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UNIFIED HEALTH SYSTEM PERFORMANCE INDICATORS: A TREND ANALYSIS

Indicadores de desempenho do Sistema Único de Saúde: uma análise de tendência

Indicadores de desempeño del Sistema Único de Salud: un análisis de tendencia

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ABSTRACT

Objective: To analyze the temporal trend of health services performance indicators. **Methods:** This is a quantitative ecological study of time series. We analyzed health services performance indicators in the regions belonging to the III Macro-region of the state of Pernambuco, namely Arcoverde (VI), Afogados da Ingazeira (X) and Serra Talhada (XI), in the period from 2008 to 2017. Simple linear regression was performed in the R software version 3.5.0. The indicators analyzed represent the dimensions of effectiveness, access, adequacy and acceptability of the model for assessment of the performance of the Brazilian health system. **Results:** An increasing trend was observed in the percentage of diabetic users who underwent lower limb amputation in the X and XI region, incidence of tuberculosis in the VI region, new cases of congenital syphilis, coverage of the Family Health Strategy, percentage of patients with stroke who underwent computed tomography, live births with more than 6 prenatal consultations, and cesarean deliveries in the VI, X and XI health regions ($p<0.05$). There was a decrease in hospitalizations for asthma and gastroenteritis in the three regions and in hospitalizations for conditions sensitive to primary care and for heart failure in the X and XI regions ($p<0.05$). **Conclusion:** The analysis of the performance indicators showed heterogeneous trends. The decrease in hospitalizations due to preventable conditions and the increase in the incidence of tuberculosis in the VI region and congenital syphilis in the three health regions should be highlighted.

Descriptors: Health Evaluation; Time Series Studies; Health Status Indicators; Regional Health Planning.

RESUMO

Objetivo: *Analisar a tendência temporal dos indicadores de desempenho dos serviços de saúde.* ***Métodos:*** *Estudo ecológico de séries temporais e quantitativo. Analisaram-se indicadores de desempenho dos serviços de saúde das regiões pertencentes à III Macrorregião do estado de Pernambuco: Arcoverde (VI), Afogados da Ingazeira (X) e Serra Talhada (XI), no período de 2008 a 2017. Realizou-se regressão linear simples no software estatístico R, versão 3.5.0. Os indicadores avaliados representam as dimensões de efetividade, acesso, adequação e aceitabilidade do modelo de avaliação de desempenho do sistema de saúde brasileiro.* ***Resultados:*** *Observou-se tendência crescente no percentual de usuários diabéticos que realizaram amputação de membros inferiores na X e XI regiões, incidência de tuberculose na VI região, casos novos de sífilis congênita, cobertura da Estratégia Saúde da Família, percentual de pacientes com acidente vascular encefálico que realizaram tomografia computadorizada, de nascidos vivos com mais de 6 consultas de pré-natal, e de partos cesáreos na VI, X e XI regiões de saúde ($p<0,05$). Decresceram as internações por asma e por gastroenterite nas três regiões e as internações por condições sensíveis à atenção primária e por insuficiência cardíaca na X e XI regiões ($p<0,05$).* ***Conclusão:*** *A análise dos indicadores de desempenho demonstrou tendências heterogêneas. Destaca-se o decréscimo nas internações por condições evitáveis e o crescimento na incidência de tuberculose na VI região e de sífilis congênita nas três regiões de saúde.*

Descritores: *Avaliação em Saúde; Estudos de Séries Temporais; Indicadores Básicos de Saúde; Regionalização.*

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RESUMEN

Objetivo: *Analizar la tendencia temporal de los indicadores de desempeño de los servicios de salud.* ***Métodos:*** *Estudio cuantitativo y ecológico de series temporales. Se analizaron indicadores de desempeño de los servicios de salud de las regiones de la III Macro región del estado de Pernambuco: Arcoverde (VI), Ahogados de la Ingazeira (X) y Sierra Tallada (XI) en el periodo entre 2008 y 2017. Se realizó la regresión linear simple en el software estadístico R versión 3.5.0. Los indicadores evaluados representan las dimensiones de la efectividad, el acceso, la adecuación y la aceptabilidad del modelo de evaluación de desempeño del sistema de salud brasileño.* ***Resultados:*** *Se observó una tendencia creciente en el porcentual de usuarios con diabetes que realizaron la amputación de miembros inferiores en las X y XI regiones, la incidencia de tuberculosis en la VI región, los casos nuevos de sífilis congénita, la cobertura de la Estrategia Salud de la Familia, el porcentual de pacientes con accidente cerebrovascular que realizaron la tomografía computadorizada, de nacidos vivos con más de 6 consultas prenatal y de partos cesáreos en las VI, X y XI regiones de salud (p<0,05). Los ingresos por la asma y por la gastroenteritis en las tres regiones y los ingresos debido las condiciones sensibles de la atención primaria y por la insuficiencia cardiaca en las X y XI regiones (p<0,05) disminuyeron.* ***Conclusión:*** *El análisis de los indicadores de desempeño ha demostrado tendencias heterogéneas. Se destaca la disminución de los ingresos por condiciones evitables y el aumento de la incidencia de tuberculosis en la VI región y de la sífilis congénita en las tres regiones de salud.*

Descriptores: *Evaluación en Salud; Estudios de Series Temporales; Indicadores de Salud; Regionalización.*

INTRODUCTION

A health region corresponds to a defined territorial area for a certain population, so that it can access actions and services in a defined territory, according to the health needs[1]. The services must include the primary care, with municipalities being responsible for medium complexity, by micro-regions, and high complexity, for macro-regions[2].

