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Research Article

Effectiveness evaluation of Program "More Physicians" through tracer conditions in Pernambuco, 2011 to 2016

Avaliação da efetividade do Programa Mais Médicos por meio de condições traçadoras em Pernambuco, 2011 a 2016

Evaluación de la efectividad del programa más médicos usando condiciones sensibles en Pernambuco, 2011 a 2016

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Abstract

Introduction: The More Physicians Program was created with the purpose of providing professionals to the most vulnerable regions, considering that physicians in Primary Care acts on demands such as health promotion and surveillance, prevention, diagnosis and treatment of diseases. **Objective:** This study evaluated the effectiveness of the More Physicians Program in Pernambuco using hospitalization and death by arterial hypertension (AH) and Diabetes Mellitus (DM) as tracer conditions. **Methods:** Cross-sectional study carried out before and after the Program from 2011 to 2013 and from 2014 to 2016. Data were obtained from the Hospital Information System of the Unified Health System (SIH/SUS), at the Department of Informatics of SUS (DATASUS), considering the state as a whole and its regions. **Results:** The number of hospitalizations was reduced in the state, 27% for AH and 26% for DM. There was a 58% decrease in admissions due to AH in the *Sertão*, being greater if due to urgency. Deaths from AH declined in almost all regions, with a drop of 41% in Pernambuco; except for Recife's Metropolitan Region, where the percentage actually increased. As for DM, hospital admissions decreased compared to AH, with an increase in admissions due to urgencies in *Zona da Mata and Sertão do San Francisco.* Deaths from DM showed a downward trend in all regions, totaling 42% in the State. **Conclusion:** The Program was proven effective in reducing hospital admissions and deaths from AH and DM in Pernambuco, featuring as an important strategy to strengthen Primary Health Care, especially to reduce complications in sensitive conditions. The need for medical professional to expand care is highlighted, mainly in more vulnerable regions where there is a lack of physicians.

Keywords: Effectiveness; Health Consortia; Primary Health Care; Diabetes Mellitus; Hypertension.

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Resumo

Introdução: O Programa Mais Médicos (PMM) foi criado com a finalidade de prover médicos para as regiões mais necessitadas, considerando-se que a presença do médico na Atenção Básica atua em demandas como promoção e vigilância da saúde, prevenção, diagnóstico e tratamento de doenças. **Objetivo:** Objetivou-se avaliar a efetividade do PMM em Pernambuco utilizando internamentos e óbitos por hipertensão arterial (HA) e diabete *mellitus* (DM) como condições traçadoras. **Métodos:** Estudo de corte transversal, do tipo antes e depois, nos períodos 2011–2013 e 2014–2016. Os dados foram obtidos do Sistema de Informação Hospitalar do Sistema Único de Saúde (SIH/SUS) do Departamento de Informática do SUS (DATASUS), considerando o estado e suas mesorregiões. **Resultados:** Foi observada redução do número de internamentos no estado, 27% por HA e 26% por DM. Por HA, houve queda nos internamentos de 58% no Sertão, maior se por urgência. Os óbitos por HA diminuíram em quase todas as mesorregiões, e no estado houve queda de 41%; exceção para a Região Metropolitana do Recife, que aumentou o percentual. Por DM, a redução dos internamentos foi menor se comparada à daqueles por HA, e houve aumento dos internamentos por urgência na Zona da Mata e no Sertão do São Francisco. Os óbitos por DM reduziram em todas as mesorregiões, totalizando 42% no estado. **Conclusões:** O PMM mostrou-se efetivo na redução de internamentos e óbitos por HA e DM em Pernambuco, caracterizando-se como importante programa para o fortalecimento da Atenção Básica, especialmente para a redução de complicações de condições sensíveis. Destaca-se a necessidade do profissional médico para a ampliação da assistência, principalmente em regiões carentes e desprovidas de médicos.

Palavras-chave: Efetividade; Consórcios de Saúde; Atenção Primária à Saúde; Diabetes *Mellitus*; Hipertensão.

