Structural aspects for Diabetes Mellitus in Basic Health Units in Brazilian capitals

Aspectos estruturais para a Diabetes Mellitus nas Unidades Básicas de Saúde em capitais brasileiras

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ABSTRACT The objective of this article is to analyze the structural conditions of health units and the guidelines, objectives/goals of municipal management related to the quality of those services in the capitals according to Brazilian regions, aimed at caring for persons suffering from Diabetes Mellitus. For that, a logical model and sub-dimensions/variables were developed to direct the search for data in the 3rd cycle of the Program for Improving Access and Quality of Primary Health Care. Descriptive analyzes of the capitals were performed by region of Brazil. For document analysis, we used the Health Plans of municipalities that presented a percentage of inadequacy greater than 50% for at least four dimensions among the seven analyzed in this study. The study revealed the need to adapt the structural conditions of Basic Health Units for most Brazilian capitals in some of the aspects analyzed, with worse results for physical structure and equipment. Based on the analysis of municipal health plans, particularities, strengths, and weaknesses were evidenced that deserve to be considered for defining the agenda and directing actions by health management. The identified conditions of inadequacy can have a negative impact on the quality of care for persons suffering from diabetes in Primary Health Care.

KEYWORDS Service structure. Health assessment. Primary Health Care. Health planning.

RESUMO *Objetivou-se, neste artigo, analisar as condições estruturais de unidades de saúde e as diretrizes, os objetivos e as metas da gestão municipal relacionados com a qualidade desses serviços nas capitais segundo regiões brasileiras, tendo em vista a atenção às pessoas com Diabetes Mellitus. Para tanto, foram elaborados um modelo lógico e subdimensões/variáveis para direcionar a busca de dados no banco do Programa de Melhoria de Acesso e Qualidade da Atenção Primária à Saúde, do 3º ciclo. Análises descritivas foram realizadas das capitais por região do Brasil. Para análise documental, utilizaram-se os planos de saúde daqueles municípios que apresentaram percentual de inadequação maior que 50% para, no mínimo, quatro dimensões entre as sete analisadas neste estudo. O estudo revelou necessidade de adequação das condições estruturais das Unidades Básicas de Saúde para a maioria das capitais brasileiras em alguns dos aspectos analisados, com piores resultados para estrutura física e equipamentos. A partir da análise dos planos municipais de saúde, evidenciaram-se particularidades, potencialidades e fragilidades que merecem ser consideradas para definição da agenda e direcionamento das ações pela gestão em saúde. As condições de inadequação apontadas podem trazer impactos negativos na qualidade da atenção às pessoas com diabetes na Atenção Primária à Saúde.*

PALAVRAS-CHAVE *Estrutura dos serviços. Avaliação em saúde. Atenção Primária à Saúde. Planejamento em saúde.*

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Introduction

Diabetes Mellitus (DM), as a public health problem, has an estimated prevalence of 9.2% on the Brazilian adult population[1]. It is considered a multifactorial chronic disease and is largely responsible for hospitalizations due to cardiovascular, cerebrovascular and renal complications[2]. The complications increase the health system expenses, as well as exert an impact on the years of life lost owing to disability and mortality. The management and prevention of diabetes and its complications, in Brazil, are mainly the responsibility of Primary Health Care (APS), which proposes to provide comprehensive, resolutive and high-quality care that impacts the population health[2,3].

APS, understood as a set of individual and collective actions and services aiming at the promotion, protection, recovery and rehabilitation of health, is characterized by the monitoring of different health-disease-care conditions, and should be the main integrating and communicating center in the Health Care Network (RAS)[4]. In this sense, diabetes, as a chronic disease, should find at its level of care the ideal scenario for longitudinal care[5].

In 2011, with the purpose of evaluating APS quality, the National Program for the Improvement of Access and Quality of Primary Care (PMAQ-AB)[6] was created, carrying in its proposal the adoption of evaluation as part of the action planning as to improve the quality of APS services[7]. So to know the scientific production on the rendering of health services in APS, a survey of studies was carried out in indexed databases, from which 17 articles were selected. Of these, ten contained a national approach[8-17], with emphasis to the Brazilian regional division, one brought a municipal focus[18] and six considered the state realities for analysis[19-24]. It is noteworthy that such productions were concentrated in the years 2018 and 2017. Most of the selected studies used data extracted from the PMAQ-AB 1st cycle, only one study compared two cycles[14], and the remaining applied data retrieved only from the 2nd cycle.

The studies assessed the following elements: infrastructure[8,10,13,16,19]; ambience[19]; accessibility[19]; utilization[23]; availability of supplies[9,10,15,24]; equipment[7-10,14,15,23,24]; medicines[8,10,14,15,23]; organizational factors[10,15]; number of professionals and composition of teams[10,13,15]; work process[10,11,15,18,24]; management and provision of care[13,15]; typology of the units in relation to the availability of equipment; size and social and economic conditions of the municipalities in relation to the availability of medicines in the units[14]; network articulation and assistance; and components of the work process[17].

Regarding tracer conditions, only one study involved the diabetes[14], although it is one of the main dependable conditions to primary care. The authors addressed service condition regarding structure as aspects that may reflect on the quality of care for persons suffering from diabetes[14]. However, the analysis of access, supply and use of health services needs to be added to evaluations on the quality of care offered.

Concerning the evaluation of health services, the structure is one of the components needed for the analysis of their performance, seeing that adequate structures favor the provision of timely and quality services[14]. In this sense, logical models, for being a visual scheme that shows how a program should be implemented and what results are expected, make up the first stage of planning an evaluation[25].

The results of the evaluations can (and should) be useful to guide actions to improve the quality of services and, therefore, need to be part of the agenda of management commitments. Thus, health plan is composed of the management set of guidelines, objectives and goals addressed to the development of the actions throughout the study period, making part of the grounds of activities and programming of each SUS level of management[26].

Political commitment is understood as the responsibility of municipal public management for the development of strategies that operationalize policies and programs considered priorities for the municipality[27]. In order to comply with SUS principles and guidelines, the administrative and organizational structures of the Municipal Health Secretariats (SMS) must be understood as a primary and non-transferable responsibility of municipal managers and be consistent with the Municipal Health Plan and the Annual Health Program[28].

