Effect of the Family Health Strategy in reducing hospitalizations for chronic non-communicable diseases

Efeito da Estratégia Saúde da Família na redução de internações por doenças crônicas não transmissíveis

Efecto de la Estrategia de Salud Familiar en la reducción de hospitalizaciones por enfermedades crónicas no transmisibles

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ABSTRACT
Objective: to analyze the profile of hospitalizations for Chronic Non-Communicable Diseases (NCDs) and their relationship with coverage by the Family Health Strategy (FHS). **Method:** this exploratory, quantitative, descriptive study was conducted from 2016 to 2018 at 21 FHS units in São Carlos, São Paulo State. Information was collected from the e-SUS system and Hospitalization Authorization forms and data were analyzed using descriptive statistics. The study was approved by the research ethics committee of São Carlos Federal University. **Results:** hospitalization rates for angina, heart failure, diabetes, and hypertension were found to have decreased between 2017 and 2018, when FHS coverage expanded. **Conclusion:** expansion of the FHS was crucial to reduce NCD admissions. However, the services provided to users need to be expanded, and care strategies, especially those directed to the elderly and individuals suffering from cerebrovascular and pulmonary diseases, need to be reassessed and intensified.
Descriptors: Primary Health Care; Family Health Strategy; Noncommunicable Diseases; Primary Prevention.

RESUMO
Objetivo: analisar o perfil de internações por Doenças Crônicas Não Transmissíveis (DCNT) e sua relação com a cobertura da Estratégia Saúde da Família (ESF). **Método:** estudo descritivo, exploratório e de abordagem quantitativa, realizado em São Carlos-SP, no período de 2016 a 2018. As informações foram coletadas no sistema e-SUS e nas fichas de Autorizações de Internação Hospitalar. Os dados foram analisados por meio da estatística descritiva. A pesquisa foi aprovada pelo Comitê de Ética em Pesquisa da Universidade Federal de São Carlos. **Resultados:** destaca-se que as taxas de internação por angina, insuficiência cardíaca, diabetes e hipertensão diminuíram, sobretudo entre 2017 e 2018, quando houve ampliação da cobertura de ESF. **Conclusão:** a expansão da ESF foi determinante para reduzir as internações por DCNT; contudo, faz-se necessário ampliar os serviços prestados aos usuários, e reavaliar as estratégias de cuidado, especialmente aquelas direcionadas aos idosos e indivíduos acometidos por doenças cerebrovasculares e pulmonares.
Descritores: Atenção Primária à Saúde; Estratégia Saúde da Família; Doenças não Transmissíveis; Prevenção Primária.

RESUMEN
Objetivo: analizar el perfil de las hospitalizaciones por Enfermedades Crónicas no Transmisibles (ENT) y su relación con la cobertura de la Estrategia de Salud de la Familia (ESF). **Método:** este estudio exploratorio, cuantitativo y descriptivo se realizó de 2016 a 2018 en 21 unidades de la ESF en São Carlos, Estado de São Paulo, Brazil. Se recopiló información del sistema e-SUS y de los formularios de Autorización de Hospitalización y se analizaron los datos mediante estadística descriptiva. El estudio fue aprobado por el comité de ética en investigación de la Universidad Federal de São Carlos. **Resultados:** se encontró que las tasas de hospitalización por angina, insuficiencia cardíaca, diabetes e hipertensión disminuyeron entre 2017 y 2018, cuando se expandió la cobertura de la ESF. **Conclusión:** la expansión de la ESF fue crucial para reducir los ingresos por ENT. Sin embargo, es necesario ampliar los servicios que se brindan a los usuarios y reevaluar e intensificar las estrategias de atención, especialmente las dirigidas a las personas mayores y a las personas que padecen enfermedades cerebrovasculares y pulmonares.
Descriptores: Atenación Primaria de Salud; Estrategia de Salud Familiar; Enfermedades no Transmisibles; Prevención Primaria.

INTRODUCTION

Chronic Non-Communicable Diseases (NCDs), characterized by being multifactorial and long-lasting, are responsible for 41 million annual deaths worldwide, having an impact mainly in developing countries. Among these diseases, the group consisting of Diabetes Mellitus (DM), Systemic Arterial Hypertension (SAH), cardiovascular diseases, neoplasms and lung diseases is responsible for more than 80% of deaths[1-3].