In 2017, there were 438 health regions in the country, which are marked by socioeconomic inequalities and the provision of services[3]. Pernambuco has four macro-regions, with the III Macro-region located in the state's hinterlands, far from the metropolitan region[4]. The macro-region had the second highest illiteracy rate of the state (25.3%) in 2010[5] and the highest proportion of neonatal deaths in children under one year old (72.4%) in 2016[6], being its network formed mainly by primary care services and services of medium complexity[5], showing a fragile capacity to offer highly complex procedures, which are strongly concentrated in the state's health I Macro-region[7]. This inequality in the dimensional supply of services presents the same pattern observed throughout the country[8,9], pointing to the need for regional planning to organize SUS actions and services[1].

In this sense, health assessment presents itself as a tool capable of assisting in decision-making processes, using scientific evidence to improve the performance of systems and services[10] and to optimize health resources[11]. Even though there is no consensus on the concept of performance evaluation, it generally corresponds to the fulfillment of objectives and expected results[12], observing a set of evaluative models developed by several countries[13].

In Brazil, after a wide process of discussion of several evaluation models, in 2003, the matrix of the Health System Performance Evaluation Project (*Projeto de Avaliação de Desempenho do Sistema de Saúde - Proadess*) was published, aiming to subsidize the monitoring and rating of the system and disseminate information that collaborates in the planning of interventions within the scope of the Unified Health System (*Sistema* Único *de Saúde - SUS*), based on four dimensions: health determinants, health conditions of the population, health system and service performance[14].

Among the indicators evaluated by the project, there are data on incidence, hospitalizations and mortality indicators due to preventable conditions. In this perspective, it becomes essential to highlight the relevance of the National Health Promotion Policy (*Política Nacional de Promoção da Saúde - PNPS*), considering the need to develop actions to face the challenges imposed by the country's epidemiological, nutritional and demographic profile[15].

The complex epidemiological scenario, composed of communicable and non-communicable diseases, in addition to high morbidity and mortality by violence and external causes, requires the strengthening of health systems and the establishment of an agenda among many sectors that implement policies, so that they act on the main health determinants[16].

PNPS seeks to modify the ways of organizing, planning, analyzing and evaluating health work, bringing in its essence the need to create relations with other public policies[17]. Therefore, it is essential to monitor the main health indicators, so that any changes are observed early and appropriate policies are organized[18].

In this perspective, the present study aimed to analyze the temporal trend of the performance indicators of the health services of the III Macro-region of the state of Pernambuco.

METHODS

This is an ecological, time series and quantitative study. This type of study is often made when one wants to analyze databases of large populations and observe the progress of rates over the years in a given population[19].

The research area corresponds to III Macroregion, located in the hinterland of the state of Pernambuco, formed by the regions of: Arcoverde (VI), Afogados da Ingazeira (X) and Serra Talhada (XI), comprising 35 municipalities and an estimated population of 849,754 inhabitants in 2018[4,5]. Among the macro-regions of the state, this has a predominance of the SUS-dependent population (97.91%)[20].

This macro-region was chosen for convenience; however it is justified by the fact that the region is located in the Pernambuco's hinterland. It is also a part of a larger project that aims to assess the performance of the health system in the state of Pernambuco, formed by four health macro-regions.

The indicators correspond to data that make up the Proadess matrix[21], in the dimension of health services performance, composed of the following sub-dimensions: effectiveness, access, efficiency, respect for people's rights, acceptability, continuity, adequacy and security. However, in this article, only the sub-dimensions that had data available in the 10-year period were included: effectiveness, access, adequacy and acceptability.

Thus, 43 indicators were analyzed, distributed among the following dimensions: effectiveness (hospitalizations for preventable conditions, incidence of preventable diseases and mortality indicators), access (indicators that represents primary care services, medium and high complexity), adequacy (users with cerebral vascular accident (CVA)) who underwent computed tomography in the first seven days of hospitalization, live births with more than six prenatal consultations, rate of hysterectomies, ratio between dialysis and kidney transplantation, bacterial meningitis diagnosed in the laboratory and average time of hospital stay), and the acceptability dimension (abandonment of tuberculosis treatment and percentage of users not vaccinated against influenza)[21].

The number of indicators corresponded to the data that were available at the time of collection (March and April 2019) for the period under analysis. Data were collected on the Proadess website (https://www.proadess.icict.fiocruz.br/index.php?pag=matrs) and the analysis period corresponded to 10 years (2008 to 2017).

Simple linear regression was performed ($y = \beta 0 + \beta 1 * x1$), where y corresponds to the scale of values of the time series; x the time scale; β0 to the intersection between the line and the vertical axis and β1 at the line slope. The free statistical software R, version 35.0, was used, and a significance level of 5% and 95% CI were considered.