In view of the problem referring the use of health services in APS and its relation with the quality of health care, this study aims to analyze the structural conditions of health units and the guidelines, objectives and goals of municipal management as to the quality of these services in the capitals of the states as per Brazilian regions, following the attention to persons suffering from DM.

Material and methods

This is a descriptive study[29] of normative assessment for data analysis on the structural conditions of health units in Brazilian capitals as to the quality of care for persons suffering from DM, based on 2017 PMAQ-AB data.

The first stage consisted of the search and revision of norms and references published in the period 2001 to 2019 with the aim to construct the logical care model for persons suffering from DM. Donabedian's reference[30,31] supported the structure attributes. We grounded on the models proposed by Borges, Lacerda[27] and Santos[32]; the DM care components; the guidelines contained in the 'Caderno de Atenção Básica # 36 – Strategies for the care of persons suffering from chronic disease: diabetes mellitus'[2] –; and the 'Manual of physical structure for basic health units: health and family'[33], detailing the variables of the structural dimension.

The second stage consisted of the definition of a matrix containing seven analytical dimensions that corresponded to the aspects to be analyzed, such as: 1) human resources; 2) accessibility, external signaling; 3) coordination and information on the provision of actions and services; 4) physical structure; 5) ambience; 6) equipment, material resources and supplies; and 7) medicines. For each dimension, variables and sources of verification were identified following to the PMAQ-AB[34] instrument. The definition of the standards and of the meaning of each dimension and/or variable was carried out by means of the search for the documents and/or theoretical framework so to explain and define the qualification/adequacy for each reality analyzed by the previous construction of the logical model.

So to characterize the structure dimensions of the Basic Health Units (UBS) of the Brazilian capitals, data on the structural conditions of health units were obtained from database retrieved from the external evaluation of PMAQ-AB 3rd cycle, made available for public access by the Ministry of Health[35]. Each selected dimension corresponded to variables retrieved from PMAQ-AB database.

For this study, a database was built containing the results and the respective variables related to the structure of health units of the Brazilian capitals for the care of persons suffering from DM. They originated in the 'Module I of the external evaluation instrument – Observation on the Basic Health Unit', in which the UBS infrastructure conditions, materials, supplies and medicines were assessed.

The variables were categorized as adequate, intermediate and inadequate, following the creation of adequacy standards as for current regulations, determining the set of sub variables necessary to meet the appropriate standard by dimension. Some dimensions fulfill the intermediate standard and the presence of minimum sub variables to meet them. The inadequate standard is characterized by the

lack of one or more necessary items of the intermediate or adequate standards.

After organizing the database and categorizing the variables of interest, the absolute and relative frequencies were obtained by means of the Stata program, version 10.0.

The third stage revealed municipalities showing a percentage of inadequacy greater than 50% as for at least four dimensions among the seven analyzed in this study. Then, a documental analysis was carried out for these municipalities by means of the Municipal Health Plans (PMS) throughout the period 2018-2021. Seven capitals met this criterion. Among the selected municipalities, three plans were not found by the searches in the open access electronic sites of each municipality/capital. Thus, the municipalities that provided free access to the respective PMS on their institutional sites were included. Therefore, those whose plans could not be identified by the search were excluded.

Thus, four PMS from three Brazilian regions were analyzed as follows: North capitals (N1, N2); Northeast capital (NE1); and Midwest capital (CO1). In order to consider, for documental analysis, at least one capital per region, a capital from the Southeast region and another from the South region were selected, which met the following criteria: at least three dimensions with inadequacy above 50%; and the highest percentage obtained from the mean of the sum of the values of these three dimensions. Finally, the municipalities coded as SE1 and S1 were selected for the Southeast and South regions, respectively.

The findings as of the six PMS (PMS1... PMS6) were systematized in a matrix that explains which plans referred to the PMAQ-AB, the aspects of APS situational analysis, particularly on health units, and the guidelines, objectives and goals for each municipality during the 2018-2021 period.

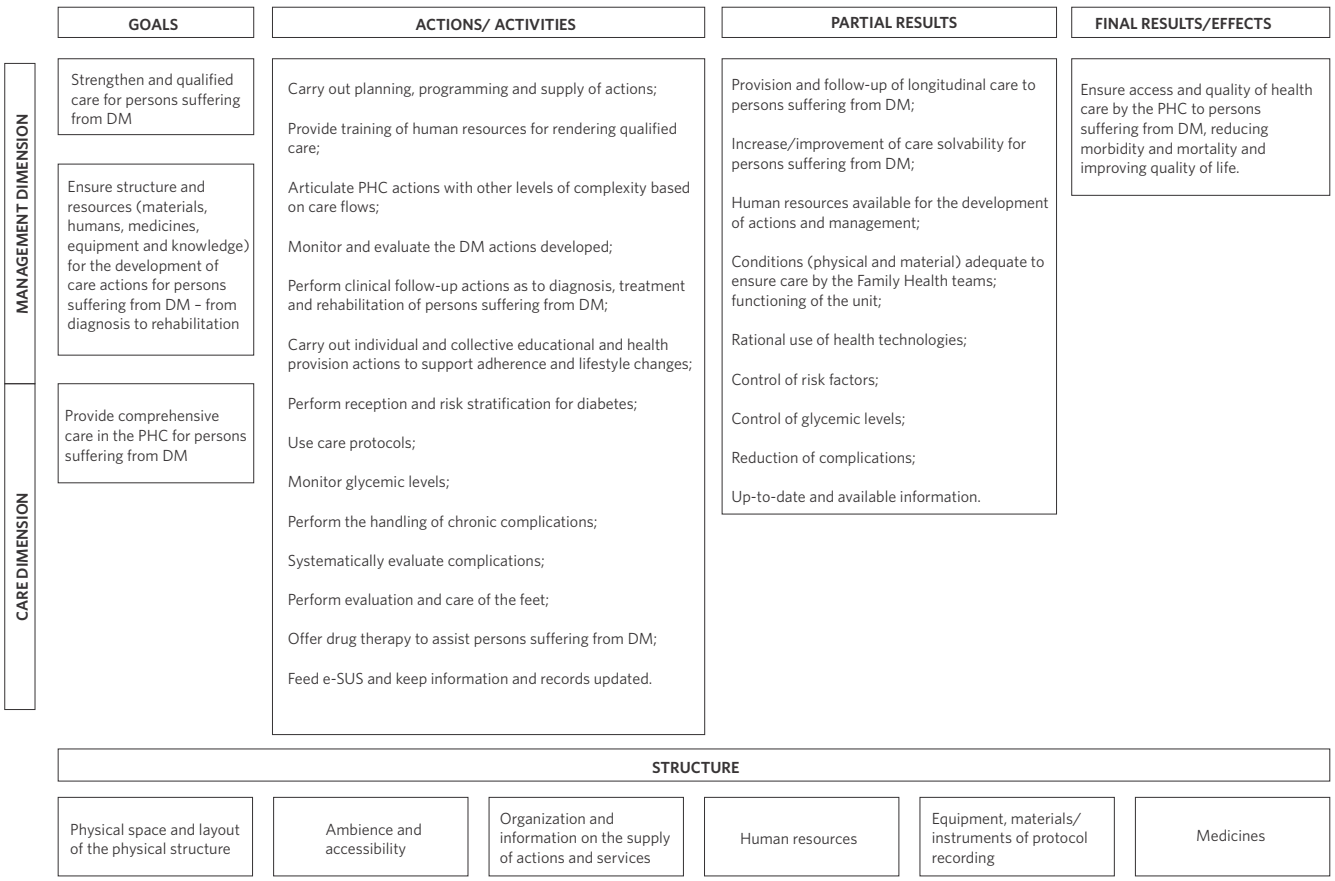
Because it is a research based on secondary data retrieved from the database/PMAQ, of public and free access, available on the Ministry of Health platform, it was not necessary to submit the research project to the Research Ethics Committee.