Resumen

Introducción: El Programa Más Médicos se creó con el propósito de brindar médicos a las regiones más necesitadas, considerando que la presencia del médico en Atención Primaria actúa sobre demandas como la promoción y vigilancia de la salud, la prevención, el diagnóstico y el tratamiento de enfermedades. **Objetivo:** El objetivo fue evaluar la efectividad del Programa Más Médicos (PMM) en el estado de Pernambuco, utilizando las hospitalizaciones y las muertes por Hipertensión (HA) y Diabetes Mellitus (DM) como condiciones de rastreo. **Métodos:** Estudio transversal, del tipo antes y después, en los períodos 2011–2013 y 2014–2016. Los datos se obtuvieron del Sistema de Información Hospitalaria del Sistema Único de Salud (SIH/SUS) del Departamento de Informática del SUS (DATASUS). **Resultados:** Hubo una reducción en el número de hospitalizaciones en el estado, 27% por HA y 26% por DM. Debido a la HA, hubo una caída de las hospitalizaciones en 58% en el *Sertão*, mayor si es por urgencia. Las muertes por HA disminuyeron en casi todas las mesorregiones, en el Estado hubo una disminución del 41%; excepción para la Región Metropolitana de Recife, que aumentó en porcentaje. Debido a la DM, la reducción de las hospitalizaciones fue menor en comparación con la HA, y hubo un aumento de las hospitalizaciones por urgencia en Zona da Mata y *Sertão* do S. Francisco. Las muertes por DM disminuyeron en todas las mesorregiones, totalizando un 42% en el estado. **Conclusiones:** El PMM demostró ser efectivo en la reducción de hospitalizaciones y muertes por HA y DM en Pernambuco, caracterizando un importante programa de fortalecimiento de la Atención Primaria, en particular para reducir las complicaciones de condiciones sensibles, y resaltando la importancia de los médicos para que haya expansión de la asistencia, principalmente en regiones necesitadas.

Palabras clave: Efectividad; Consorcios de Salud; Atención Primaria de Salud, Diabetes Mellitus; Hipertensión.

INTRODUCTION

The scarcity and poor distribution of medical professionals, especially in the more vulnerable regions of the world, translates into unequal access to health services, one of the biggest social justice problems nowadays due to resistance to promote actions to face it.[1]

In Brazil, the lack of physicians in Primary Care, especially in the poorest regions, has always generated criticism of the Unified Health System (SUS), as it leads to a lack of assistance to the population and the need for referral to specialized care, which violates the principle of integrality of SUS.[2] As debates on the topic, requests from the National Front of Mayors and popular manifestations increased, in 2013 the Program “More Physicians” (*Programa Mais Médicos*, PMM) was instituted.[3,4]

The PMM’s aim was to recruit and send physicians to the most vulnerable regions, as well as to expand investments in the structure of basic health units (BHUs), open more vacancies in undergraduate and graduate courses of Medicine, with special attention to priority specialties in SUS[5], as a means of strengthening Primary Care.[6]

The program brought more than 18 thousand doctors to Primary Care, distributed in about 4 thousand municipalities and 34 Special Indigenous Health Districts by 2016, assisting more than 63 million

people.[3,6] The Ministry of Health made a temporary call for physicians trained in Brazilian institutions or with revalidated diplomas, graduated in other countries and cooperative members; the latter filled approximately 71% of the vacancies.[4]

Law 12,871/13, which established the PMM, prioritized municipalities or areas with a high percentage of the population in extreme poverty, with a low human development index (HDI), located in the semiarid and Amazon regions, and with indigenous and quilombola populations.[7] Physicians were allocated in the Northeast (33.4%), Southeast (30%), South (16.6%), North (13.1%) and Midwest (6.4%) regions.[4]

The gains obtained by the PMM, according to the literature, were the expansion of national care coverage, and a positive response from the population regarding the quality of care offered by the cooperating physicians.[8] The care also became comprehensive, with better reception and bonding between users and professionals, availability of professionals to solve problems and greater integration between different areas of health.[3,6]

Physicians in Primary Care fulfill different demands such as health promotion and surveillance, disease prevention, diagnosis and treatment.[5] Within this proposal, SUS can also act in this moment of epidemiological transition, where we see an increase in chronic non-communicable diseases (NCDs).[9]

In order to analyze the effectiveness of PMM, the Brazilian List of Hospital Admission for Ambulatory Care Sensitive Conditions (ACSC) can be used as an indirect indicator of health care. The diseases included in the list are characterized by the need for effective local prior surveillance to avoid hospitalization.[10] High rates of ACSC in a population may indicate problems in the access to health care, in the service performance, in the coverage of services, and/or a low resolution at Primary Care.[11]

Arterial hypertension (AH) and diabetes mellitus (DM) are very easily detected in Primary Care, and are used here as tracer conditions due to their high prevalence, well-defined diagnosis, well-known treatment standards, and because medical intervention at the primary care level influences the course of the disease.