Positive values of β1 indicate an upward trend, while negative values show a downward trend[22]. Therefore, the trends were classified as increasing (positive β1 regression coefficient and $p \leq 0.05$), decreasing (negative regression coefficient and $p \leq 0.05$) and stationary ($p > 0.05$).

In view of the large volume of data, the presentation was made in tables, exposing only the first and last year of the historical series, regression coefficient β1 and p-value.

The study waived the opinion of the Research Ethics Committee for using secondary data, without identifying the subjects and in the public domain.

RESULTS

In the effectiveness dimension, there was a significant growing trend ($p < 0.05$) in the indicators: percentage of hospitalized users with diabetes mellitus who underwent non-traumatic lower limb amputation (lower limbs) (X and XI health regions); an incidence of tuberculosis (VI); a number of new cases of congenital syphilis in children under one year of age in the three health regions and rate of hospitalization for bacterial pneumonia (VI and X), as shown in Table I.

In the effectiveness dimension, there was a significant growing trend ($p < 0.05$) in the indicators: percentage of hospitalized users with diabetes mellitus who underwent non-traumatic lower limb amputation (lower limbs) (X and XI health regions); an incidence of tuberculosis (VI); a number of new cases of congenital syphilis in children under one year of age in the three health regions and rate of hospitalization for bacterial pneumonia (VI and X), as shown in Table I.

In the other hand, they showed a decreasing trend: rate of hospitalization for asthma (three regions), percentage of hospitalizations for conditions sensitive to Primary Care (X and XI), a hospitalization rate for gastroenteritis (VI, X and XI) and rate of hospitalization for heart failure (X and XI).

The incidence rate of acquired immunodeficiency syndrome (AIDS) per 100 thousand inhabitants and the mortality rates due to diabetes, hypertension and acute respiratory failure did not show significant linear trends ($p > 0.05$).

Table II shows the trend of indicators of access to health services. An increasing trend was observed in the three health regions: in the percentage of the population covered by the Family Health Strategy (*Estratégia de Saúde da Família - ESF*), in the ratio between the number of mammography procedures in women aged 50 to 69 years (VI and XI), in angioplasty rate in the population aged 20 years or older in the three health regions and in the rate of hospitalization for hip arthroplasty (VI).

In the indicators corresponding to the percentage of medium and high complexity procedures, outside and in the home health region, an increasing trend was found in the percentage of surgical admissions outside the VI and X health regions. On the other hand, the percentage of surgical admissions in the health region in the same locations decreased. The percentage of mammograms showed a decreasing trend for tests performed outside and an increasing trend in the X region. The percentage of hospital deliveries in the VI region and the percentage of deliveries outside the health region in the three regions also showed an increasing trend, as shown in Table III.

Table I - Variations in the performance indicators of the health services effectiveness dimension. VI, X and XI health regions. Pernambuco, Brazil, 2008-2017.

Indicators	RS	2008	2017	β1	p-value
1 - Percentage of users hospitalized with diabetes mellitus who underwent non-traumatic lower limb amputation	VI	0.5	0.9	0.06	0.351
	X	0.4	3.9	0.25	0.047
	XI	0	1.5	0.14	0.006
2 - Tuberculosis incidence rate per 100 thousand inhabitants	VI	16	24	1.20	<0.001
	X	17.5	12.2	-0.36	0.319
	XI	18.6	16	-0.32	0.582
3 - Number of new cases of congenital syphilis in children under 1 year	VI	2	26	2.84	<0.001
	X	1	7	0.68	0.001
	XI	0	12	1.32	<0.001
4 - Asthma hospitalization rate per 100 thousand inhabitants aged 15 years and over	VI	59.1	26.9	-8.36	0.054
	X	259.9	2.6	-38.7	<0.001
	XI	108.7	13.8	-17.3	0.001
5 - Percentage of hospitalizations for conditions sensitive to Primary Care	VI	11.1	11	-0.21	0.179
	X	23.2	4.3	-2.46	<0.001
	XI	17.8	12.5	-0.94	<0.001
6 - Hospitalization rate for gastroenteritis per 100 thousand inhabitants from 1 to 4 years	VI	293.1	194.8	-14.4	0.001
	X	803.2	54.4	-119.3	<0.001
	XI	733.5	306.2	-76.1	0.001
7 - Rate of hospitalization for heart failure per 100 thousand inhabitants aged 40 or over	VI	306.7	274.2	-4.30	0.400
	X	835.3	180.5	-86.1	<0.001
	XI	584.8	350	-25.0	<0.001
8 - Hospitalization rate for bacterial pneumonia per 100,000 inhabitants 18 years of age or older	VI	0	33.2	2.64	0.005
	X	0	12.2	1.45	0.002
	XI	4.2	8.9	-0.20	0.802

RS: health region; LL: lower limbs. Source: Health System Performance Assessment Project (Proadess)

Table II - Variations in indicators of access to health services. VI, X and XI health regions. Pernambuco, Brazil, 2008-2017.