Results

Logical model

The logical model considered the dimensions of management and care, their respective objectives, actions and activities whose final result/effect are: ensure access and quality of APS health care to persons suffering from DM so to provide reduction of morbidity and mortality and improve quality of life. As structure subdimensions, the following was defined: physical area and arrangement of the physical structure; ambience and accessibility; coordination an d information on the provision of actions and services; human resources; equipment, materials and supplies; and medicines.

Figure 1. Logical model of PHC care for persons suffering from DM



Source: Adapted from Borges and Lacerda; Santos Brasil[2,27,32].

Characterization of the structure dimensions of Basic Health Units in Brazilian capitals

The results are expressed by structure dimensions concerning the 2,176 UBS among the capitals evaluated, following data retrieved from the 2017 PMAQ-AB 3rd cycle.

Regarding the 'human resources' dimension, most of the capitals appoints a person to be responsible for their UBS management. However, it is noteworthy that Porto Alegre, Cuiabá and Belém show a small percentage – respectively 3.82%, 3.92% and 8.06% – of the evaluated unities carrying out a management service that entitles a person exclusively for the function.

Also, few are the capitals in which the professional is not responsible for both the UBS management and the user care. The reality can be mainly stressed for the capitals of the Southeast region. Evidence is seen in Porto Alegre, in which approximately 91% of its units the professional who provides care is also responsible for the management of the unit.

As for 'accessibility', most units among capitals carry an adequate plate on the façade specifying the Signaling Guide, but not an external totem, neither a strip on the entrance wall nor an identifying painting on the UBS entrance wall. The capital Goiânia stands out for the highest percentages of these three items, respectively as 88.89%, 50.79% and 76.19%.

The external signage, in which the variables are complemental to the dimension of accessibility, handrails in non-level places were mostly absent. The greatest variation was observed between Porto Velho (0%) and Florianópolis (85.71%). For most units among capitals, tactile floor and internal doors adapted for wheelchairs were also absent, a lack that achieved a rate of 80.20% in the city of Rio de Janeiro.

Concerning the dimension 'coordination and information on the provision of actions and services', the worst percentages concerned the health unit opening hours with regard to the provision of activities during the lunch break, exception to most units among Southeast and South capitals. In this aspect, the capital Florianópolis stands out, where only 10% of its units accounted positively for this variable.

Table 1. Frequency of data structuring variables on the supply of actions and services of Basic Health Units of Brazilian capitals, as per region, 2017

			Health unit opening hours (General)	Listing (scope) of actions/ services and provision of the team (Strategic)	Shift of professionals containing name and working hours (General)	Ombudsman telephone number of the Ministry of Health or of the state or municipal health secretariat (General)	Identification of all professionals (e.g. badges, uniforms, lab coat) (General)	UBS regular opening hours	UBS supplies all its activities during lunchtime
Rg.	**Cap.**	**Unit. eval. (N)**	**Yes (%)**	**Yes (%)**	**Yes (%)**	**Yes (%)**	**Yes (%)**	**Yes (%)**	**Yes (%)**
N	Belém	62	62.90	58.06	45.16	29.03	45.16	93.55	11.29
	Boa Vista	34	76.47	85.29	97.06	94.12	73.53	97.06	17.65
	Macapá	39	74.36	82.05	64.10	35.90	43.59	79.49	35.90
	Manaus	188	65.43	90.96	63.30	75.00	54.26	89.89	79.79
	Palmas	36	97.22	100.00	91.67	97.22	58.33	100.00	86.11
	Porto Velho	35	31.43	89.31	20.00	14.29	22.86	60.00	51.43
	Rio Branco	58	67.24	62.07	39.66	62.07	17.24	68.97	8.62
NE	Aracaju	43	83.72	81.40	83.72	72.09	44.19	100.00	23.26
	Fortaleza	93	40.86	49.96	49.46	35.48	21.51	51.61	47.31
	João Pessoa	103	84.47	90.29	83.50	89.32	80.58	92.23	30.10
	Maceió	41	73.17	78.05	78.05	73.17	29.27	85.37	41.46
	Natal	42	97.62	90.48	92.86	69.05	61.90	100.00	23.81
	Recife	126	21.43	23.81	34.92	43.65	15.87	50.00	4.76
	Salvador	67	53.73	47.76	44.78	58.21	29.85	64.18	23.88
	São Luís	49	93.88	87.76	91.84	81.63	65.31	95.92	38.78
	Teresina	24	91.67	91.67	95.83	91.67	83.33	95.83	45.83