The Family Health Strategy (FHS), implemented in Brazil with a view to remodeling Primary Health Care (PHC), plays a fundamental role in reducing the incidence of NCDs. The FHS implements an assistance model oriented towards

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prevention and health promotion, with the participation of the community and guided by a multidisciplinary team[2,4].

This study is justified by recognizing the effectiveness and capacity of the FHS in reducing Hospitalizations due to Conditions Sensitive to Primary Care (HCSPCs), in addition to reinforcing the need for investments in PHC to overcome these challenges, even in the face of economic crises, since it constitutes one of the main support pillars of the Unified Health System (*Sistema Único de Saúde*, SUS). Thus, the objective was to evaluate the profile of hospital admissions for NCDs in São Carlos-SP and its relationship with the FHS coverage.

THEORETICAL FRAMEWORK

NCDs account for nearly 80% of the deaths recorded in the Americas. These diseases could be prevented by adopting healthy eating habits, practicing physical activities, reducing the intake of alcoholic beverages and quitting smoking. NCDs are due to demographic, nutritional and epidemiological transition processes, aggravated by factors inherent to the individual, such as gender, age and genetic characteristics[5,6].

Among the adult Brazilian population, the presence of at least one NCD is associated with a higher frequency of use of the health services and hospitalizations[7]. Early diagnosis and adequate treatment are essential to reduce the incidence of premature deaths due to complications from NCDs[5].

The actions implemented at the national level try to minimize the impacts of NCDs, especially the activities carried out by the FHS, which offers comprehensive and continuous care to the user, with emphasis on home monitoring and collective care, in addition to exams for early diagnosis and detection of possible complications[8-10].

The evolution of these health indicators, especially the reduction in morbidity and mortality due to different types of illnesses, has motivated studies since the implementation of the FHS. When compared to the classic health care model, the FHS achieves more satisfactory results and has the potential to reduce NCD morbidity and mortality among PHC users[11].

In the period from 2001 to 2016, there is evidence of a reduction in the rate of Hospitalizations due Conditions Sensitive to Primary Care (HCSPCs), characterized as a group of causes of hospitalizations and diagnoses, as established in the Tenth Review of the International Classification of Diseases (ICD-10), and listed in Ordinance No. 221/2008 of the Ministry of Health. This reduction, which reached 45%, was the result of expanding access to medications and of improvements in the monitoring and diagnosis of diseases, provided by the FHS[12,13].

The list of HCSPCs covers 74 classes of diseases, grouped into 18 categories, of which NCDs are a part f. The behavior of the HCSPC rates, especially in the areas covered by the FHS, represents an important indicator of the quality of care that is provided to users, which can foster future decisions by health managers for the need to reformulate strategies[13,14].

The inclusion of NCDs in the list of HCSPCs is related to the fact that these diseases represent a worrying public health problem, contributing to the increase in costs associated with their treatment both by individuals and by the public health system. These diseases have a significant participation in mortality rates. In Brazil, of the total deaths of individuals in the age group from 30 to 69 years old, 56% were caused by some NCD; in the city of São Paulo, more than 70% of all deaths are caused by these diseases[3,6,7,15].

Although research on the subject already exists, it is highlighted that the studies present data that attest to the importance of humanized care provided in PHC and the association between the expansion of FHS coverage and hospitalization rates for NCDs[16-20]. This study presents a time analysis, covering a period of three years, of the evolution of NCDs, aiming to relate these data to the FHS coverage; and, indirectly, to evaluate the contribution of the actions currently developed in the context of PHC to modify the morbidity profile.

METHOD

This is a descriptive, exploratory and observational study with a quantitative approach, using secondary data in time series from São Carlos, São Paulo, which has an estimated population of 238,958 inhabitants and FHS coverage for approximately 75,900 inhabitants[21]. In the health area, in 2018, the municipality's PHC was composed of 12 Basic Health Units (BHUs) and 21 FHS.

Data was collected in the e-SUS and in the Hospitalization Authorization forms at the Health Department, for the period from 2016 to 2018. For the categorization of the hospitalizations as HCSPCs, the List of Conditions Sensitive to Primary Care that appears in Ordinance No. 221/2008[13] was used. The variables collected from the HAs were the following: CID; age; neighborhood; street address and zip code.