This research aimed to evaluate the effectiveness of the PMM in reducing hospital admissions and deaths from complications of these diseases in Pernambuco.

METHODS

This was a cross-sectional study, with an analytical component in two moments: before and after the implementation of the PMM, with 2011–2013 and 2014–2016 as reference periods, respectively. The research is anchored in a project funded by the Pan American Health Organization/Institute for Integral Medicine “Professor Fernando Figueira” (PAHO/IMIP), Letter of Agreement PAHO-SCON2016-05070, entitled “Effectiveness of providing medical professionals in the health conditions of the population”, approved by the IMIP Health Ethics Committee, under Certificate of Presentation for Ethical Assessment (CAAE) no. 69849517.3.0000.5201 and opinion no. 2,179,854.

The study took place in Pernambuco (PE) from August 2018 to July 2019. The state is located in the Northeast Region of Brazil, and its HDI in 2010 was 0.673, according to the Brazilian Institute of Geography and Statistics (IBGE), which places it in 19th place among the 27 Brazilian states. Its population was estimated in 9,473,266 inhabitants in 2017, also according to IBGE.[12] The state is divided into five geopolitical mesoregions: Recife Metropolitan Region (RMR, with 15 municipalities), Zona da Mata Pernambucana (43 municipalities), Agreste Pernambucano (71 municipalities), Sertão Pernambucano (41 municipalities) and São Francisco Pernambucano (15 municipalities).[12] Sertão and Agreste concentrate municipalities with low HDI, manly the ones that make up the northeastern semi-arid region.[1,12,13]

Aggregate data were obtained from the website of the Department of Informatics of the Unified Health System (DATASUS) at the Hospital Information System (SIH/SUS), freely accessible and made available by the System.[14] The material was composed of registries of hospital admissions of people with aged 20 years and older, defined by the SIS/SUS, in public and private hospitals affiliated to SUS during 2011-2016, due to complications of AH and DM (International Classification of Diseases – ICD I10; I11; E10; E11; E12; E13; E14), excluding DM in pregnancy, childbirth or postpartum period (ICD O24).

Variables used were origin according to mesoregion, sex, main diagnosis and death. The database was built in a Microsoft Excel® spreadsheet and was applied to the EpiInfoTM 7® program, in which the descriptive analysis was performed and the results were compared using the Mantel-Haenszel χ^2 test, with a significance level of 5%. Participation of patients or the community was not included in the planning, conduction or dissemination of this study.

RESULTS

Of the total of 2,364,409 admission in PE from 2011 to 2016, 54,950 were for AH and DM with the selected ICD, 22,474 patients were men and 32,476 were women aged 20 years or older (Table 1).

Table 1. Distribution of hospital admissions due to complications of arterial hypertension and diabetes mellitus by sex, in the trienniums before (2011-2013) and after (2014-2016) the implementation of the "More Physicians" Program. Pernambuco, 2011–2016.

Clinical conditions	2011–2013		2014–2016		Total	
	M	F	M	F	M	F
Arterial hypertension	4,205	7,021	3,303	5.083	7.508	12.104
Total (AH)	11,226		8,386		19,612	
Diabetes mellitus	8,255	11,780	6,711	8.592	14.966	20.372
Total (DM)	20,035		15,303		35,338	
Total	31,261		23,689		54,950	

AH: arterial hypertension; DM: diabetes mellitus.

These admissions were divided into three-year periods, before PMM (2011–2013) and during PMM (2014–2016): 31,261 admissions in the first three-year period and 23,689 in the second period for HA and DM (Table 1).