Indicators	RS	2008	2017	β1	p-valor
1 - Percentage of the population covered by the ESF	VI	77.5	85.0	1.21	0.001
	X	84.3	99.7	1.44	0.001
	XI	66.5	86.7	2.96	<0.001
2 - Population coverage estimated by Primary Care teams	VI	88.9	92.6	0.09	0.634
	X	94.8	96.3	-0.10	0.502
	XI	92.9	94.9	-0.19	0.421
3 - Percentage of the population aged 60 and over vaccinated against influenza	VI	86.1	91.6	-0.65	0.496
	X	86.2	89.8	-0.10	0.845
	XI	86.6	97.7	-0.35	0.580
4 - Percentage of children under 1 year vaccinated with tetravalent / pentavalent	VI	104	83.2	-1.58	0.037
	X	109	90.4	-1.05	0.262
	XI	123	93.5	-3.17	<0.001
5 - Ratio between the number of mammograms in women aged 50 to 69 and half the population of women in the same age group	VI	0.09	0.38	0.04	<0.001
	X	0.10	0.59	0.05	0.177
	XI	0.09	0.43	0.04	<0.001
6 - Ratio between the number of cytopathologists in women aged 25 to 64 and one third of the population of women in the same age group	VI	0.54	0.65	0.02	0.085
	X	0.92	0.88	-0.01	0.538
	XI	0.63	0.51	-0.01	0.311
7 - Angioplasty rate per 100 thousand inhabitants aged 20 or over	VI	6	20.5	2.00	0.026
	X	14.6	34.7	3.09	0.001
	XI	11.1	35.8	2.70	<0.001
8 - Rate of cataract surgeries per 100 thousand inhabitants aged 40 or over	VI	307.3	573.9	17.84	0.342
	X	480	748.2	28.89	0.181
	XI	298.7	757.5	38.01	0.093
9 - Hospitalization rate for hip arthroplasty per 100 thousand inhabitants aged 60 or over	VI	19.5	32.2	2.47	0.011
	X	41.7	26.8	2.04	0.282
	XI	50.4	84.4	3.83	0.071
10 - Rate of myocardial revascularization surgery per 100 thousand inhabitants aged 20 or over	VI	6	5.3	-0.36	0.349
	X	8.9	16.3	0.64	0.135
	XI	11.8	8.7	0.12	0.796

RS: health region; ESF; Family Health Strategy. Source: Health System Performance Assessment Project (Proadess)

The percentage of radiotherapies and angioplasties showed a stationary trend, since 100% of these procedures are performed outside the users' home health region. The percentage of chemotherapy also showed a stationary trend in the three health regions, with 100% of the procedures performed outside the X and XI health regions. However, in the VI region, by the year 2015, 100% were carried out outside the health region and, in the years 2016 and 2017, the realization began in the region itself (71.3%, in 2017, outside and 28.7% in the health region).

Table III - Percentage of medium and high complexity procedures performed outside and in the health region. VI, X and XI health regions. Pernambuco, Brazil, 2008-2017.

Indicators	RS	2008	2017	β1	P-valor
1 - Percentage of surgical hospitalization performed outside the RS	VI	31.2	50.9	2.83	0.002
	X	17	47	3.40	<0.001
	XI	11.3	20.8	1.20	0.186
2 - Percentage of surgical hospitalization performed in RS	VI	68.8	49.1	-2.83	0.002
	X	83	53	-3.40	<0.001
	XI	88.7	79.2	-1.20	0.186
3 - Percentage of mammograms performed outside the RS of residence	VI	3.6	3.1	-0.28	0.141
	X	14.5	1.3	-1.11	0.029
	XI	2.3	3	0.14	0.916
4 - Percentage of mammograms performed in the RS of residence	VI	96.4	96.9	0.28	0.141
	X	85.5	98.7	1.11	0.029
	XI	97.7	97	-0.14	0.916
5 - Percentage of hospital childbirth	VI	96.6	98.7	0.18	0.017
	X	99.8	99.6	0.09	0.192
	XI	98.3	99.1	0.04	0.315
6 - Percentage of hospital deliveries performed outside the RS of residence	VI	14.1	21.2	0.86	0.004
	X	4.5	15.1	1.54	<0.001
	XI	8.4	16.6	0.96	0.014
7 - Percentage of hospital childbirth performed in the RS of residence	VI	85.9	78.8	-0.86	0.004
	X	95.5	84.9	-1.54	<0.001
	XI	91.6	83.4	-0.96	0.014

RS: health region. Source: Health System Performance Assessment Project (Proadess)

In the adequacy dimension, a positive result can be seen in the following indicators: the percentage of patients with cerebral vascular accident (CVA) who underwent computed tomography up to seven days and the percentage of live births whose mothers had more than six prenatal consultations (a growing trend in the three regions); in the ratio between dialysis and kidney transplantation (a decreasing trend in the VI region), in the rate of hysterectomies in women aged 20 and over (a decreasing trend in the VI and X regions). A worse performance was observed in the indicator regarding the percentage of cesarean deliveries, which showed an increasing trend in the three health regions, as shown in Table IV.

In the acceptability dimension, it was found that the rate of abandonment of tuberculosis treatment showed a significant downward trend in the VI region, unlike the percentage of elderly people not vaccinated against influenza, which showed a downward trend in the X and XI regions, as shown in Table V.

Table IV - Variations in performance indicators in the adequacy dimension of health services. VI, X and XI health regions. Pernambuco, Brazil, 2008-2017.