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In this study, chronic conditions related to HCSPC rates were considered as the outcome variable. According to ICD-10, the NCDs considered to be conditions sensitive to outpatient care are the following: asthma, lung diseases, SAH, angina, heart failure (HF), cerebrovascular diseases, DM and epilepsy[12]. The following were selected for this study: SAH, DM, angina, lung diseases and cerebrovascular diseases.

Information was collected regarding the total number of hospitalizations due to NCDs in areas of the municipality where there were FHS units and also in those not covered by the Strategy. A survey of the frequency of hospitalizations was carried out according to each of the pre-established NCDs, in the three years, in order to verify whether the expansion of the FHS, in addition to influencing the change in total hospitalization rates, would also modify the occurrence profile of specific NCDs, determining their reduction.

Data was collected on the age group of patients hospitalized due to NCDs, in order to identify patterns that would justify the need to reformulate and/or intensify strategies aimed at certain population groups. Data were entered twice in an Excel spreadsheet, grouped according to ICD-10 and analyzed using descriptive statistics.

The research was approved by the Research Ethics Committee (REC) of the institution, under Certificate of Presentation for Ethical Appreciation (CAAE) number 02162018.5.0000.5504.

RESULTS AND DISCUSSION

In the period from 2016 to 2018, 4,025 admissions due to NCDs were recorded in São Carlos; 32.15% (1,294) occurred in 2016; 36.30% (1,461) in 2017; and, in 2018, 31.55% (1,270). It is verified that in the period from 2016 to 2017 there was a growth rate of 12.9% and, in 2018, a reduction of 13.07% in relation to the previous year.

This increase in the number of admissions due to NCDs does not necessarily attest that the population is becoming more frequently ill over the years, but can reflect the gradual expansion of the offer and access to health services, as well as the optimization of diagnostic procedures, especially in the preventive consultations. This assertion is corroborated by a survey that analyzed the evolution of the offer of health facilities and resources in the country in the last three decades, showing that there was a significant increase in the number of establishments, from 21,532 in 1981 to 129,544 in 2017[22].

The reduction in the number of hospitalizations observed in 2018 can be associated with the expansion of FHS coverage in the municipality, which, in December 2017, was 28.31%, serving an estimated population of 69,000 people; in 2018, there was an increase in FHS coverage, which increased to 30.84%, serving a population of 75,900 people[23]. Increasing FHS coverage benefits the most vulnerable population and contributes to making PHC more efficient and preventing users from being unnecessarily referred to other levels of health care.

Regarding the causes of hospitalizations due to NCDs, in 2016, those resulting from angina predominated, representing 25% (324) of the cases, and HF, which concentrated 25% (324) of the cases. In addition, 10.4% (134) of the hospitalizations occurred as a result of DM and 2.7% (35) due to SAH (Figure 1).

Diseases of the Circulatory System (DCS) have been leading the cause of death statistics for decades in the world[24-25]. In Brazil, in 2011, these diseases represented the main causes of death, corresponding to 28.6%[25]. The multiplicity of associated risk factors can be determinant in the predominance of hospitalizations for diseases associated with the cardiovascular system, as it increases the demand for monitoring and continuous care, making it difficult for patients to adhere to the treatments.

The pattern observed in 2016 was maintained in 2017, the year in which the records of hospitalizations due to NCDs were mostly due to angina (401 cases, 27.45% of the hospitalizations) and HF (345 cases, 23.61% of the hospitalizations). Among the lowest hospitalization rates, the rates caused by DM with 142 (9.27%) and SAH with 32 (2.19%) hospitalizations remained; these rates were even lower in 2018, when 72 (5.7%) hospitalizations were recorded for DM and only 16 (1.3%) for SAH. These data can be seen in Figure 1.

The frequency of hospitalizations for DM and SAH is due to the efforts that have been made especially since 2001 with the introduction of the Reorganization Plan for the Assistance to SAH and DM in PHC. This Plan aims to ensure and facilitate the access of individuals affected by these pathologies to health services, which must invest in prevention and early diagnosis[26]. In addition, it should be considered that part of these hospitalizations does not necessarily have SAH or DM as the primary cause, but results from their complications such as stroke, acute myocardial infarction (AMI), chronic kidney disease, circulatory and renal problems, and ophthalmological conditions.