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Rg.	**Cap.**	**Unit. eval. (N)**	**Yes (%)**	**Yes (%)**	**Yes (%)**	**Yes (%)**	**Yes (%)**	**Yes (%)**	**Yes (%)**
CO	Brasília	76	34.21	35.53	44.74	21.05	53.95	80.26	55.26
	Campo Grande	36	100.00	97.22	94.44	100.00	94.44	100.00	2.78
	Cuiabá	51	62.75	45.10	76.47	52.94	31.37	86.27	9.80
	Goiânia	63	92.06	96.83	95.24	95.24	74.60	93.65	93.65
SE	Belo Horizonte	149	71.81	60.40	66.44	75.17	65.77	81.88	75.84
	Rio de Janeiro	197	92.89	95.43	92.89	94.92	91.88	95.94	95.43
	São Paulo	270	90.74	91.85	94.44	95.93	94.07	98.15	98.15
	Vitória	23	65.22	60.87	73.91	60.87	73.91	86.96	82.61
S	Curitiba	89	83.52	76.92	92.31	90.11	90.11	94.51	97.80
	Florianópolis	47	95.92	89.80	87.76	93,88	87.76	95.92	10.20
	Porto Alegre	132	85.50	89.31	90.84	87.79	90.84	98.47	32.82

Source: PMAQ-AB[35].

The 'physical structure' dimension detected the absence of many areas in most units, such as a parceling area in the pharmacy; dressing room; inhalation/nebulization; administration; and exclusive place for external shelter of solid waste. As for the bathrooms, a high number of units containing toilets was noted, especially for Palmas, Aracaju, Natal and Campo Grande, whose rate achieved 100%. However, a sharp decrease occurs when bathroom for disables is concern, Recife showing the lowest rate of 17.46%.

Table 2. Frequency of physical structure variables of Basic Health Units in Brazilian capitals, as per region, 2017

Rg.	Cap.	Unit. eval. (N)	Sanitary for users Yes (%)	Toilet for disabled persons Yes (%)	Reception/waiting room Yes (%)	Vaccine room Yes (%)	Medicine dispensing area Yes (%)	Medicine fractioning area Yes (%)	Area for pharmacotherapeutic follow-up Yes (%)	Medicine storage area Yes (%)	Computer availability in the pharmacy Yes (%)	Offices for clinical appointments Yes (%)	Room for collective inhalation/nebulization Yes (%)	Room for collecting examination materials Yes (%)	Dressing room Yes (%)	Procedure room Yes (%)	Observation room Yes (%)	Administration and management room Yes (%)	Room for collective activities Yes (%)	Cleaning Material Deposit Yes (%)	Place exclusively for external shelter of solid waste Yes (%)	External area for ambulance boarding and disembarking Yes (%)
N	Belém	62	93.55	32.26	67.74	50.00	43.55	6.45	9.96	48.39	77.42	59.67	14.52	19.35	16.13	30.65	1.61	14.52	30.65	54.84	19.35	38.71
	Boa Vista	34	91.18	50.00	88.24	85.29	91.18	11.76	26.47	47.06	94.12	26.47	26.47	8.82	44.12	64.71	25.53	79.41	35.29	76.47	61.76	55.88
	Macapá	39	82.05	35.90	53.85	56.41	66.67	28.11	11.84	58.97	20.51	87.18	15.38	25.64	53.85	33.33	17.95	46.15	20.51	43.59	25.64	51.28
	Manaus	188	73.94	40.96	60.11	46.81	61.70	17.02	3.72	32.68	55.85	79.79	45.21	13.83	18.09	35.11	4.26	17.02	10.11	44.68	27.66	23.94
	Palmas	36	100.0	69.44	97.22	91.67	33.33	22.22	5.56	36.11	33.33	0	47.22	36.11	50.00	58.33	27.78	77.78	25.00	80.56	55.56	86.11
	Porto Velho	35	65.71	40.00	62.86	54.29	54.29	17.14	14.29	60.00	37.15	62.86	17.14	7.63	25.71	37, 14	17.14	57.14	28.57	51.43	25.71	17.14
	Rio Branco	58	70.69	55.17	5*,62	63.79	63.79	13.79	3.45	20.69	8.62	56.9	27.59	6.90	6.90	25.86	8.62	50.00	39.66	55.17	37.93	25.86
NE	Aracaju	43	100.0	81.40	97.67	95.35	34.88	34.88	25.58	69.77	39.53	93.02	93.02	20.93	50.00	51.16	65.12	93.02	65.12	83.72	62.79	51.16
	Fortaleza	93	47.31	35.48	48.39	41.94	12.90	12.90	66.45	38.71	51.62	68.62	4.30	46.24	47.31	44.09	22.58	49.46	31.18	38.71	27.96	32.26
	João Pessoa	103	91.26	47.57	89.32	85.44	6.80	6.80	17.48	40.78	25.24	91.26	27.18	23.30	59.22	21.36	24.77	34.95	38.83	66.99	43.69	50.49
	Maceió	41	80.49	41,46	70.73	75.61	12.50	12.20	7.32	68.85	68.29	70.73	17.07	12.20	41.46	41.46	2.44	60.98	19.51	51.22	14.63	34.15
	Natal	42	100.0	78.57	73.81	88.10	21.43	21.43	28.57	80.95	85.71	19.05	59.52	16.67	90.48	69.05	9.52	90.48	69.05	69.05	78.57	54.76
	Recife	126	54.76	17.46	53.17	44.44	5.56	5.56	4.76	36.31	15.08	60.32	10.32	97.14	29.37	10.32	1.59	13.49	16.67	33.33	17.46	13.49
	Salvador	67	62.69	46.27	58.21	56.72	8.86	8.96	2.92	46.27	62.68	95.52	2.99	16.42	91.48	44.78	1.49	64.18	38.81	52.24	34.33	31.34
	São Luís	49	95.92	55.10	89.80	87.76	32.65	32.65	18.37	79.59	2.04	83.67	55.10	14.29	71.43	42.86	6.12	83.67	40.82	71.43	46.94	36.73
	Teresina	24	95.83	83.33	79.17	83.33	33.33	33.33	20.83	62.50	50.00	20.8	54.17	75.00	58.33	45.83	4.17	70.83	66.67	70.83	50.00	79.17
CO	Brasília	76	89.47	51.32	67.11	28.95	11.89	22.37	11.84	56.58	47.38	18.42	26.32	34.21	38.16	23.68	13.16	40.79	39.47	64.47	43.22	59.21
	Campo Grande	36	100.0	69.44	97.22	88.89	27.78	27.78	27.78	88.89	91.67	22.22	86.11	50.00	80.56	55.56	41.67	91.67	69.44	91.67	63.89	75.00
	Cuiabá	51	86.27	70.33	76.47	76.47	21.57	33.33	21.57	74.51	68.63	21.57	58.82	50.98	43.14	33.33	19.61	15.69	31.37	66.67	43.14	43.14
	Goiânia	63	96.83	36.51	82.54	58.73	7.94	14.29	7.94	42.86	33.24	33.33	6.35	31.75	50.79	58.73	46.03	77.78	44.44	66.67	53.97	50.79
SE	Belo Horizonte	149	80.54	55.70	79.87	75.84	14.7	22.82	14.77	61.07	81.21	24.16	5.37	52.35	67.11	31.54	39.60	74.50	52.35	64.43	37.58	54.36
	Rio de Janeiro	197	95.94	74.62	93,91	86.29	70.05	13.20	70.05	95.43	95.95	11.17	19.80	72.08	89.34	70.05	59.39	89.85	77.16	89.85	66.50	87.31
	São Paulo	270	97.78	92.22	94.07	93.10	45.19	15.56	45.19	95.19	96.76	54.54	70.00	54.81	91.48	63.70	41.85	94.81	67.04	94.81	81.85	79.26
	Vitória	23	86.96	69.57	86.96	82.61	43.48	17.39	43.48	78.26	86.95	17.39	73.91	78.26	82.61	65.22	56.52	82.61	86.96	65.22	78.26	73.91
S	Curitiba	89	97.80	70.33	92.31	92.31	34.07	2.20	34.07	92.31	97.8	6.59	38.46	67.03	68.13	43.96	43.96	94.51	73.63	90.11	92.31	68.13
	Florianópolis	47	95.92	83.67	85.71	85.71	22.45	24.49	22.45	91.84	95.92	0	12.24	4.08	44.90	10.20	10.20	79.51	69.39	87.76	51.02	69.39
	Porto Alegre	132	99.65	51.91	95.42	81.68	9.92	4.58	9.92	72.52	58.88	3.82	24.43	7.63	38.93	15.27	15.27	32.82	45.04	73.28	70.23	51.15