Indicators	RS	2008	2017	β1	p-valor
1 - Percentage of stroke patients hospitalized for up to seven days who underwent computed tomography	VI	11.3	38.4	2.26	0.003
	X	4.6	38.5	3.38	0.018
	XI	2.3	12.8	1.39	<0.001
2 - Percentage of live births whose mothers had more than six prenatal consultations	VI	48.2	75.7	3.11	<0.001
	X	36.7	84.8	5.86	<0.001
	XI	27.2	70.9	4.84	<0.001
3 - Ratio between dialysis and kidney transplantation	VI	167	20.8	-10.90	0.007
	X	80	22.4	-1.98	0.543
	XI	0	18.5	0.39	0.923
4 - Hysterectomy rate standardized by age per 100 thousand women aged 20 years and over	VI	192.2	90.5	-11.71	0.003
	X	333.3	159.1	-20.04	0.002
	XI	291.6	137.5	-9.29	0.187
5 - Percentage of bacterial meningitis that had laboratory confirmation	VI	0	33.3	3.22	0.401
	X	0	0	0.83	0.836
	XI	0	0	1.82	0.664
6 - Percentage of cesarean deliveries	VI	28.2	44	1.70	0.001
	X	51.7	68.9	1.86	0.005
	XI	32	59.6	3.43	<0.001
7 - Average length of hospital stay of patients aged 60 years or older due to hip fracture	VI	8.3	7.2	-0.47	0.084
	X	5.9	4.9	-0.17	0.552
	XI	5.4	4.2	-0.17	0.085

RS: health region. Source: Health System Performance Assessment Project (Proadess)

Table V - Variations of performance indicators in the acceptability dimension of health services. VI, X and XI health regions. Pernambuco, Brazil, 2008-2017.

Indicators	RS	2008	2017	β1	p-valor
1 - Rate of abandonment of tuberculosis treatment	VI	11.1	3.2	-1.11	0.001
	X	5.3	3.3	-0.65	0.216
	XI	6.7	0.0	0.17	0.789
2 - Percentage of elderly people not vaccinated against influenza	VI	25.8	8.5	-0.91	0.312
	X	25.9	10.3	-1.52	0.008
	XI	28	4.8	-1.42	0.017

RS: health region. Source: Health System Performance Assessment Project (Proadess)

DISCUSSION

The results of the present study demonstrated that the behavior of the indicators is not uniform in the four dimensions (effectiveness, access, adequacy, and acceptability) and in the health regions (VI, X, and XI) over the period studied (2008 to 2017).

Regarding the effectiveness indicators, different situations occurred, observing both the worsening and the improvement in performance depending on the indicator and the region analyzed. The increase in the percentage of diabetic users who underwent amputation of lower limbs (X and XI region) stands out since this is an avoidable condition, through actions to control risk factors and promote health carried out in Primary Care[23].

The growing trend of tuberculosis in the VI health region is also a worrying fact, since, throughout the country, there was an average annual drop in the incidence rate of 1.6% in the period from 2008 to 2017[24]. However, the results are heterogeneous among the federative units (*unidades federativas - UFs*) and insufficient to achieve the goals of the National Plan for the End of Tuberculosis[24].

As for the incidence of congenital syphilis, the findings of the present study corroborate with data from the Ministry of Health, in which there was growth in the last ten years in Brazil, whose rate, in 2007, was 1.9 cases / 1,000 live births (*nascidos vivos - NV*) and, in 2017, 8.6 cases / 1,000 NV. Pernambuco is among the states that had congenital syphilis incidence rates higher than the national rate (14.4 cases / 1,000 live births)[25]. The increase in syphilis notifications can be attributed to the implementation of rapid tests in health units after the implementation of the Cegonha Network[26].

Regarding the indicators of hospitalizations for preventable conditions, their reduction is already well documented in the literature, which is associated with the strengthening and expansion of primary care[27-32].

When it comes to the indicators of the access dimension, it was observed that the performance improved: in the percentage of the population covered by the ESF in the three health regions, in the ratio of mammograms in women aged 50 to 69 in the VI health region, in the rate of angioplasty in the population aged 20 years or older in the three health regions and in the rate of hospitalization for hip arthroplasty in the VI region. These results corroborate the findings of another study, which found an increasing trend in the first three indicators between 1998 and 2010[27].

Another study also showed an increasing trend in ESF coverage in Brazil and in most UFs and their macro-regions. The regions with the greatest growth in coverage were the North, Southeast, and South, in which more than 50% of the UFs had coverage greater than or equal to 75% in 2016. In Pernambuco, the trend was also increasing, varying between 62.4%, in 2006, and 76.9% in 2016[33].

In 2019, the monitoring performed by Proadess revealed a continuous increase in the rate of angioplasty in the country, with significant variations between the major regions, with higher rates in the South and lower rates in the North. As for the rate of hospitalization for hip arthroplasty, there has been stability in all regions of Brazil since 2009, with higher rates in the South and lower rates in the North and Northeast[34].

Regarding access to other medium and high complexity services, it was found that some of the procedures are performed predominantly outside the health region (chemotherapies, radiotherapies and angioplasties). In general, access to health services has increased over the past three decades, with growth in all types of establishments; however, there are huge regional disparities[35].

