Records of tele-education services at the telehealth center in brazil: spatial distribution for the period 2016-2020

Registros dos serviços de tele-educação do núcleo de telessaúde no brasil: distribuição espacial do período 2016-2020. Perfil epidemiológico de los ancianos afectados por covid-19

RESUMO

Objetivo: Analisar a distribuição espacial do acesso aos serviços de tele-educação ofertados por um Núcleo de Telessaúde para o Brasil durante os anos de 2016 a 2020. Métodos: Estudo descritivo e ecológico. Os acessos aos serviços de tele-educação foram coletados a partir da plataforma Telessaúde Brasil Redes que integra o Sistema de Gerenciamento de Atividades de Tele-Educação. Mapas temáticos da distribuição espacial dos acessos georreferecniados por município foram confeccionados no software QGis, versão 3.12.0. Resultados: Observou-se o aumento da frequência de acesso às ações de tele-educação do Núcleo de Telessaúde. No Maranhão e nas capitais de todos os estados em relação aos interiores, foram identificadas áreas com elevado predomínio de registros de acesso às ações de tele-educação, enquanto o menor número de acessos foi observado na Região Norte. Conclusão: Observa-se a expansão das ações de tele-educação promovidas por Núcleo de Telessaúde ao longo dos anos.

DESCRITORES: Análise espacial; Brasil; Educação à Distância; Sistema Único de Saúde; Telemedicina.

ABSTRACT

Objective: To analyze the spatial distribution of access to tele-education services offered by a Telehealth Center for Brazil during the years 2016 to 2020. Methods: Descriptive and ecological study. Access to tele-education services was collected from the Telessaúde Brasil Redes platform, which is part of the Tele-Education Activity Management System. Thematic maps of the spatial distribution of accesses georeferenced by municipality were made using the QGis software, version 3.12.0. Results: There was an increase in the frequency of access to tele-education actions at the Telehealth Nucleus. In Maranhão and in the capitals of all the states in relation to the interior areas, areas with a high predominance of records of access to tele-education actions were identified, while the lowest number of accesses was observed in the North Region. Conclusion: There has been an expansion of tele-education actions promoted by the Telehealth Center over the years.

DESCRIPTORS: Spatial analysis; Brazil; Education, Distance; Unified Health System; Telemedicine.

RESUMEN

Objetivo: Analizar la distribución espacial del acceso a los servicios de teleeducación ofrecidos por un Centro de Telesalud para Brasil durante los años 2016 a 2020. Métodos: Estudio descriptivo y ecológico. Los accesos a los servicios de teleeducación fueron recolectados a partir de la plataforma Telessaúde Brasil Redes, que forma parte del Sistema de Gestión de Actividades de Teleeducación. Se realizaron mapas temáticos de la distribución espacial de los accesos georreferenciados por municipio mediante el software QGis, versión 3.12.0. Resultados: Hubo un aumento en la frecuencia de acceso a las acciones de teleeducación en el Núcleo de Telesalud. En Maranhão y en las capitales de todos los estados con relación al interior, fueron identificadas áreas con alto predominio de registros de acceso a acciones de teleeducación, mientras que el menor número de accesos se observó en la Región Norte. Conclusión: Ha habido una expansión de las acciones de teleeducación promovidas por el Centro de Telesalud a lo largo de los años.

DESCRIPTORES: Análisis espacial; Brasil; Educación a distancia; Sistema Único de Salud; Telemedicina.

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INTRODUCTION

The World Health Organization (WHO) recommends that Telehealth be part of the health systems of countries, regardless of geographically distant locations and their economic and social characteristics, as it provides health services and contributes to the training of health care providers, in a decentralized manner. (1) Research carried out by the WHO Global Observatory for eHealth (GOe) showed that 114 of the approximately 193 countries recognized by the United Nations had telemedicine services recognizing it as an activity included in Telehealth. [2]

Brazilian telemedicine can be an essential component of medical care when considering some structural characteristics of Brazil, such as: having almost 8.52 million km2 of territorial extension, more than 210 million inhabitants in 2020, being composed of 5570 municipalities, being a federative republic with three autonomous levels of government, in addition to presenting macro regions with contrasting sociodemographic and assistance characteristics. [3] Additionally, Brazil has a universal health system, governed by the social security model and presents decentralization, regionalization and hierarchization as organizational principles, with the aim of universalizing access to public health services. However, telemedicine emerged in a decentralized and fragmented way in health, teaching and research establishments in the 1990s [4] and was institutionalized only in 2007, through the National Telehealth Program Brasil Redes. [5]