Source: PMAQ-AB[35].

As to the 'ambience', the aspects of washable floors and walls and privacy to users in the consultation offices represented the lowest percentages, mainly for the capitals Rio Branco (24.14%) and Recife (25.40%).

Regarding 'equipment, materials and supplies', most capitals inform the absence of the various items partially assessed within health units, e.g., adult stethoscopes, anthropometric scales, anthropometric rulers, glucometers, monofilament kits for sensitivity testing (aesthesiometer), reagent strips for glycemia measurement. The non-existence of refrigerators exclusive to medicines in the pharmacy responded for the higher rates, varying from 9.68% in Belém to 100% in Teresina.

Table 3. Frequency of materials, equipment and supplies' variables of Basic Health Units in Brazilian capitals, as per region, 2017

			Adult blood pressure devices (standard size)	Adult stethoscopes	Anthropometric scales of 150 or 200 kg	Children's scales	Adult anthropometric rulers	Children's anthropometric rulers	Stretchers/tables for clinical examination	Refrigerators exclusive for medicines in the pharmacy	Glucometers	Reagent strips for glycemia measurement	Hard containers for sharps disposal	Measuring tape
Rg.	**Cap.**	**Unit. eval. (N)**	**Yes (%)**	**Yes (%)**	**Yes (%)**	**Yes (%)**	**Yes (%)**	**Yes (%)**	**Yes (%)**	**Yes (%)**	**Yes (%)**	**Yes (%)**	**Yes (%)**	**Yes (%)**
N	Belém	62	96.77	96.77	88.71	82.26	90.32	83.87	95.16	9.68	80.65	83.87	93.55	93.55
	Boa Vista	34	100.00	100.00	100.00	97.06	100.00	94.15	100.00	91.18	100.00	100.00	100.00	88.24
	Macapá	39	97.44	97.44	89.74	92.31	92.31	94.37	94.37	30.77	89.74	56.41	84.62	84.62
	Manaus	188	99.47	99.47	93.62	98.4	93.62	82.45	79.26	22.87	97.87	89.89	94.15	90.43
	Palmas	36	100.00	100.00	100.00	97.22	100.00	100.00	100.00	30.56	100.00	100.00	100.00	97.22
	Porto Velho	35	100.00	97.14	65.71	85.71	100.00	85.71	100.00	82.86	74.13	34.29	62.86	51.14
	Rio Branco	58	100.00	100.00	74.14	94.83	98.28	85.71	98.28	58.62	98.28	63.79	72.41	100.00
NE	Aracaju	43	97.67	100.00	100.00	100.00	90.7	95.35	100.00	86.05	95.35	93.02	100.00	97.67
	Fortaleza	93	97.85	96.77	51.61	96.77	100.00	98.92	100.00	96.77	93.55	43.01	100.00	93.65
	João Pessoa	103	99.03	100.00	93.00	98.06	98.06	98.06	100.00	58.25	100.00	93.20	92.23	93.20
	Maceió	41	95.14	95.12	82.93	100.00	100.00	100.00	97.56	48.78	97.56	78.05	80.49	78.05
	Natal	42	100.00	100.00	100.00	100.00	97.62	97.62	100.00	92.86	95.24	97.62	92.86	90.48
	Recife	126	100.00	99.21	51.59	98.41	91.27	96.83	100.00	56.35	97.17	54.76	55.56	52.38
	Salvador	67	98.51	97.01	64.18	98.51	100.00	89.55	100.00	92.54	98.51	62.69	100.00	61.19
	São Luís	49	100.00	95.92	89.80	100.00	93.88	91.84	97.96	69.39	100.00	93.98	100.00	83.67
	Teresina	24	100.00	100.00	91.67	100.00	95.83	100.00	100.00	100.00	100.00	95.83	100.00	87.50

Table 3. Frequency of materials, equipment and supplies' variables of Basic Health Units in Brazilian capitals, as per region, 2017