In the triennium when the program took place, there was a reduction of hospitalizations in Pernambuco by 27% for HA. For DM, the reduction was of 26% between the periods compared, as shown in Table 2.

In the analysis of mesoregions (Table 2), the second triennium showed a 7% increase in hospitalizations due to AH and a 33% decrease in hospitalizations due to DM in the RMR.

In Zona da Mata, hospitalizations for HA were reduced by 30% and for DM by 8% in the triennium of the PMM (Table 2).

In Agreste, hospitalizations for AH decreased by 29% in the second triennium and by 21% for DM. In Sertão, hospitalizations for AH dropped 58%, and for DM, 11% (Table 2).

In Sertão do São Francisco, there was a 35% decrease in hospitalizations for AH, while for DM the reduction was of 3% (Table 2).

Table 2. Total hospital admissions in Pernambuco, admissions due to arterial hypertension and diabetes mellitus, percentage in relation to the total before and after the implementation of "More Physicians" Program, and differences between timeframes according to regions and in Pernambuco. Recife, 2019.

		MRR	Zona da Mata	Agreste	Sertão	Sertão do São Francisco	Pernambuco
Total hospital admissions	2011–2013	677,465	115,687	174,696	129,535	66,429	1,163,812
	2014–2016	758,161	94,521	163,151	119,541	65,223	1,200,597
Admissions due to SAH	2011–2013	n=3,747	n=1,421	n=2,575	n=3,074	n=409	n=11,226
		% 0.55	% 1.23	% 1.47	% 2.37	% 0.62	% 0.96
	2014–2016	n=4,455	n=806	n=1,687	n=1,179	n=259	n=8,386
		% 0.59	% 0.85	% 1.03	% 0.99	% 0.40	% 0.70
	Comparison between timeframes	+7%	-30%	-29%	-58%	-35%	-27%
Admissions due to DM	2011–2013	n=6,316	n=4,182	n=4,952	n=3,700	n=885	n=20,035
		% 0.93	% 3.61	% 2.83	% 2.86	% 1.33	% 1.72
	2014–2016	n=4,733	n=3,111	n=3,610	n=3,015	n=834	n=15,303
		% 0.62	% 3.29	% 2.21	% 2.52	% 1.28	% 1.27
	Comparison between timeframes	-33%	-8%	-21%	-11%	-3%	-26%

MRR: Metropolitan Region of Recife; SAH: systemic arterial hypertension; DM: diabetes mellitus.

There were 48,153 emergency admissions in the study period, of which 16,641 were due to AH and 31,512 due to DM. In the first three-year period, there were 26,925, of which 9,316 were due to HA and 17,609 due to DM. In the second period, 21,228 urgency hospitalizations took place, of which 7,325 were due to HA and 13,903 were due to DM. In Pernambuco, there was a 25% reduction in admission due to AH-related emergencies and 24% in DM-related emergencies in the period of PMM.

Table 3 shows the results per mesoregions. In the RMR, there was an increase of 18% in AH emergencies and a reduction of 35% in DM emergencies. In Zona da Mata, emergencies for HA reduced by 32% and for DM, by 9%; in the Agreste, both conditions had a drop: 25% for AH and 22% for DM. In Sertão, the reduction recorded was of 59% for AH and 12% for DM. In Sertão do São Francisco, there was a 19% decline in AH emergencies and an increase of 15% in DM emergencies.

Analyzing hospitalizations by sex, after the implementation of the PMM, there was a reduction of 26% in AH among males and, when it came to emergencies, of 21%. For DM, the reduction among males was of 24% and; 22% for emergencies. Among females, there was a reduction in hospitalizations for both conditions — 27% for AH and 27.5% for DM. Also for women, the reduction of emergencies due to AH was of 27% and due to DM of 26% in the second triennium.