A study on the factors associated with the search for emergency care and hospitalization for patients with SAH and DM showed that 20.7% (113 patients) of the emergency consultations and 6% (33 patients) of the hospital

admissions were due to some complication of these diseases[27]. It is noteworthy that individuals with SAH have complications more frequently, especially AMI and stroke, when compared to diabetic individuals[28].

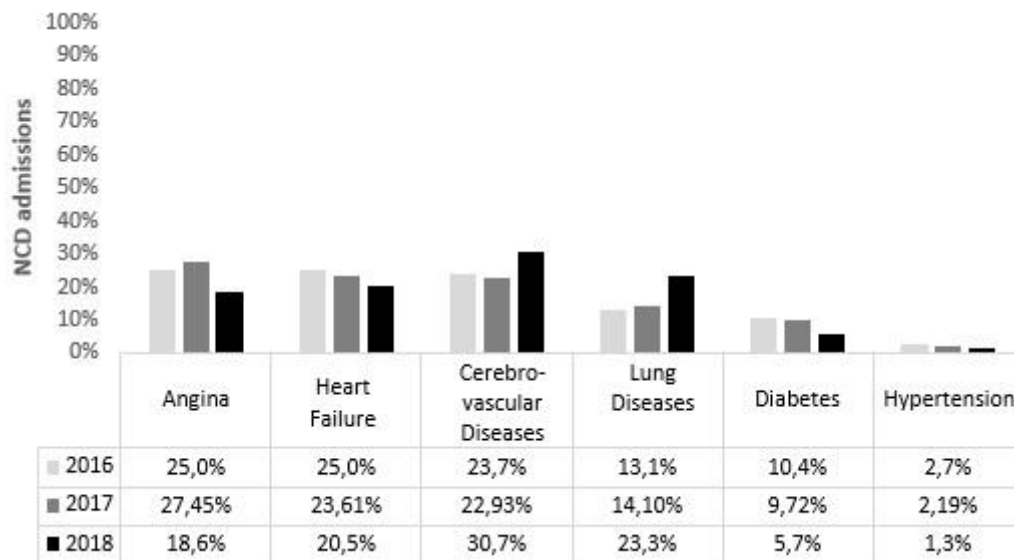|	Angina	Heart Failure	Cerebro-vascular Diseases	Lung Diseases	Diabetes	Hypertension
2016	25,0%	25,0%	23,7%	13,1%	10,4%	2,7%
2017	27,45%	23,61%	22,93%	14,10%	9,72%	2,19%
2018	18,6%	20,5%	30,7%	23,3%	5,7%	1,3%

FIGURE 1: Profile of the hospitalizations due to NCDs in the 2016-2018 period in the city of São Carlos, São Paulo, Brazil, 2019.

In view of this scenario, the actions directed to health education developed in PHC and the increase in the FHS coverage are fundamental for the reduction of the hospitalization rates for DM and SAH, observed in different Brazilian regions, as evidenced by studies carried out in Goiás, Paraná, Minas Gerais, Pernambuco and Espírito Santo[14,16–20].

In 2018, 30.7% (390) of the hospitalizations for NCDs in São Carlos were due to cerebrovascular diseases. A study on trends in cerebrovascular disease in Brazil from 1990 to 2015 found an increase in the number of cases and deaths[29]. In relation to mortality from these diseases, there has been a reduction in deaths among the older adults in recent decades in most Brazilian regions[30]. The reduction in mortality can be related to changes in lifestyles and to the control of risk factors for cerebrovascular diseases such as smoking, dyslipidemia, high blood pressure, inadequate diet, diabetes and physical inactivity[31,32]. The expanded access to health services, esp xpansion of PHC and improvements in the socioeconomic conditions of the population, contribute to clarify this reduction in mortality due to cerebrovascular diseases in the population[33, 34].

However, even in the face of reduced mortality in more developed regions, cerebrovascular diseases are still the main cause of death in the country[33]. Thus, actions for the prevention and control of risk factors for the morbidity and mortality due to these diseases, as well as the early identification of signs and symptoms should remain a public health priority[34].