The technologies used in health have promoted transformations in the daily activities of health care, enabling the expansion of skills, resoluteness and the offer of new resources for action, in the most diverse contexts and health territories. [3,6] In this context, the area of digital health has been evolving intensely, especially in the period of the COVID-19 pandemic. Telehealth services were consolidated as essential for the health system and the domain of Information and Communication Technologies (ICTs) was configured as an important attribution of the health sector.[1,7]

ICTs make up a set of telecommunications technologies developed to allow access to information, while telecommunication can be understood as the transmission of signals over long distances, through mobile phone networks and the Internet, for example. [8,9] ICTs favor the development of various health information activities and health education actions to expand the skills of professionals in this area. Among these actions, tele-education is a Telehealth strategy that promotes the exchange of information and knowledge, eliminating geographic barriers. [10]

Telehealth is part of the e-Health Strategy (Digital Health) of the Ministry of Health and aims to: the expansion and improvement of the health services network, especially Primary Health Care (PHC), and its interaction with other levels of care, strengthening the Health Care Networks of the SUS. [11] In research that aimed to analyze the prevalence and characteristics of PHC continuing education actions in more than 180 municipalities in the state of Mato Grosso do Sul (MS), it was observed that tele-education and distance education were more used in the capital.[12]

With the use of modern ICTs, Telessaúde Brasil Redes (TBR) plans, develops, executes and evaluates activities at a distance through Telehealth Centers [13] and aims to qualify health services, through teleconsulting and tele-education activities.[14] The process of implementing ICTs in Permanent Health Education (PHE) occurs at the same time that new knowledge in the area is developed, especially in developing countries like Brazil, demanding a continuous process of evaluation and monitoring.[15]

The incorporation of tele-education strategies can advance as the challenges for its implementation are unveiled. In this regard, studies that indicate how this technology has been used in the expansion of PHE are scarce, especially with data from the entire national territory and with spatial analysis, allowing the evaluation of the space-time distribution of the frequency of accesses. In this context, the present work can con-

tribute to evaluate the expansion of tele-education services in Brazil, as well as subsidize this discussion in other countries, especially those with low and medium income, promoting the long-term reduction of health inequalities. This work aimed to establish the space-time distribution of access to tele-education services offered by the Telehealth Center for the entire national territory in the period from 2016 to 2020.

METHODS

This is a descriptive research with a quantitative approach of tele-education actions carried out by the Telehealth Center of the University Hospital of the Federal University of Maranhão (NTS HU-UFMA). The NTS HU-UFMA is located in the capital of the State of Maranhão, São Luís.

This study is part of the research "Telehealth: a tool for permanent health education for Primary Care professionals in the State of Maranhão" submitted and approved by the Research Ethics Committee of the HU-UFMA (CAAE nº 72765317.0.0000.5086 and Opinion nº 2.315. 66).

Tele-education refers to health education actions offered remotely or in the form of distance education through the use of ICTs. At NTS HU-UFMA, tele-education actions were carried out in various activities such as courses, web lectures, special study groups, postgraduate defenses, congress transmission, study and research meetings, theoretical and practical classes with transmission of procedures in surgical centers. All these activities composed the data analyzed in this study. The education content programming was elaborated based on the demands and doubts most frequently identified by the teleconsulting service, defining the outline of the PHE. [14,16]

For the analysis of tele-education use indicators, the total number of accesses to this service was considered. Secondary data collected on the Telessaúde Brasil Redes platform that integrates the Tele-Education Activities Management System (SGAT - Sistema de Gerenciamento de Atividades de Tele-Educação) of NTS HU-UFMA, available on the website http://smart.telessaude.ufrn.br/, was used.

The access points to tele-education actions registered through registrations carried out by the participants were considered as the unit of analysis. The geographic area of this study corresponded to all municipalities where accesses to the system were generated.

The SGAT stores the data of health professionals from all over Brazil, among which we mention personal data, location of access and performance and professional data connected to the database of the National Register of Health Establishments. It also stores data records about activities, such as date/time of occurrence, moderator and speakers involved, status, connections, types, modalities and descriptors, the latter connected to the DeCS system. For this study, the variables location of access and date of occurrence were addressed. As an exclusion criterion, an access record without location information was defined.