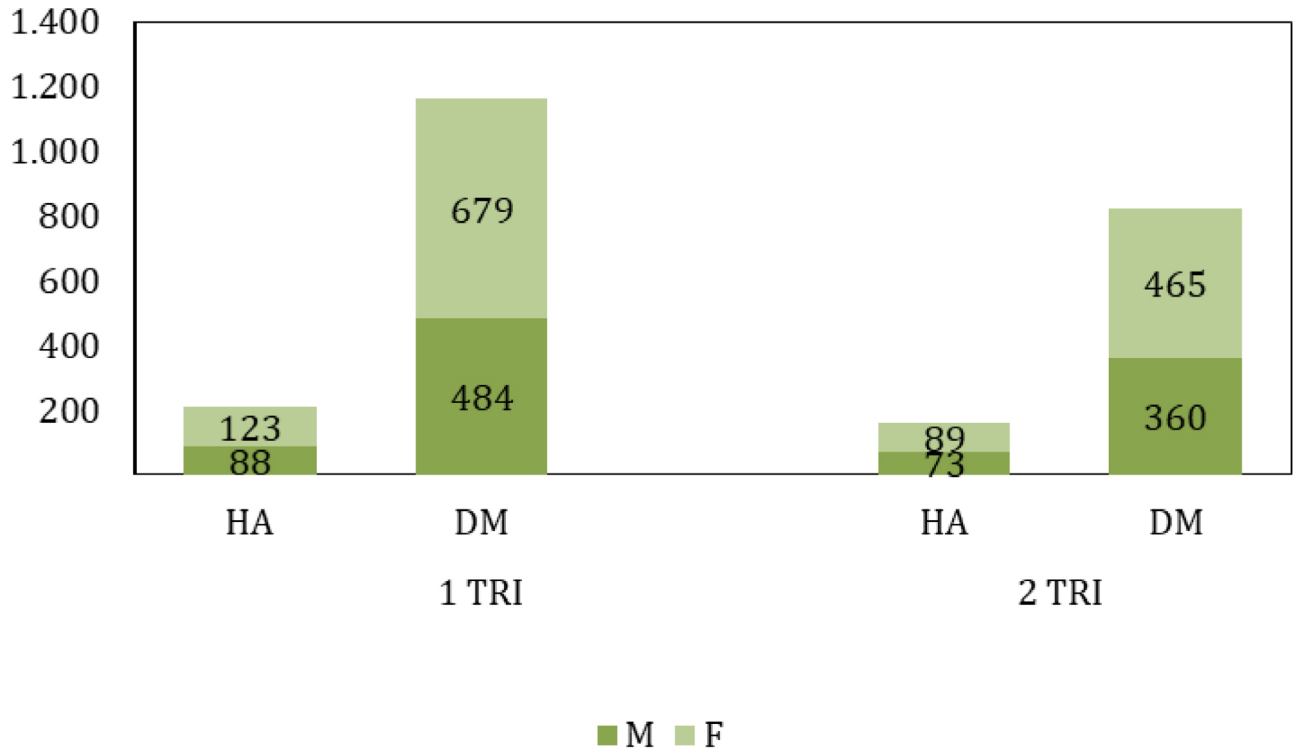
In the period studied, as seen in Graph 1, there were 2,377 deaths from the tracer conditions: 389 from AH and 1,988 from DM. In the first three years, 211 deaths from hypertension were registered (88 men and 123 women) and 1,163 from DM (484 men and 679 women). In the second period, there were 987 death occurrences, of which 162 were due to AH (73 men and 89 women) and 825 due to DM (360 men and 465 women).

In the state of Pernambuco, as one can see in Table 4, there was a 41% decrease in deaths from AH and a 42% decrease in deaths from DM in the second three-year period after the implementation of PMM.

Table 3. Total urgencies in Pernambuco, number of admissions due to arterial hypertension and diabetes mellitus, percentage in relation to the total before and after the implementation of “More Physicians” Program, and differences between timeframes according to regions and in Pernambuco. Recife, 2019.

