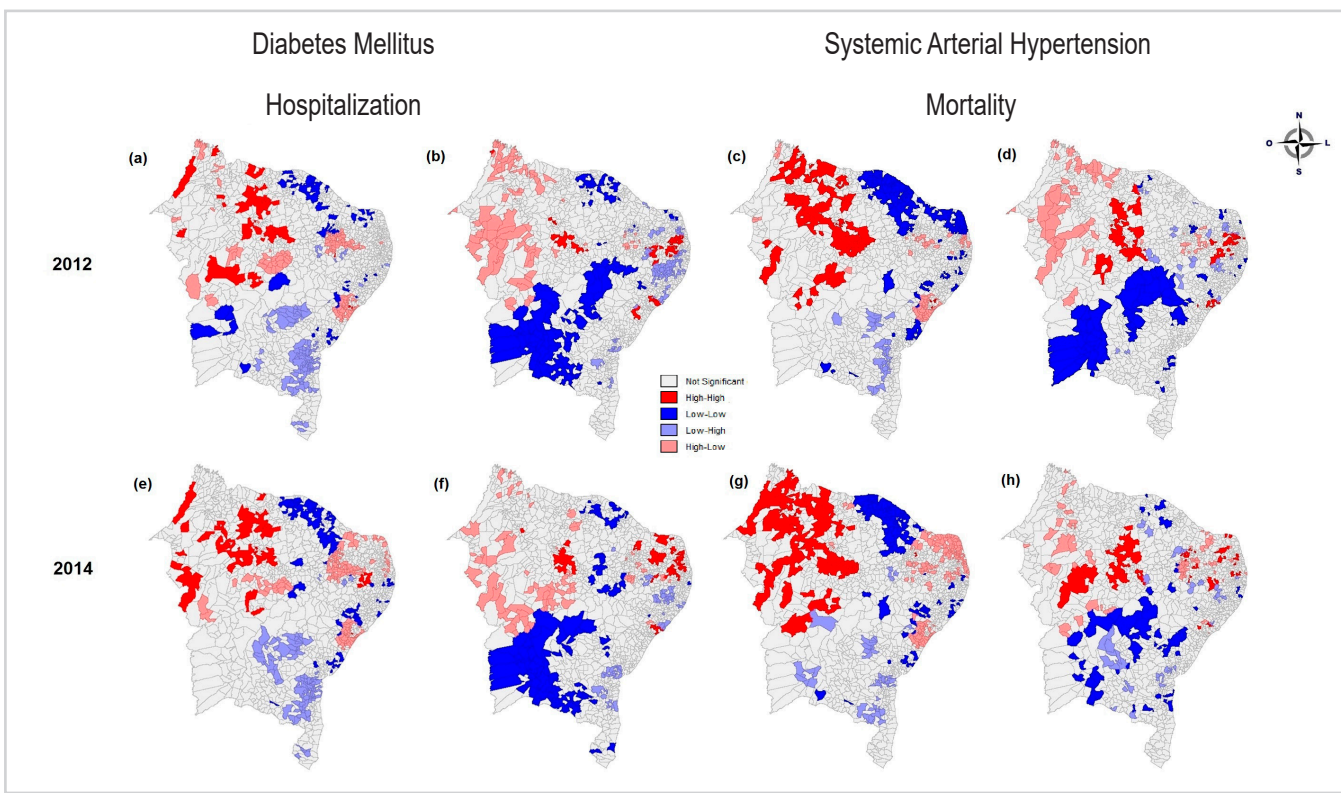


Figure 3- Correlation of morbidity and mortality rates due to systemic arterial hypertension and Diabetes Mellitus with Primary Care coverage in 2012 and 2014 in northeastern Brazil.

## DISCUSSION

In the present study, it was observed that after the implementation of the PMAQ-AB there was a reduction in hospitalization and mortality due to SAH and DM, when comparing the two cycles implemented, as seen in figures 1 and 2. In addition, it is important to highlight that there was a change in the spatialization pattern of the hospitalization rate.

A time series study concerning mortality from SAH and DM, reported that this rate was higher in the Northeast. However, there was a decrease in all other regions between 1996 and 2007, especially in the south and southeast, but the north and the northeast (the poorest regions of Brazil) possessed the highest mortality rates from these pathologies in 2007<sup>12</sup>.

The aforementioned study corroborates the findings of this study, considering that the occurrence of high morbidity and mortality rates due to SAH and DM increased, and that after the implementation of the PMAQ-AB, there was a reduction of these indicators, further emphasizing the importance of Primary Health Care as the center and base of the Brazilian health system.

Among the various health policies existing in Brazil, there is an agenda of initiatives related to SAH and DM, highlighting the approval of the National Health Promotion Policy (2006), in which its reviewed 2014 version reiterated the commitment to equality and to improving conditions and ways of living, as well as affirming the right to life and health<sup>13</sup> The Plan to Combat SAH and DM was prepared for 2011-2022 with goals for reducing risk factors, defined a set of actions in the field of health promotion, prevention, surveillance, and assistance. The Healthy Eating Guide in 2014 also reiterated the message of healthy eating for improving quality of life<sup>13</sup>. They further

reinforce the importance of improving the quality of access to health services, bearing in mind that the more access is provided to a prevention service, the fewer people will be hospitalized and/or die. This cascade reduces spending on hospitalization services.