Rg.	Cap.	Unit. eval. (N)	Adult blood pressure devices (standard size) Yes (%)	Adult stethoscopes Yes (%)	Anthropometric scales of 150 or 200 kg Yes (%)	Children's scales Yes (%)	Adult anthropometric rulers Yes (%)	Children's anthropometric rulers Yes (%)	Stretchers/tables for clinical examination Yes (%)	Refrigerators exclusive for medicines in the pharmacy Yes (%)	Glucometers Yes (%)	Reagent strips for glycemia measurement Yes (%)	Hard containers for sharps disposal Yes (%)	Measuring tape Yes (%)
CO	Brasília	76	96.05	98.68	90.79	95.74	73.68	95.74	100.00	56.58	96.05	80.26	81.58	71.05
	Campo Grande	36	100.00	100.00	97.22	97.22	86.11	100.00	100.00	91.67	100.00	97.22	100.00	97.22
	Cuiabá	51	98.04	98.04	84.31	98.04	66.67	66.67	100.00	92.16	96.08	78.43	68.63	80.39
	Goiânia	63	100.00	100.00	96.83	98.41	95.24	98.41	100.00	33.33	100.00	95.24	100.00	93.65
SE	Belo Horizonte	149	100.00	100.00	81.21	100.00	97.99	100.00	100.00	95.3	99.33	78.52	100.00	81.88
	Rio de Janeiro	197	100.00	100.00	96.45	100.00	65.48	100.00	99.49	98.48	100.00	96.45	100.00	95.94
	São Paulo	270	99.26	99.63	98.52	100.00	94.07	99.63	100.00	97.41	100.00	94.44	95.56	95.56
	Vitória	23	100.00	100.00	86.96	100.00	56.52	100.00	100.00	91.3	100.00	82.61	100.00	86.96
S	Curitiba	89	100.00	100.00	100.00	98.90	78.02	100.00	100.00	91.21	100.00	97.80	96.70	96.70
	Florianópolis	47	100.00	100.00	100.00	100.00	53.06	100.00	100.00	95.92	100.00	95.92	100.00	95.92
	Porto Alegre	132	100.00	100.00	98.47	98.47	58.78	100.00	98.47	96.18	100.00	98.47	100.00	98.47

Source: PMAQ-AB[35].

As to 'medicines', most capitals showed high frequency for glibenclamide and metformin, and low frequency for 50% glucose ampoules, drugs for clinical urgency, NPH insulin and regular insulin. The latter variables are mainly present among the capitals of the Southeast and South regions, achieving a frequency above 90% for most of them.

In summary, considering all the Brazilian capitals as a whole, and the percentage of adequacy, intermediate and inadequacy of UBS structure, all the cities assessed showed a percentage inferior to 25% among health units considered adequate, which provided all the items to fulfill the dimension 'physical structure'. This dimension revealed the highest inadequacy rate among the dimensions analyzed. Then, the 'availability of equipment, materials and provisions' was inferior to 25% in 22 capitals – Boa Vista, Macapá, Manaus, Palmas, Porto Velho, Aracaju, Fortaleza, João Pessoa, Maceió, Natal, Recife, Salvador, São Luís, Teresina, Brasília, Cuiabá, Goiânia, Belo Horizonte, São Paulo, Vitória, Florianópolis and Porto Alegre. The dimension placed as the second most inadequate, together with the dimension 'coordination and information made available to users'.

Table 4. Percentage of adequacy of the structure analysis dimensions of Basic Health Units in the Brazilian capitals, as per region, 2017

			Human Resources			Accessibility		Organization and information on the supply of actions and services			Physical structure			Ambience		Equipment		Medicines	
Rg.	Cap.	Unit. eval. (N)	AD (%)	I (%)	IN (%)	AD (%)	IN (%)	AD (%)	I (%)	IN (%)	AD (%)	I (%)	IN (%)	AD (%)	IN (%)	AD (%)	IN (%)	AD (%)	IN (%)
N	Belém	62	8.06	82.56	9,68	95.16	4.84	1.75	22.81	75.44	-	-	100.0	22.58	77.42	100.00	-	10.81	89.19
	Boa Vista	34	35.29	64.71	-	100.00	-	6.25	59.38	34.38	-	-	100.0	61.76	38.24	18.18	81.82	96.88	3.13
	Macapá	39	51.28	30.77	10,26	94.44	5.56	17.14	28.70	45.71	-	2.78	88.89	21.62	70.27	-	86.36	10.81	81.08
	Manaus	188	14.89	73.40	6,91	97.19	2.81	24.02	59.78	11.17	0.56	-	94.41	20.59	74.12	5.26	71.05	12.02	83.06
	Palmas	36	80.56	19.44	-	94.44	5.56	50.00	38.89	11.11	-	-	100.0	72.22	27.78	5.56	94.44	64.29	35.71
	Porto Velho	35	31.43	34.29	-	95.35	4.65	3.03	45.45	15.15	-	-	65.71	11.43	54.29	4.55	40.91	37.14	28.57
	Rio Branco	58	10.34	60.34	3,45	97.67	2.33	-	21.82	50.91	-	-	74.14	15.79	57.89	48.28	-	52.73	20.00
NE	Aracaju	43	52.81	41.86	2,33	93.02	6.98	2.33	51.16	46.51	4.65	9.30	86.05	53.49	46.51	11.63	88.37	88.10	11.90
	Fortaleza	93	46.24	5.38	-	97.92	2.08	10.75	37.63	3.23	-	1.08	50.54	29.03	22.58	1.18	45.88	40.86	10.75
	João Pessoa	103	13.59	79.61	0,97	89.58	10.42	23.76	49.50	20.79	-	-	94.17	57.58	36.36	4.82	87.95	19.64	69.64
	Maceió	41	73.17	9.76	2,44	100.00	-	34.15	43.90	34.15	-	-	85.00	20.51	64.10	-	81.25	30.77	53.85
	Natal	42	40.48	59.52	-	80.95	19.05	9.52	52.38	38.10	-	-	100.0	51.22	48.78	7.89	92.11	90.48	9.52
	Recife	126	15.08	22.22	18,25	100.00	-	44.07	7.63	0.85	-	-	55.56	12.10	42.74	-	53.33	16.81	33.63
	Salvador	67	59.70	4.48	-	100.00	-	5.97	34.33	23.88	-	-	64.18	13.43	50.75	2.99	61.19	43.94	19.7
	São Luís	49	55.10	38.78	2,04	95.74	4.26	20.41	59.18	20.41	-	2.04	93.88	41.30	54.35	-	88.89	32.65	63.27
	Teresina	24	45.83	50.00	-	85.71	14.29	33.33	50.00	12.50	-	-	95.83	45.83	50.00	-	94.74	50.00	45.83
CO	Brasília	76	46.05	42.11	5,26	94.37	5.63	-	60.61	31.82	-	-	93.42	30.67	62.67	6.45	85.48	46.67	45.00
	Campo Grande	36	69.44	30.56	-	85.71	14.29	2.78	83.33	13.89	-	8.33	91.67	66.67	33.33	33.33	66.67	91.43	8.57
	Cuiabá	51	3.92	70.59	13,73	97.78	2.22	-	22.92	64.58	-	-	88.24	18.00	70.00	-	53.85	62.00	26.00
	Goiânia	63	82.54	14.29	-	67.24	32.76	69.35	25.81	1.61	-	3.23	93.55	32.26	64.52	16.13	80.65	8.82	85.29
SE	Belo Horizonte	149	75.84	6.04	-	90.98	9.02	40.27	38.93	2.68	-	1.34	80.54	31.54	50.34	10.74	71.14	75.84	6.04
	Rio de Janeiro	197	92.39	4.06	-	75.34	24.46	-	12.24	-	1.02	7.11	88.32	59.90	36.55	47.72	48.73	95.43	1.02
	São Paulo	270	95.19	2.96	0,37	70,94	29.06	83.58	14.55	0.37	2.96	13.33	82.22	51.85	46.67	18.59	79.93	8.24	90.26
	Vitória	23	82.61	4.35	-	85.00	15.00	39.13	47.83	8.70	8.70	13.04	65.22	52.17	34.78	4.35	82.61	82.61	4.35
S	Curitiba	89	57.14	39.56	1,10	97.75	2.25	60.23	37.50	-	-	9.89	87.91	43.96	53.85	26.37	71.43	95.60	2.20
	Florianópolis	47	32.65	63.27	-	91.49	8.51	10.20	67.35	18.37	-	-	95.92	69.39	26.53	16.33	79.59	93.88	2.04
	Porto Alegre	132	3.82	92.37	2,29	95.35	4.65	22.90	56.49	19.08	-	0.76	97.71	42.75	55.73	2.31	96.15	84.92	13.49