To monitor the space-time evolution of the origin of access to tele-education actions offered by the Núcleo de Telessaúde do Maranhão, thematic maps were made showing the distribution of accesses by municipality for each year and for the period (2016-2020). The construction of the maps was carried out in the QGis software, version 3.12.0. The cartographic projection corresponded to the Datum SIRGAS 2000 Geographic Coordinate System and the municipal grid was obtained from the website of the Brazilian Institute of Geography and Statistics, 2018 update.

RESULTS

Total use of NTS HU-UFMA tele-education services in the period from 2016 to 2020 was 24,622 accesses. After applying the exclusion criteria, 606 access records were removed due to lack of location information. Use records georeferenced according to the municipality of access, totaling 24,016. It is evident that, for all years of the study, a georeferencing percentage of 97.5% of the records was obtained. The year 2020 had 7,374 access records while 2016 had just over 1,000 records (Table 1)

The tele-education actions developed in the years of the study, such as web lectures, courses, among others, totaled 1,524 and were distributed as follows: 300 in the first year of the series, 374 in the second year, 368 in the third year, 293 in the fourth year and 189 in the fifth and last year studied. In the period, NTS HU-UFMA's tele-education activities reached 1,439 municipalities distributed in all regions and states of the country. The capitals concentrated 52.1% of accesses to tele-education services (Figure 1).

In 2016, 300 tele-education activities were registered, with 862 participants distributed in 20 Brazilian states and the Federal District and 131 municipalities, with 86.9% of these municipalities being in Maranhão (Figure 1). The year 2017 registered 374 tele-education activities, with participants from 26 Brazilian states and the Federal District. There was expansion of access reaching 468 municipalities. That year, 5,119 records were from participants in Maranhão (Figure 1).

In 2018, 368 activities were carried out, with participants from 26 states and the Federal District, from 573 Brazilian municipalities. For that year, Maranhão had 4,739 of the participation records, followed by Minas Gerais with 360 and São Paulo with 353 records (Figure 1). In 2019, only 322 municipalities registered participants distributed in the 26 states and the Federal District. Maranhão concentrated on 78.7% of the participants (Figure 1).

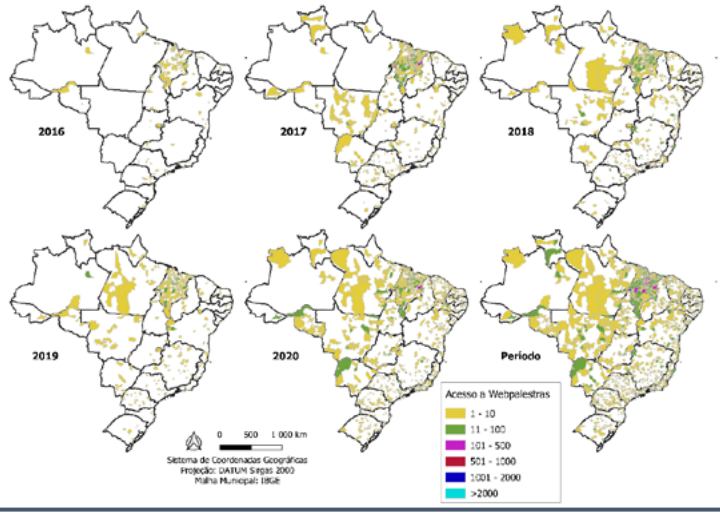
In 2020, the participants remained distributed in the 26 States and the Federal District, and for that year an occurrence was registered in 954 municipalities. In Maranhão, the frequency of participation was 4,147. However, another six states had occurrences above 200 records each. And seven states had more than 100 entries. The number of municipalities registered in that year was 954 (Figure 1).

Table 1. Distribution of participation in tele-education actions for all Brazilian municipalities, according to the frequency of geocoded records, from 2016 to 2020.

Year	Access Records	Georeferenced Access Records	
	n*	n*	%**
2016	1.086	862	79,37
2017	6.037	5945	98,47
2018	6.823	6697	98,15
2019	3.302	3224	97,63
2020	7.374	7288	98.83
Período	24.622	24016	97,53

Source: NTS HU-UFMA Tele-Education Activities Management System (SGAT), available on the website http://smart.telessaude.ufrn.br/. .*n: Absolute Frequency; **Percentage.