PHC should strengthen the development of actions aimed at minimizing the influence of modifiable risk factors such as overweight, obesity, physical inactivity and smoking. A study that analyzed risk factors and complications in diabetic and hypertensive people showed that overweight and obesity together constitute one of the most prevalent risk factors among these individuals, especially those who present SAH alone or in association with DM; in addition, 44.01% of the participants were sedentary[28].

Sedentary lifestyle represents one of the main causes of excess weight, resulting in metabolic changes that increase the risk of developing NCDs, it is reasonable to infer that activities aimed at encouraging physical exercise among PHC users are of fundamental importance in the context of the FHS.

In this study, the increase in the hospitalization rates due to lung diseases stands out, responsible for 23.3% (296) in 2018 (Figure 1). According to the Pan American Health Organization, lung diseases are included among the top ten causes of death in the world, especially Chronic Obstructive Pulmonary Disease (COPD), lower airway infections and lung, trachea and bronchial cancers, which were responsible for 54% of the 56.9 million deaths that occurred in the world in 2016[35].

Deaths from respiratory diseases can be associated with factors such as smoking and passive exposure to cigarette smoke. The survey by the Surveillance of Risk and Protection Factors for Chronic Diseases by Telephone Survey (*Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por Inquérito Telefônico*, VIGITEL), in 2018, showed that 12.5% of the adult population in São Paulo are smokers, in addition to 6.8% and 6.7 % identified as passive smokers at home and at work, respectively[36]. Smokers with tobacco related NCDs should be assisted at all care levels, especially with regard to strategies aimed at behavioral changes[37,38].

Another aspect that contributes to the increase in the rates of acute and chronic respiratory diseases refers to exposure to high levels of air pollution, which exceed the maximum limit recommended by the air quality guidelines of the World Health Organization (WHO) in several countries, including Brazil[5].

The number of HCSPCs related to bacterial pneumonias was reduced by 4% in children under one year old, such reduction can be partly associated with the preventive strategies developed in PHC[39].

The worsening of air quality results from innumerable processes that involve the action of man, such as fires and the burning of fuels in industries and automobiles, mainly affecting the health of children, older adults and individuals who have a history of respiratory diseases. Children comprise the most vulnerable population, with 93% exposed to harmful levels of air pollution. In Brazil, unlike what occurs in other countries, air pollution is not treated as a risk factor for NCDs, despite the evidence that proves its negative implications for quality of life and the consequent increase in expenses related to medical consultations, hospitalizations and medication use among all age groups[40].

It is noteworthy that, in this study, the age group defined by the Child and Adolescent Statute (*Estatuto da Criança e do Adolescente*, ECA), Law 8,069 of 1990, was contemplated, which considers a child as someone under 12 years old and defines adolescence as the age group between 12 and 18 years of age; and the Older Adult Statute, which considers an older adult to be 60 years of age or older. For the comparison criteria between the life cycle phases, the young adult (19 to 24 years old), adult (25 to 40 years old) and middle-aged adult (40 to 60 years old) division was also adopted[40].

With regard to the hospitalizations by age group, it is verified that they are concentrated in the age group of people over 60 years old. In 2016, 60.74% (786) of the hospitalizations due to some NCD were older adults; however, there was a reduction in the hospitalization rates in subsequent years, with 851 (58.24% of the total) of older adult hospitalizations recorded in 2017 and 730 (57.48% of the total) in 2018 (Table 1). This result is consistent with data from a survey that analyzed the trends of NCDs in Brazil from 2002 to 2012, in which higher rates of hospitalization were observed among the older age groups[41].

HF hospitalizations concentrated people over 60 years old, 76.5% (248) in 2016, 75.1% (259) in 2017 and 78.8% (205) in 2018; of the hospitalizations due to angina, 58.3% (189) were recorded among older adults in 2016, while in 2017 and 2018 the proportions were 57.9% (232) and 60.6% (143), respectively; in relation to cerebrovascular diseases, 69.4% of the hospitalizations occurred in the age group above 60 years old, a proportion that reached 68.1% (228) in 2017 and 70.3% (274) in 2018 (Table 1). These findings, in addition to reflecting the greater vulnerability and susceptibility to certain health conditions, characteristics of this age group, show that the scarcity of financial resources, loss of memory and loneliness, can have a negative impact on the quality of the eating habits and the intake of medications.