Source: PMAQ-AB[35].

AD=adequacy; I=intermediate; IN=inadequacy.

Guidelines, objectives and goals of municipal management related to the structural aspects of health units

From the analysis of the six PMS during the 2018-2021 period, PMAQ reference was introduced as were the contents that refer to guidelines, objectives, actions, goals and programming related to the structural elements of APS health units.

The reference on PMAQ-AB was identified in the plans PMS2, PMS3 and PMS6. Regarding the APS situational analysis, the coverage was 47.36% in PMS1, 43.95% in PMS2, 45.21% in PMS3, 62.6% in PMS5 and 62.5% in PMS6. As to the structural conditions of the units, the PMS2 health units are classified as inadequate infrastructure, while PMS3 reveals lack of supplies, equipment and medicines.

As for the objectives and goals acknowledged in the assessed health plans, we stress the broadening and reform of the units (PMS1, PMS2); the network broadening through the construction, expansion, reform and equipping

of the units (PMS3, PMS5). PMS6, on the other hand, has as goal to qualify the structure of APS units and to implement extended opening hours. In addition, PMS2, PMS3, PMS4 and PMS5 carry issues concerning pharmaceutical services and goals related to the supply and access to medicines.

Discussion

The evidence collated between the logical model and the database organized from the PMAQ-AB emphasized that the adequacy of the UBSs structural conditions among the Brazilian capitals remains mostly below 50% for all dimensions of analysis, except for accessibility, being the dimensions of physical structure and equipment those accounting for the lowest percentages.

Differences were observed in the structural conditions of the units as per each region, the worse results being revealed for ambience and medicines in capitals of the North and Northeast regions. This result adds to the findings in the literature on the evaluation of health services according to each region. Studies have confirmed regional inequalities in relation to UBSs structures, by means of which the North and Northeast regions exhibited the highest precariousness in services when compared to physical structure, materials and supplies[9,14,36,37]. Taking the regions into account, significant differences were observed between the capitals in most dimensions, except for physical structure, in which all showed low adequacy. They all showed high adequacy for accessibility.

Regarding the dimension of human resources, the lack of a professional in charge of exclusively the management implies the multiplicity of tasks took on by that person and, consequently, the low effectiveness of his/her work. This finding reveals that the worker, in addition to dedicating time to articulate resources and needs of the service and to coordinate the work team process as to APS objectives and purposes, needs to develop care actions. In this context, organizing the time between caring and managing makes work dynamics complex due to the fact that the activities to be developed, in most cases, are not intercessory and inter complementary actions[38].

As to accessibility, the absence of external totem and handrail was a concern found in health units also in this as in other researches' results[39]. As for other aspects of accessibility analyzed in this study, such as tactile floor and wheelchair adaptations, they are provided for as fundamental rights of access to health services ensured by the Federal Constitution, besides enabling adequate care for persons suffering from DM, as they carry sequelae and restricted mobility[40].

Structural dimensions are pivotal to ensure user accessibility[41,42]. In addition to the attention to persons suffering from disabilities and reduced mobility, also provided for under the National Health Policy for Persons with Disabilities, these dimensions are central to ensure access for individuals with disabilities resulting from DM[33,43].

The results concerning coordination and information on the provision of actions and services show weaknesses due to the non-operation of the unit during lunch time and to non-flexible hours, confirmed in other studies[15,19]. The unit opening at alternative hours may expand access to users who are prevented from attending the service during business hours and that could benefit from a service in flexible hours, especially the male population.

According to data retrieved from the Surveillance of Chronic Diseases by Telephone Inquiry[44], women still represent the highest percentage of persons suffering from DM, although the increase in male prevalence be significant, which accounted for 54% between 2006 and 2018, while the women rate was 28%. These data call the attention to the coordination and availability of services, as well as to the awareness of the male population about the need for follow-up by health services.