In a research that analyzed the regional arrangements of SUS, according to the legal sphere of providers and the spatial distribution of the production of medium and high complexity services in Brazil, it was demonstrated that the highest percentages were registered in the capital, confirming health care gaps, mainly in the states North, Northeast and Midwest[8].

In the adequacy dimension, the increase in the percentage of cesarean deliveries in the three health regions stands out. These findings corroborate with data from the Proadess report, in which high percentages (55.4%) were observed, ranging from 45.6% (in the North) to 62% (in the Midwest)[34].

In 2015, it was estimated that 21.1% of births worldwide occurred by cesarean sections, representing almost a doubling of the proportion in 2000 (12.1%)[36]. Brazil is among the countries in Latin America with the highest rates of cesarean sections (55.6%)[37], despite the fact that the World Health Organization (WHO) warns, since 1985, that rates greater than 10% are not associated with a reduction in maternal and perinatal mortality[38].

In the acceptability dimension, there was a significant decrease in the rate of abandonment of tuberculosis treatment (VI region) and in the percentage of elderly people not vaccinated against influenza (X and XI regions). The VI, X and XI regions showed percentages below 5% in 2017. In contrast, in the monitoring of the Proadess published in 2018, it was noticed that all regions of the country have values around 9 to 12%, with these results above the 5% goal recommended by the WHO [39], demonstrating the need to improve the quality of coverage of the treatment directly observed[40].

As limitations of this study, the use of secondary data is pointed out, which may present under-registration and errors in processing, in addition to the difficulty in obtaining data with the same periodicity for all indicators. Despite this, the use of information provided by Proadess is relevant for monitoring and evaluating the performance of the health system.

CONCLUSION

The performance of health services in the VI, X and XI health regions presented different situations in the four dimensions that were researched, with more marked improvements in the indicators related to the presence of primary care. We highlight the significant decreasing trends in hospitalizations for preventable conditions and, on the other hand, the increase in the incidence of tuberculosis in the VI region and in new cases of congenital syphilis in the three health regions.

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest.

CONTRIBUTIONS

Alaine Santos Parente, Arianny Soares Ramos de Santana, George Tadeu Nunes Diniz and **Sydia Rosana de Araujo Oliveira** contributed to the preparation and design of the study; acquisition, analysis and interpretation of data and the writing and / or revision of the manuscript.

REFERENCES

1. Santos L. Região de saúde e suas redes de atenção: modelo organizativo- sistêmico do SUS. Ciênc Saúde Colet [Internet]. 2017 [accessed on 2019 Set 09];22(4): 1281-9. doi: 10.1590/1413-81232017224.26392016
2. Mendes EV. As redes de atenção à saúde. 2ª ed. Brasília: Organização Pan-Americana de Saúde; 2011.
3. Albuquerque MV, Viana ALA, Lima LD, Ferreira MP, Fusaro ER, Iozii FL. Desigualdades regionais na saúde: mudanças observadas no Brasil de 2000 a 2016. Ciênc Saúde Colet [Internet]. 2017 [accessed on 2020 Fev 18];22(4):1055-64. Available from: http://www.scielo.br/pdf/csc/v22n4/1413-8123-csc-22-04-1055.pdf
4. Secretaria Estadual de Saúde (PE). Plano diretor de regionalização [Internet]. 201 1 [accessed on 2019 Set 09]. Available from: http://portal.saude.pe.gov.br/documentos/secretaria-executiva-de-coordenacao-geral/plano-diretor-de-regionalizacao-2011
5. Ministério da Saúde (BR), Departamento de Informática do Ministério da Saúde. Informações de Saúde [Internet]. 2020 [accessed on 2020 Jan 14]. Available from: http://www2.datasus.gov.br/DATASUS/index.php?area=02
6. Lima SS. Assistência pré-natal, parto e ao recém-nascido e tendência de mortalidade neonatal evitável no estado de Pernambuco (2000-2014): um estudo de adequação [dissertação]. Recife: Centro de Pesquisas Aggeu Magalhães; 2017.
7. Lemos RS. Regionalização da alta complexidade em saúde no estado de Pernambuco: oferta e alocação de recursos [dissertação]. Recife: Universidade Federal de Pernambuco; 2014.
8. Lima LD, Albuquerque MV, Scatena JHG, Melo ECP, Oliveira EXG, Carvalho MS, et al. Arranjos regionais de governança do Sistema Único de Saúde: diversidade de prestadores e desigualdade espacial na provisão de serviços. Cad Saúde Pública [Internet]. 2019 [accessed on2019 Set 09];35(Sup 2). doi: 10.1590/0102-311x00094618
9. Ribeiro JM, Moreira MR, Ouverney AM, Silva CMFP. Políticas de saúde e lacunas federativas no Brasil: uma análise da capacidade regional de provisão de serviços. Ciênc Saúde Colet [Internet]. 2017 [accessed on 2019 Set 09];22(4). Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1413-81232017002401031&lng=pt&nrm=iso&tlng=pt
10. McDavid JC, Huse I, Hawthorn LR. Program Evaluation and Performance Measurement: an introduction to practice. 3ª ed. [New York]: Sage Publications; 2018.