The highest percentage of hospitalizations due to lung diseases among children from 0 to 11 years of age stands out, followed by the population aged over 60 years old, a pattern that differs from the profile of the other NCDs evaluated, as shown in Table 1.

Asthma is considered a lung disease with a high incidence in children, affecting 235 million people worldwide[42]. Also, the participation of other lung diseases of global impact is considered, such as pneumonia, one of the main causes of death in children under five years old; COPD, responsible for 3 million deaths annually; in addition to tuberculosis and lung cancer, which cause respectively 1.4 million and 1.6 million deaths each year[42].

Analysis of the HCSPCs in Santa Catarina identified that lung diseases correspond to the third cause of hospitalization, responsible for 16.9% of the hospitalizations among children up to 5 years old. These results do not necessarily attest to the inability to solve the health problems of the population in PHC, but indicate gaps in operationalization that, if corrected, will contribute to reduce hospitalization rates for preventable causes[42]. The gaps can have several origins, from the scarcity of trained personnel to the lack of basic items to carry out consultations, of medications and of essential devices for diagnosis, shortages resulting from the constant cuts in the funds destined to the SUS.

Therefore, the growth in coverage and access to PHC does not necessarily imply an improvement in the quality of the services provided to the population, with the need for investments in hiring and qualifying professionals, purchasing equipment and maintaining units.

TABLE 1: Profile of the hospitalizations due to NCDs according to age group in the 2016-2018 period in the city of São Carlos, São Paulo, Brazil, 2019.

CAUSE		2016		2017		2018	
		n	%	n	%	n	%
Hypertension	19-24 years old	1	2.8	1	3.1	1	6.25
	25-40 years old	4	11.4	1	12.5	2	12.5
	41-50 years old	3	8.5	4	3.1	2	12.5
	51-60 years old	5	14.3	1	3.1	1	6.25
	>60 years old	22	63.0	1	78.2	10	62.5
	Total	35	100	25	100	16	100
Diabetes	0-11 years old	6	4.5	5	3.5	3	4.2
	12-18 years old	12	8.9	12	8.4	4	5.6
	19-24 years old	3	2.2	7	5.0	4	5.6
	25-40 years old	17	12.7	12	8.4	8	11.0
	41-50 years old	12	8.9	7	5.0	11	15.3
	51-60 years old	27	20.2	35	24.6	15	20.8
	>60 years old	57	42.6	64	45.1	27	37.5
	Total	134	100	142	100	72	100
Angina	19-24 years old	1	0.3	0	0.0	0	0.0
	25-40 years old	6	1.9	10	2.5	4	1.7
	41-50 years old	34	10.5	29	7.2	22	9.3
	51-60 years old	94	29.0	130	32.4	67	28.4
	>60 years old	189	58.3	232	57.9	143	60.6
	Total	324	100	401	100	236	100
Heart failure	0-11 years old	1	0.3	5	1.4	5	1.9
	12-18 years old	0	0.0	0	0.0	1	0.4
	19-24 years old	0	0.0	0	0.0	2	0.8
	25-40 years old	6	1.9	5	1.4	4	1.5
	41-50 years old	16	5.0	23	6.7	8	3.1
	51-60 years old	53	16.3	53	15.4	35	13.5
	>60 years old	248	76.5	259	75.1	205	78.8
	Total	324	100	345	100	260	100
Cerebrovascular diseases	0-11 years old	1	0.32	0	0.0	1	0.26
	12-18 years old	0	0.0	1	0.3	0	0.0
	19-24 years old	0	0.0	4	1.2	12	3.1
	25-40 years old	11	3.6	19	5.7	12	3.1
	41-50 years old	23	7.5	35	10.4	36	9.2
	51-60 years old	59	19.2	48	14.3	55	14.1
	>60 years old	213	69.4	228	68.1	274	70.3
	Total	307	100	335	100	390	100
Pulmonary diseases	0-11 years old	90	53.0	146	70.9	196	66.2
	12-18 years old	0	0.0	0	0.0	1	0.3
	19-24 years old	0	0.0	1	0.5	0	0
	25-40 years old	2	1.2	1	0.5	4	1.4
	41-50 years old	6	3.5	4	1.94	6	2.0
	51-60 years old	15	8.8	11	5.3	18	6.1
	>60 years old	57	33.5	43	20.9	71	24.0
	Total	170	100	206	100	296	100