In respect to physical structure, results reveal that problems still persist in health units, such as lack of toilet for disabled persons, dispensing of medicines, and rooms for the pharmacy, offices, nebulization, collection, dressing, procedures and observation. A previous study on persons suffering from diabetes carried out in Cycles I and II of the PMAQ-AB revealed the low adequacy in this aspect as consequence of the assessed set of items, e.g., clinical office, pharmacy, reception, reception room and meeting[14].

Despite positive results and resources invested in APS coming from the PMAQ-AB and from the Program for the Requalification of Basic Health Units (Requalifica UBS), inadequacy and insufficiency of UBS structure still persist, especially in the states of the North and Northeast regions, possibly related to low economic development and to the provision of services. In contrast, the South and Southeast regions, more developed and rendering a greater number of services, show more satisfactory results as to the infrastructure[45].

So to the care of persons suffering from DM be adequately serviced, municipal health management must ensure that the UBS counts on adequate physical spaces that follows to the 'Manual of physical structure of basic health units: family health'[33] and to the elements contained in PMAQ-AB34 external evaluation instrument[34].

In what the environment is concerned, this study evidenced the lack of acoustics in most health units as to avoid noise from the external and internal environments. The Ministry of Health adopts the broad concept of ambience, e.g., as a social, professional and interpersonal relation space that enables care in a resolutive, humane and welcoming way, in addition to a healthy environment for the work of health professionals[19,46]. Another study concludes that the ambience is influenced by the structure and interaction among health professionals[47].

As to the availability of equipment, materials and provisions, the findings reveal a low adequacy of health units in the assessed set of items. It was observed, for example, the absence of refrigerators exclusively for medicines in many units, confirming the results of another study[48]. Only health units provided with all the assessed equipment, materials and provisions can fully comply with the care of persons suffering from diabetes, since the availability of the set of listed items can be considered as an ideal situation to render health monitoring. Results reveal an important difference among capitals as for the availability of both reagent strips for capillary glycemia and adult blood pressure device. The 'Caderno de Atenção Básica # 36 – Strategies for the care of persons suffering from chronical disease: diabetes mellitus', states these elements as essential for the monitoring of glycemia and blood pressure with the aim to control and prevent complications[2].

The results of this study as to the availability of medicines reveal an unfavorable situation concerning the 50% glucose ampoules, emergency medicines and insulins. The APS low availability of insulin for the care of persons suffering from diabetes may also be related to funding and absence of refrigerators for conservation[8,48].

Those medicines are essential for the care of persons suffering from diabetes and should always be available to the population.

Access to medicines and the guarantee of adequate drug treatment provide more DM effective control, enabling the reduction of morbidity and mortality and the improvement of health and life quality to the user. The drugs NPH human insulin and regular human insulin make up the Hypertension and Diabetes Drug Group. The Ministry of Health is responsible also for also the financing and acquisition as for its distribution to the warehouses and Pharmaceutical Supply Centers of the States and the Federal District. The State Health Secretariats are responsible for the distribution of human insulin and of regular human insulin to the municipalities[49].

Although the structural characteristics of a health service alone cannot ensure the quality

of care, it is possible to say that adequate structures ease a better health care. The relation between the structural and operational elements of health services is able to generate analyses not related to direct effects on the population health, but to the way of achieving the best health outcomes[50-52].

Given the dimensions and the respective variables discussed here, the structural conditions of health units account for a problem related to the service and the health system, therefore requiring for initiatives and commitment from managers to improve the condition. In this sense, health plans should consider the situational analysis of people's health conditions, as well as health services, so to create the guidelines, objectives and goals to guide the management actions for the study period.

As for the set of six PMS analyzed, which included at least one capital per Brazilian region, it can be noted that half of them did not mention PMAQ-AB, a program that proposed to improve APS access and quality, given the criteria agreed with the municipalities for each evaluation cycle[35]. Therefore, the health situation evidenced by means of PMAQ-AB assessment should be mentioned in the chapter that analyzes the situation of health plans, as to define the guidelines, objectives and goals aimed at improving APS access and quality.

As for the units' structural elements, the health plans analyzed mentioned little about the environment, the management of health services, the operation and the information on health units. The plans stressed the need for reforms in health units, including the definition of objectives and goals related to themselves. The need to equip and re-equip the units was also included in two plans. It should be noted that these aspects are important for the population's access to public health services, directly influencing the quality of care provided, so that it surrounds aspects of the structure and reverberates the processes and results. Findings from other studies showed relations between structure, work process and quality of the Family Health Strategy services in the country[9,53,54].

Final remarks

The analysis of the structural conditions of health units in the Brazilian capitals revealed the need for adequacy for most of them regarding one or some of the aspects analyzed so that to achieve quality of care for persons suffering from DM.

This study reveals aspects of structure dimensions as to health units of Brazilian capitals, evidencing particularities, potentialities and weaknesses that deserve to be considered in the definition of the agenda and in the guidance of actions by health management. It should also be noted that the observed inadequacy conditions can impact negatively on the APS quality of care for persons suffering from diabetes. The structural conditions of health units should generate a management commitment to improve access and quality of health services. However, it was suggested that many elements related to the structure of the units, detailed by means of adequacy percentages, are not yet emphasized in the health plans of Brazilian capitals, meaning that they are not an objective/goal to be achieved.

As limitations, we can mention the use of secondary data retrieved from PMAQ-AB. In addition, the information for evaluation of the structure does not correspond to the total health units of the municipalities due to the exclusion of those that did not adhere to the program, and to the unavailability of some PMS as for documental analysis. However, the limitations do not reduce the quality of the results, since data obtained from the program are strong enough to fulfill the diagnosis of the structural conditions of the health units. So, it is to reinforce that the interruption or lack of a program to evaluate the quality of services implies losses also for the investment in structure as for the induction of improvements by means of the assessment of these aspects in an institutional approach.

Therefore, this study analyzed the structural conditions of health units by connecting them with the guidelines, objectives and goals

set forth in the health plans of the capitals under assessment. However, further investigation may search for: the evaluation of factors that interfere in the quality of care for persons suffering from DM; the aspects that determine the inadequacy of the structural conditions of the units; the analysis of care effectiveness for persons suffering from DM; and the efficiency in the resources' appropriation for ensure managers decision-making.

Collaborators

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