11. Wachholz PA, Lima SAM, Boas PJFV. Da prática baseada em evidências para a saúde coletiva informada por evidências: revisão narrativa. Rev Bras Promoç Saúde [Internet]. 2018 [accessed on 2020 Fev 17];31(2). Available from: https://periodicos.unifor.br/RBPS/article/view/6753/pdf

12. Viacava F, Almeida C, Caetano R, Fausto M, Macinko J, Martins M, et al. Uma metodologia de avaliação do desempenho do sistema de saúde brasileiro. Ciênc Saúde Colet [Internet]. 2004 [accessed on 2019 Set 09];9(3):711-24. doi: 10.1590/S1413-81232004000300021

13. Reis AC, Santos EM, Arruda MR, Oliveira PTR. Estudo exploratório dos modelos de avaliação de desempenho em saúde: uma apreciação da capacidade avaliativa. Saúde Debate [Internet]. 2017 [accessed on 2019 Set 09];41:330-44. doi: 10.1590/0103-11042017s24

14. Projeto: desenvolvimento de metodologia de avaliação do desempenho do sistema de saúde brasileiro (PROADESS) [Internet]. 2003 [accessed on 2019 Set 09]. Available from: https://www.proadess.icict.fiocruz.br/relatoriofinal.pdf

15. Malta DC, Reis AAC, Jaime PC, Morais OL Neto, Silva MMA, Akerman M. O SUS e a Política Nacional de Promoção da Saúde: perspectiva resultados, avanços e desafios em tempos de crise. Ciênc Saúde Colet [Internet]. 2018 [accessed on 2020 Fev 18];23(6):1799-809. Available from: http://www.scielo.br/pdf/csc/v23n6/1413-8123-csc-23-06-1799.pdf

16. Silva JB Jr. Promoção da saúde: ação necessária e urgente nas Américas. Ciênc Saúde Colet [Internet]. 2019 [accessed on 2020 Fev 18];24(11). Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1413-81232019001103994

17. Malta DC, Morais OL Neto, Silva MMA, Rocha D, Castro AM, Reis AAC, et al. Política Nacional de Promoção da Saúde (PNPS): capítulos de uma caminhada ainda em construção. Ciênc Saúde Colet [Internet]. 2016 [accessed on 2020 Fev 18];21(6). Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1413-81232016000601683&lng=en&nrm=iso&tlng=pt

18. Massuda A, Hone T, Leles FAG, Castro MC, Atun R. The Brazilian health system at crossroads: progress, crisis and resilience. BMJ Glob Health [Internet]. 2018 [accessed on 2020 Fev 18];3(4). Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6035510/

19. Medronho RA. Estudos ecológicos. In: Medronho RA, Bloch KV, Luiz RR, Werneck GL, organizadores. Epidemiologia. Editora Atheneu; 2009. p. 265-274.

20. Secretaria Estadual de Saúde de Pernambuco. Plano Estadual de Saúde 2020-2023 [Internet]. 2019 [accessed on 2020 Fev 18]. Available from: http://portal.saude.pe.gov.br/sites/portal.saude.pe.gov.br/files/plano_estadual_de_saude_2020-2023.pdf

21. Projeto de Avaliação do Desempenho do Sistema de Saúde. Matriz de Indicadores [Internet]. 2020 [accessed on 2020 Fev 18]. Available from: https://www.proadess.icict.fiocruz.br/index.php?pag=matraba

22. Antunes JLF, Cardoso MRA. Uso da análise de séries temporais em estudos epidemiológicos. Epidemiol Serv Saúde [Internet]. 2015 [accessed on 2019 Set 09];24(3):565-76. Available from: http://www.scielo.br/pdf/ress/v24n3/2237-9622-ress-24-03-00565.pdf

23. Flor LS, Campos MR. Prevalência de diabetes mellitus e fatores associados na população adulta brasileira: evidências de um inquérito de base populacional. Rev Bras Epidemiol [Internet]. 2017 [accessed on 2019 Set 09];20(1):16-29. Available from: http://dx.doi.org/10.1590/1980-5497201700010002

24. Ministério da Saúde (BR), Secretaria de vigilância em saúde. Implantação do plano nacional pelo fim da tuberculose como problema de saúde pública no Brasil: primeiros passos rumo ao alcance das metas. Bol Epidemiol [Internet]. 2018 [accessed on 2019 Set 09];49. Available from: http://portalarquivos2.saude.gov.br/images/pdf/2018/marco/26/2018-009.pdf

25. Ministério da Saúde (BR), Secretaria de Vigilância em Saúde. Boletim epidemiológico de sífilis [Internet]. 2018 [accessed on 2019 set 09]. Available from: http://www.aids.gov.br/pt-br/pub/2018/boletim-epidemiologico-de-sifilis-2018

26. Machado RC, Forster AC, Campos JJB, Martins M, Ferreira JBB. Avaliação de desempenho dos serviços públicos de saúde de um município paulista de médio porte, Brasil, 2008 a 2015. An Inst Hig Med Trop

[Internet]. 2019 [accessed on 2020 Fev 17];(sup 1). Available from: https://anaisihmt.com/index.php/ihmt/article/view/319