		MRR	Zona da Mata	Agreste	Sertão	Sertão do São Francisco	Pernambuco
Total urgencies	2011–2013	462,064	87,117	138,235	109,560	53,042	850,018
	2014–2016	521,261	77,815	135,906	102,305	51,685	888,972
Urgencies due to SAH	2011–2013	n=2,755	n=1,213	n=2,092	n=2,925	n=331	n=9,316
		% 0.60	% 1.39	% 1.51	% 2.67	% 0.62	% 1.10
	2014–2016	n=3,702	n=732	n=1,539	n=1,096	n=256	n=7,325
		% 0.71	% 0.94	% 1.13	% 1.07	% 0.50	% 0.82
	Comparison between timeframes	+18%	-32%	-25%	-59%	-19%	-25%
Urgencies due to DM	2011–2013	n=5,286	n=3,669	n=4,399	n=3,517	n=738	n=17,609
		% 1.14	% 3.86	% 3.18	% 3.21	% 1.39	% 2.07
	2014–2016	n=3,832	n=3,000	n=3,372	n=2,871	n=828	n=13,903
		% 0.74	% 4.21	% 2.48	% 2.81	% 1.60	% 1.56
	Comparison between timeframes	-35%	+9%	-22%	-12%	+15%	-24%

MRR: Metropolitan Region of Recife; SAH: systemic arterial hypertension; DM: diabetes mellitus.



AH: arterial hypertension; DM: diabetes mellitus; TRI: triennium; M: male; F: female.

Source: DATASUS (02/07/19).

Graph 1. Distribution of deaths from complications of arterial hypertension and diabetes mellitus in the trienniums 2011-2013 and 2014-2016 among males and females.

Breaking down by region, the RMR registered an increase of 13% in deaths from AH, and a reduction of 42% in deaths from DM. For the other regions, the percentage decrease in the number of deaths from AH was greater than 40%, the highest of all in Sertão, with an 82% reduction (Table 4). The decrease in DM-related deaths was less accentuated, with the lowest percentage of reduction in Zona da Mata, 21%, and the highest in Agreste, 52% (Table 4).

Table 4. Total deaths in Pernambuco, number of admissions due to arterial hypertension and diabetes mellitus, percentage in relation to the total before and after the implementation of "More Physicians" Program, and differences between timeframes according to regions and in Pernambuco. Recife, 2019.

		MRR	Zona da Mata	Agreste	Sertão	Sertão do São Francisco	Pernambuco
Total deaths	2011–2013	38,440	2,512	7,182	2,391	2,390	52,915
	2014–2016	47,019	2,430	9,879	3,912	2,142	65,382
Deaths from SAH	2011–2013	n=58	n=27	n=95	n=45	n=2	n=227
		% 0.15	% 1.07	% 1.32	% 1.88	% 0.08	% 0.43
	2014–2016	n=78	n=11	n=59	n=13	n=1	n=162
		% 0.17	% 0.48	% 0.60	% 0.33	% 0.04	% 0.25
	Comparison between timeframes	+13%	-55%	-54%	-82%	-50%	-41%
Deaths from DM	2011–2013	n=450	n=200	n=330	n=128	n=55	n=1.163
		% 1.17	% 7.96	% 4.69	% 5.35	% 2.30	% 2.20
	2014–2016	n=313	n=142	n=221	n=115	n=34	n=825
		% 0.67	% 6.24	% 2.24	% 2.94	% 1.52	% 1.26
	Comparison between timeframes	-42%	-21%	-52%	-45%	-33%	-42%

MRR: Metropolitan Region of Recife; SAH: systemic arterial hypertension; DM: diabetes mellitus.

DISCUSSION

The present study sought to evaluate the effectiveness of PMM using HA and DM data, when hospitalization took place. The results showed a reduction in the absolute and percentage numbers of elective and emergency hospitalizations, as well as a decrease in deaths after the implementation of the program.

These findings can be explained by the greater ease of access to physicians in health services and by their professional training focused on Primary Care, especially in more remote regions with difficult access to are and greater socioeconomic vulnerability.[15,16] From this perspective, we highlight the Sertão and Agreste Pernambucano mesoregions, which make up the northeastern semi-arid region and, historically, have grouped together cities with low HDI and which hosted a large number of physicians.[1]

There was a significant decrease in emergency admissions in Pernambuco due to complications from AH and DM, possibly due to better control of blood pressure and glycemic levels, since in Primary Care it is possible to manage about 60–80% of these conditions.[17]

The probability of greater adherence to treatment is also highlighted, and it interacts with personal factors, the health system and the professionals involved with health promotion actions, the adoption of a

healthy lifestyle and the use of medication.[18,19] These actions are related to the training of a cooperating physician focused on availability and greater patient care at the primary level.[15,20]