NCD admissions were higher among users living in areas of the city that did not have FHS. In 2016, 16.3% (211) of the admissions due to NCDs were users coming from areas with FHS coverage; and 83.7% (1,083) of the admissions were from people living in areas not covered by the FHS. In 2017, the percentage of admissions due to NCDs in the area covered by the FHS increased to 20.6% (301); while 79.4% (1,160) of the admissions were from people living in areas without coverage. In 2018, there was a reduction in the number admissions due to NCDs of people living in the coverage area in relation to the previous year; 18.7% (238) of the admissions were recorded

among individuals residing in the coverage area while, in the areas without coverage, the percentage was 81.3% (1,032), as shown in Figure 2.
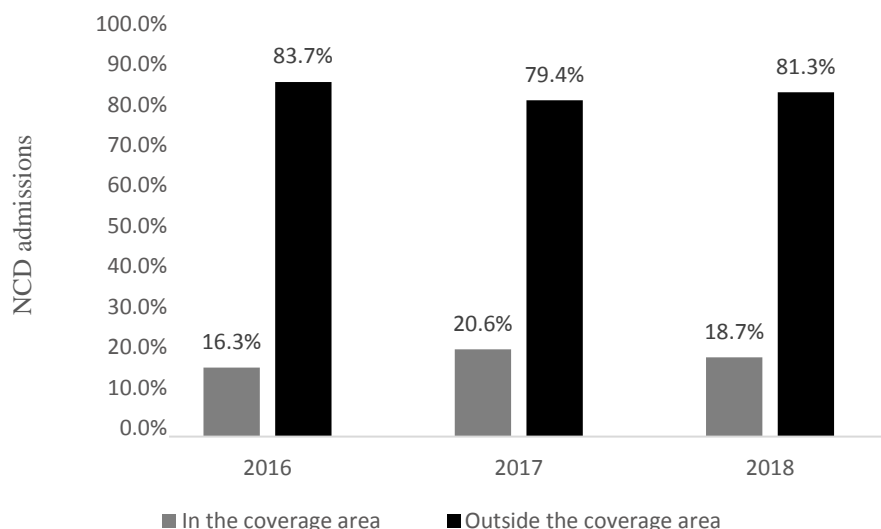

FIGURE 2: Percentage of admissions due to NCDs from 2016 to 2018 in areas covered and not covered by the FHS in the city of São Carlos, São Paulo, 2019.

The investment in strategic actions, such as the expansion of FHS coverage, in addition to causing a reduction in the hospitalization rates due to NCDs, and ensuring the availability of hospital beds for the most serious cases, reduces public health expenses, allowing for the re-management of resources within the system itself[44].

The FHS is the main services that promote user participation in the public health system through prevention and health promotion actions, in addition to promoting adherence to treatments; it reduces travel costs to specialized health centers and can be an important strategy for modifying general and infant mortality indicators. The need considered to expand the FHS taking into account not only the health needs, but also socioeconomic factors of the populations.

Despite the relevance of the findings, this study was limited by the lack of filling in some fields of the HA form.

CONCLUSION

There was a reduction in the hospitalization rates due to angina, HF, DM and SAH, more pronounced in the period from 2017 to 2018, when there was an expansion of the FHS coverage in São Carlos, which mainly benefits the most vulnerable population.

The studied HCSPCs were mostly concentrated in the age group above 60 years old, showing greater vulnerability of the older adult population, and can also be considered a reflection of the long period of living with NCDs and associated comorbidities. However, the age group from 0 to 11 concentrated the highest percentage of hospitalizations due to pulmonary diseases.

Considering that the percentage of hospitalizations resulting from the NCDs evaluated was considerably higher among users in areas not covered by the FHS, it is concluded that investments in PHC, especially in order to guarantee the access of a greater number of people to the FHS and avoid complications, are decisive for the reduction in the rates of these hospitalizations.

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