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Expansion of Primary Health Care coverage in Campo Grande, Mato Grosso do Sul, Brazil (2013-2023)

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Abstract *This paper aimed to analyze the factors related to the expansion of family health teams, oral health teams, and multidisciplinary teams in Campo Grande-MS, from 2013 to 2023, and identify the effect of this activity with the establishment of a Family and Community Medicine Residency and a Multidisciplinary Family Health Residency, verifying whether the teams were deployed in areas with a higher social exclusion rate. This quantitative, analytical, and longitudinal study employed secondary data, and we observed a significant increase in Family Health, Oral Health, and Multidisciplinary teams in Campo Grande throughout the period studied. In 2018, we identified a broad transformation from traditional units to family health units, and family health residencies were established in 2020, which led to the second year with a more significant expansion of the teams. In 2023, we noted that family health coverage achieved 100% of the areas with the highest social exclusion rate.*
Key words *Family Health, Primary Health Care, Public Policy*

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Introduction

Primary Health Care (PHC) concepts and benefits are recognized worldwide, as it is considered a gateway (responsibility for access) for offering person-centered care, addressing the most common problems in the community, providing prevention services, treatment, and rehabilitation through teamwork, favoring equity and improved health[1], establishing bonds with the individuals and their families, effective communication, care continuity and longitudinality, holistic approach to health problems, community guidance, decision-making process defined by the prevalence and incidence of the disease in the community, leading to acute and chronic diseases, and conducting actions to promote and prevent health problems in the population[2].

PHC has been used in different countries but with different organizations, following how the health system is structured in these places, affecting access and results differently. In Brazil, PHC has been structured since the 1990s, with the Family Health Program (PSF) as a precursor plan for access and first contact, implemented in 1994, later replaced in the National Primary Care Policy (PNAB) in 2006 by the Family Health Strategy (ESF), as a plan to consolidate the new care model, revised in 2011 and 2017[3-6].

Implementing the ESF with the expanded PHC coverage has increased the population's access to health units. However, among other factors, professionals must have the skills to work in this area to achieve effective and comprehensive care. In this sense, continuing education programs and residency programs are strategic to qualify the work of these professionals in PHC. It is also noteworthy that infant mortality dropped, vaccination coverage increased, and hospitalizations for conditions sensitive to primary care[7] decreased in territories with greater access to primary care.

The expanded ESF did not occur uniformly in the country. Despite the massive presence of PHC in Brazilian municipalities, the different coverage may have led to adjustments in the PHC models, interfering in the structure and mainly in the results obtained in each city[8]. Thus, following ministerial regulations, Campo Grande-MS implemented the first PSF teams in 1999, just five years after national enactment. Since then, its coverage has evolved slowly, as coverage remained stationary at 38% after 17 years of ESF in 2016.

Several factors jointly interfere with the development of health indicators, including the maintenance of social policies such as the *Bolsa Família* Program (PBF) and the expansion of ESF coverage, which reduce poverty and monitor the Program's health conditionalities[9].

Given this evident need to expand coverage, new strategies were programmed since the ESF Expansion Plan outlined in 2010 for the municipality did not achieve the expected success until early 2019 when coverage was still at 40%. However, the expansion project's design had to adopt several course corrections to adjust the weak coverage in providing essential PHC services. In this sense, expansion planning should be guided by the level of vulnerability of the neighborhoods, a situation measured by the Social Exclusion Index (SEI), according to Sauer *et al.*'s[10] classification. This author affirms that streamlining the distribution of resources to meet the socioeconomic needs of the most vulnerable part of the population requires knowledge of the municipal mapping of these needs. By identifying the social demands in different sectors, the actions of the municipal administration will be able to meet these needs more efficiently, preventively anticipating the creation of situations of exclusion and thus preventing social policies from continuing to be compensatory.

This study aimed to analyze the factors related to the expansion of family health teams (eSF), oral health teams (eSB), and multidisciplinary teams (eMULTI), previously called Expanded Family Health Center (NASF) in Campo Grande, MS, from 2013 to 2023, and identify the effect of expanding this coverage, creating the Family and Community Medicine Residency (RMFC) and the Multiprofessional Family Health Residency (RMSF) and verifying whether the teams were implemented in areas with a higher Social Exclusion Index (SEI).