The development of actions of this type will further contribute to reducing the occurrence of health problems, further strengthening immunity, and contributing to the improvement of the quality of life of not only the northeastern population, but of those in areas, regions, and even other countries where the population has living conditions similar or equal to those studied here.

In figure 3, when correlated with the coverage of Primary Care, there was an increase in areas with high spatial correlation when compared between the years studied. The coverage of Primary Care in the Northeast is the largest in the country, but even with high values the number of teams participating in the first cycle of the PMAQ-AB is still considerably low. However, what is particularly noteworthy in Figure 3 is that the same places that presented high values of hospitalization and mortality rates also presented high values of Primary Care coverage.

There is, therefore, a great challenge for coping with these diseases, since increases in the prevalence of SAH (14.2%) and DM (61.8%) are presented, considering the time interval from 2006 to 2016<sup>9,13</sup>.

As for the population surveys that are applied, those evaluated in this study reveal an unequal distribution of SAH and DM<sup>14</sup>. Thus, the health-disease profile of the population that depends on a public health system and this system must incorporate effective interventions to promote equity. The reduction of social inequalities in the

prevalence of chronic conditions depends on expanding the coverage and quality of health services, which can provide improvements in the diagnosis, control, and treatment of diseases<sup>5</sup>.

In Brazil, public health policies have been implemented with a focus on SAH and DM, and with this, the increase of patients with these diseases have become a priority, showing the need for a concern with the traditional way medical care is provided and for a care focused on the prevention of diseases and injuries, health promotion, and intersectoral action.

Among the initiatives to implement public health policies with actions to reduce health problems related to SAH and DM in Brazil, the health promotion policy, tobacco control, health clubs, performance of Primary Care more and more with Family Health teams can be highlighted. However, even with so many actions, gaps are still found specifically regarding the integration of health services at different levels of health care in the care of patients with chronic diseases<sup>12</sup>.

Therefore, the presence of a high coverage of services alone does not appear to solve these health problems. Other aspects that may be involved have to be considered. Access to services itself requires other specific dimensions such as: availability, accessibility, functional adequacy, financial capacity, and acceptability<sup>15,16</sup>.

The limitation in access that needs to be considered, such as the low capacity for interaction between primary care teams, the lack of integration between the Family Health Strategy and the other more complex levels of the system, and the low competency of

Primary Care in its relationship with other sectors of society and government<sup>17</sup>.

The Care Networks model and the model presented for chronic conditions, developed by Mendes<sup>19</sup>, in Brazil, reveal the need to improve a care model that takes into account the Social Determinants of Health and the performance of proper services that can reverse the still fragmented reality of public health services<sup>18,19</sup>.

Health institutions, as well as regulatory bodies, have aimed at the quality of care through the training of working professionals. Even the professionals themselves have sought to be trained to better serve the population. The search to improve the quality of care has been incorporated daily into the health work process and a great example of this is the implementation of the PMAQ-AB and its effectiveness observed in the results presented.

It is important to highlight that studies which are carried out based upon secondary data reveal the situation of care of the studied place while the health indicators show the real health situation of the population; as well as showing where to intervene in a given area and why. This type of study also allows managers and health professionals to review their action plans and reform their health planning.

Quality indicators are valuable basic instruments for the planning of the health service managers so that the Primary Care teams can organize and/or reorganize the actions carried out<sup>20</sup>.

The limitations of this study may be linked to health information data on admissions and deaths from the Ministry of Health's health information systems.



## CONCLUSION

With the results presented, it was possible to observe that the implementation of the PMAQ-AB, with the objective of improving access and quality of health care, was effective when evaluating the reduction of morbidity and mortality indicators due to SAH and DM. However, a factor to be considered was the high correlation indices between the above-mentioned indicators with assistance coverage within Primary Health Care, as it was expected that the opposite would take place.

However, this study reveals the need for planning that involves not only health promotion actions, but also professional training on how to integrate such actions into daily activities. In this way, the prevention of injuries caused as a result of the presence of SAH and DM is ensured through the health professionals who integrate the Primary Care and the line of care within the network at the secondary and tertiary levels, as well as ensuring the coverage offered by Primary Care in different regions of Brazil. In the

meantime, greater attention should be paid to the northeast region, as it has peculiar socioeconomic factors.

National and regional goals must be respected, as well as the implementation of actions and policies that recognize local singularities, considering the heterogeneous distribution and inequalities in Brazilian regions. Therefore, the implementation of policies according to the local reality can be more effective when compared to a national plan of strategies applied to different realities. Furthermore, the element of strengthening Primary Care in Brazil by increasing healthcare coverage in Brazil needs to be considered.

In addition to looking at the acquisition of equipment and high technological density for clinical treatments, it is necessary to allocate resources and conditions aimed at policies that work to promote health and prevent chronic diseases, as well as strengthen Primary Care as a level of care that operates within sensitive conditions.

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