Despite the chronic nature of the diseases studied, adequate management and, as described in another study, the construction of a bond between user and professionals may have favored the reduction of complications and deaths.[18] These measures involve factors such as communication skills, which are well documented in the training of PMM professionals,[15] and which are related to the perception of physicians in the program in studies conducted by PAHO. They reported the low level of education of users assisted in certain PE locations as a difficulty overcome by the dedication in knowing the population to provide continuity of care and obtain good results.[21]

Also noteworthy is the concentration of health care resources in the capital of the state and in specific centers, in which hospital complexes and universities are located, with a capital/inland physician ratio of 11.78 in 2018. Thus, Recife had 6.48 doctors per thousand inhabitants, while the other municipalities had 0.63 doctors/1,000 inhab.[22]

The establishment of PMM filled a gap in medical care in regions where the presence of physicians was non-existent or transitory. This resulted in an important reduction in hospitalizations and deaths from AH in the Sertão of Pernambuco, which has a large number of municipalities with a population in extreme poverty—priority areas for the implementation of the program.[21] The significant reduction of 82%, in deaths from AH in this mesoregion is the data that most draws attention in the present study.

As for DM, the greatest decrease in hospitalizations occurred in the RMR. This finding may be explained by the higher concentration of population and physicians, including the program, in areas with a population in extreme poverty on the outskirts of urban centers.[1]

Other factors reported by different authors may have contributed to the positive results of the study, such as the degree of satisfaction with the quality of the service of PMM users, especially due to understanding of guidelines, and also the reduction of travel for consultations, since some units in the neighborhoods did not have a medical professional before.[20,23] In addition, it is possible that there was an increase in the number of medical consultations, as well as an expansion of home visits, as found in a municipality in the sertão of Ceará.[24]

Inversely to most results found in the present study, there was an increase in hospitalizations for DM urgencies in Sertão do São Francisco and in Zona da Mata, as well as for AH in the RMR. This can be explained by the spontaneous search of the population to hub cities, such as Recife (RMR) and Petrolina (Sertão do São Francisco), because they have larger hospital complexes and specialized care—both scarce resources in the interior of the Northeast—and, in the latter, due to its closeness to cities in the states of Bahia and Piauí that are far from their capitals.[12] There is also the possibility of fluctuations in teams and supplies, with drug shortage periods in basic units, which generates discontinuity in the stabilization of a disease. As reported by patients, there may be also turnover in teams, with the exception of cooperating physicians.[20,21,25]

In view of the above, the present research brings important contributions to the public health scenario in Pernambuco by evaluating the effectiveness of PMM with the complications of AH and DM used as tracer conditions.

The program was proven effective in reducing hospitalizations and deaths, possibly due to its ability to solve problems with the presence of a physician in the team.[26,27] The most accentuated reduction of these variables occurred in regions historically lacking professionals, such as the outskirts of urban centers and the interior of the state. In this way, the need for the physician to expand care, including home care,

and the formation of bonds in communities, especially in locations where access to health is more difficult, is reinforced.

Some of the limitations of this study was the use of secondary data from SIH/SUS and available in DATASUS that were not yet closed, therefore subject to changes from 2015; and the presence of co-interventions in the study period, especially if implemented at the municipal level. Also, the possibility of migration of cases to regions with larger hospital complexes was not considered.

It is inferred that the PMM was an important program for SUS and for the strengthening of Primary Care. We emphasize the need for public policies that address the training and provision of these professionals to compose the care team focused on health promotion and prevention of complications of chronic diseases.

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CONFLICT OF INTEREST

Nothing to declare.

AUTHORS' CONTRIBUTION

ILAA: Conceptualization Data curation Formal Analysis Funding acquisition, Investigation Methodology Project administration Resources Software Supervision Validation Visualization Writing – original draft Writing – review & editing. GCC: Conceptualization Data curation Formal Analysis Funding acquisition, Investigation Methodology Project administration Resources Software Supervision Validation Visualization Writing – original draft Writing – review & editing. MJTS: Conceptualization Data curation Formal Analysis, Project administration, Supervision, Writing – review & editing. SAV: Conceptualization Data curation Formal Analysis Funding acquisition, Investigation Methodology, Software, Supervision, Writing – review & editing.

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