Figure 1. Space-time distribution maps of access to tele-education actions by municipality for each year and for the period (2016-2020).



DISCUSSION

There were 24,622 accesses, from 2016 to 2020, with more expressive numbers in 2020. In addition, there was a greater concentration of accesses between the Brazilian capitals in relation to the interiors and a greater expansion of accesses in Maranhão, Mato Grosso, Mato Grosso do Sul and São Paulo.

NTS HU-UFMA started its activities in 2007, but only from 2016, information on access to tele-education activities began to be registered, therefore, this contributed to the distribution of this time frame to be included in the study. With this, a greater number of accesses without registration of location information is observed in the year 2016, constituting an underreporting. This aspect indicates the need to improve it over time since the provision of the service started in 2007, moreover, it is important to invest in the process of feeding this data and making it available in a didactic way for the manager who works in the SUS, with the objective of guiding the planning of the actions of this service.

The study showed the expansion of tele-education actions promoted by Núcleo de Telessaúde over the years in the studied series, reaching municipalities in all regions of the country. Access to tele-education between the years 2016 to 2020 showed a growing trend with an increase of almost 700%. Health technologies used by the Telehealth Center are increasingly present in health systems and are configured as an important mechanism for qualifying and expanding access to health care and education services for users and professionals.

The biggest increase in the number of accesses and use of Telehealth in 2020 may be related to the COVID-19 pandemic, due to the reconfiguration of the Health Care Network (RAS) service to meet this demand and the greater investment in the area of health information technology this year. Telehealth assists in screening, remote care and treatment, surveillance, detection and prevention, and for the mitigation of health care impacts indirectly related to COVID-19. [10] However, in a study carried out in southern Brazil, it was observed that physicians from low-income municipalities, based on per capita GDP, are less likely to consult the telemedicine service, despite facing higher rates of COVID-19 cases. [17] This result points to the need not only to have the service available, but also to encourage telemedicine as a permanent strategy, in order to qualify the professionals who work at all points of the RAS and even reconfigure the SUS in the future.

With the findings of this study, it can be observed that the distribution of access to tele-education services is more concentrated among the capitals, but over the years there has been a greater interiorization of services, which represents progress. Accordingly, a study carried out in Mato Grosso do Sul points out that telemedicine can increase access to permanent health education strategies in municipalities in the interior of the state. [12] Based on these results, the importance of deploying this service especially in the interior and using it with the aim of minimizing access barriers is highlighted.

The greatest expansion of services was concentrated in the states of the Northeast, Midwest and Southeast regions, with emphasis on the states of Maranhão, Mato Grosso, Mato Grosso do Sul and São Paulo. The distribution of these data reflects the improvement and investment in services used by the Telehealth Center, especially in Maranhão. [18] These characteristics may be related to the fact that before the system was shared with the Federal University of Rio Grande do Sul and later there was a transition to a monitoring system of the HU-UFMA.

> The North region is the one with the lowest concentration of attendances over time, especially the states of Amapá and Amazonas. The lower number of professionals linked to the SUS and the low demographic density in the State may contribute to a lower number of accesses to Telehealth. This result reflects possible care barriers constantly pointed out as difficulties that hinder the provision of internalized actions and access to health in the RAS. [19]

However, these limitations should result in greater effort and expansion of Telehealth as a tool to assist in the provision of health actions and services in the Amazon scenario, since care gaps and displacement difficulties must be overcome and considered in health planning, through innovative strategies, such as Telehealth.

A limitation is the non-inclusion of data after the year 2020, however, this is the first article to include data in a larger time frame and with a Brazilian scope on Telehealth, which allows establishing an overview of the implementation process of this service in Brazil. Spatial analysis is considered a strength of this study, as it contributes to the identification of areas where this service operates more frequently, in addition, in the long term it allows subsidizing the greater expansion of this service in Brazil and facilitates the allocation of resources to invest in this service in areas that are configured as care gaps.

CONCLUSION

There was an expansion of access to Telehealth, especially in 2020, due to the COVID-19 pandemic. However, the implementation of Telehealth occurs unevenly among municipalities and Brazilian macro-regions, since there is less access in the interior and in the North region. Therefore, the challenges remain latent, especially in countries of continental dimensions and contrasting socio-demographic characteristics, such as Brazil. Tele-education actions are important tools for improving and universalizing access to health services and should be improved mainly as an EPS strategy in low- and middle-income countries.

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