27. Viacava F, Ugá MAD, Porto S, Laguardia J, Moreira RS. Avaliação de desempenho de sistemas de saúde: um modelo de análise. Ciênc Saúde Colet [Internet]. 2012 [accessed on 2019 Set 09];17(4):921-34. Available from: http://dx.doi.org/10.1590/S1413-81232012000400014

28. Ugá MAD, Laguardia J, Porto SM, Viacava F, Duarte CMR. A efetividade do sistema de saúde brasileiro: uma avaliação através de indicadores referentes a condições evitáveis. Reciis [Internet]. 2013 [accessed on 2019 Set 09];7(2). Available from: http://dx.doi.org/10.3395/reciis.v7i2.495

29. Ceccon RF, Meneghel SN, Viecili PRN. Internações por condições sensíveis à atenção primária e ampliação da Saúde da Família no Brasil: um estudo ecológico. Rev Bras Epidemiol [Internet]. 2014 [accessed on 2019 Set 09];17(4). Available from: http://dx.doi.org/10.1590/1809-4503201400040014

30. Boing AF, Vicenzi RB, Magajewski F, Boing AC, Moretti-Pires RO, Peres KG, et al. Redução das internações por condições sensíveis à atenção primária no Brasil entre 1998-2009. Rev Saúde Pública [Internet]. 2012 [accessed on 2019 Set 09];46(2). doi: 10.1590/S0034-89102012005000011

31. Gonçalves RF, Souza IMC, Tanaka OY, Santos CR, Brito-Silva K, Santos LX, et al. Programa Mais Médicos no Nordeste: avaliação das internações por condições sensíveis à Atenção Primária à Saúde. Ciênc Saúde Colet [Internet]. 2016 [accessed on 2019 Set 09];21(9):2815-24. doi: 10.1590/1413-81232015219.15392016

32. Pinto LF, Giovanella L. Do Programa à Estratégia Saúde da Família: expansão do acesso e redução das internações por condições sensíveis à atenção básica (ICSAB). Ciênc Saúde Colet [Internet]. 2018 [accessed on 2020 Fev 17];23(6):1903-13. Available from: http://www.scielo.br/pdf/csc/v23n6/1413-8123-csc-23-06-1903.pdf

33. Neves RG, Duro SMS, Nunes BP, Tomasi E. Tendência temporal da cobertura da Estratégia Saúde da Família no Brasil, regiões e Unidades da Federação, 2006-2016. Epidemiol Serv Saude [Internet]. 2018 [accessed on 2019 Set 09];27(3). doi: 10.5123/s1679-49742018000300008

34. Projeto de Avaliação do Desempenho do Sistema de Saúde. Boletim Informativo do Proadess [Internet]. 2019 [accessed on 2019 set 09]. Available from: https://www.proadess.icict.fiocruz.br/Boletim_4_PROADESS_Monitoramento%20da%20assistencia%20hospitalar_errata_1403.pdf

35. Viacava F, Oliveira RAD, Carvalho CC, Laguardia J, Bellido JG. SUS: oferta, acesso e utilização de serviços de saúde nos últimos 30 anos. Ciênc Saúde Colet [Internet]. 2018 [accessed on 2019 Set 09];23(6):1751-62. doi: 10.1590/1413-81232018236.06022018

36. Boerma T, Ronsmans C, Melesse DY, Barros AJD, Barros FC, Juan L, et al. Global epidemiology of use of and disparities in caesarean sections. Lancet [Internet]. 2018 [accessed on 2020 Fev 17];392(10155): 1341-48. Available from: https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(18)31928-7/fulltext?rss=yes

37. Betrán AP, Ye J, Moller AB, Zhang J, Gülmezoglu AM, Torloni MR. The Increasing Trend in Caesarean Section Rates: Global, Regional and National Estimates: 1990-2014. PLos One [Internet]. 2016 [accessed on 2020 Fev 17];11(2). Available from: https://www.ncbi.nlm.nih.gov/pubmed/26849801

38. Organização Mundial de Saúde. Declaração da OMS sobre Taxas de Cesáreas [Internet]. 2015 [accessed on 2019 Set 09]. Available from: https://apps.who.int/iris/bitstream/handle/10665/161442/WHO_RHR_15.02_por.pdf;jsessionid=CE1B13148F5A4C4944EACB78A0A3D739?sequence=3

39. Projeto de Avaliação do Desempenho do Sistema de Saúde. Boletim Informativo do Proadess, n. 3, agosto/2018. Indicadores para o monitoramento do setor Saúde na Agenda 2030 para o Desenvolvimento Sustentável [Internet]. 2018 [accessed on 2019 Set 09]. Available from: https://www.proadess.icict.fiocruz.br/Boletim_3_PROADESS_Agenda%202030_agosto2018.pdf

40. Ministério da Saúde (BR), Secretaria de Vigilância em Saúde, Departamento de Vigilância Epidemiológica. Manual de recomendações para o controle da tuberculose no Brasil [Internet]. 2011 [accessed on 2019 Set 09]. Available from: http://bvsms.saude.gov.br/bvs/publicacoes/manual_recomendacoes_controle_tuberculose_brasil.pdf

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