Methods

Study design and context

This quantitative, analytical, and longitudinal study of the expansion of primary health care (PHC) coverage in Campo Grande-MS was based on secondary data from the WEB platform e-Gestor AB, through the electronic address: https://egestorab.saude.gov.br, public and restricted access information, the National Health Establishment Registry (CNES) (https://cnes.

datasus.gov.br/), and instruments such as the Annual Management Report of the Municipality of Campo Grande-MS.

Data on the population of Campo Grande-MS were extracted from e-Gestor in December 2023, totaling 916,001 inhabitants. According to IBGE data (2022), the population of Campo Grande totals 898,100 inhabitants; however, there was no update of this data in e-Gestor.

Ethical aspects

This research employed information systems, and the project included a Term of Commitment for the Use of Database Information and a Letter of Request for the Exemption from the Informed Consent Form. The Research Ethics Committee (CEP) of the Federal University of Mato Grosso do Sul (UFMS) approved the study under CAAE No. 75540023.6.0000.0021, meeting the requirements of Resolution No. 466/2012 of the National Health Council.

Data analysis

Initially, descriptive and exploratory analyses were conducted on all data presented in table form. Additionally, generalized additive models (GAM) were fitted, indicating data trends. The fit of the models was interpreted by statistical significance and the coefficient of determination (R^2). All analyses were conducted using R[11] software with a 5% significance level.

The study published by Sauer *et al.*[10] was adopted to verify whether the eSFs, eSBs, and eMULTIs were implemented in areas with higher SEIs. It represented through maps the social portrait of Campo Grande by neighborhood. The author defined three principal themes that configure the components of social exclusion or risk of social exclusion, per the Atlas of Social Exclusion in Brazil. This categorization helps management define priority areas for municipal investment to improve people's living conditions. The themes chosen were Decent standard of living, Knowledge, and Youth risk, with several components, including poverty and inequality indicators, demographic dependency ratio, literacy, schooling years, and indicators of rights suppressed in youth. All of these indicators were transformed into indices, representing the relative situation of each neighborhood against the others. As a result, the SEI mapping was presented with the following range parameters: 0.05-0.21, 0.21-0.45, 0.45-0.61, 0.61-0.74, 0.74-0.96[10], where the higher the index value, the worse the situation in the neighborhood.

Results

Table 1 and Figure 1 present the analysis results of the numbers of eSFs, eSBs, and eMULTI-supported teams in Campo Grande-MS by year. The estimated generalized additive model (GAM) revealed a significant increase in the number of teams over the studied period ($p<0.0001$; $R^2=0.9411$). Similar results were observed for the number of eSBs, with a significant increase in the municipality in the analyzed period ($p<0.0001$; $R^2=0.9416$).

We can also observe that the number of eSFs hiked from 86 in 2013 to 197 in 2023 (an increase of 129.1%). The eSBs grew from 88 teams in 2013 to 150 in 2021 (an increase of 70.5%). Regarding the eMULTI teams, the control graph in Figure 1 indicated four out of five consecutive years in the upper alert zone from 2019 to 2023, showing higher numbers in this period against the entire period analyzed. GAM also indicated a significant increase in eMULTI teams in the analyzed period ($p<0.0001$; $R^2=0.9357$). Analysis of the curve

Table 1. Number of Family Health teams, Oral Health teams, and eMULTI-supported teams in Campo Grande-MS, by year.

Year	Family Health Teams	Oral Health Teams	Number of eMULTI-supported teams
2013	86	88	42
2014	90	91	57
2015	85	91	57
2016	86	92	57
2017	95	92	57
2018	128	118	110
2019	125	125	110
2020	163	147	160
2021	177	150	160
2022	186	150	165
2023	197	150	156
[1]p-value	<0.0001	<0.0001	<0.0001
[1]R^2	0.9411	0.9416	0.9357

[1] Generalized additive models (GAM). R^2: Determination coefficient.

Source: Annual Management Report of the Municipality of Campo Grande-MS, 2013 to 2023.

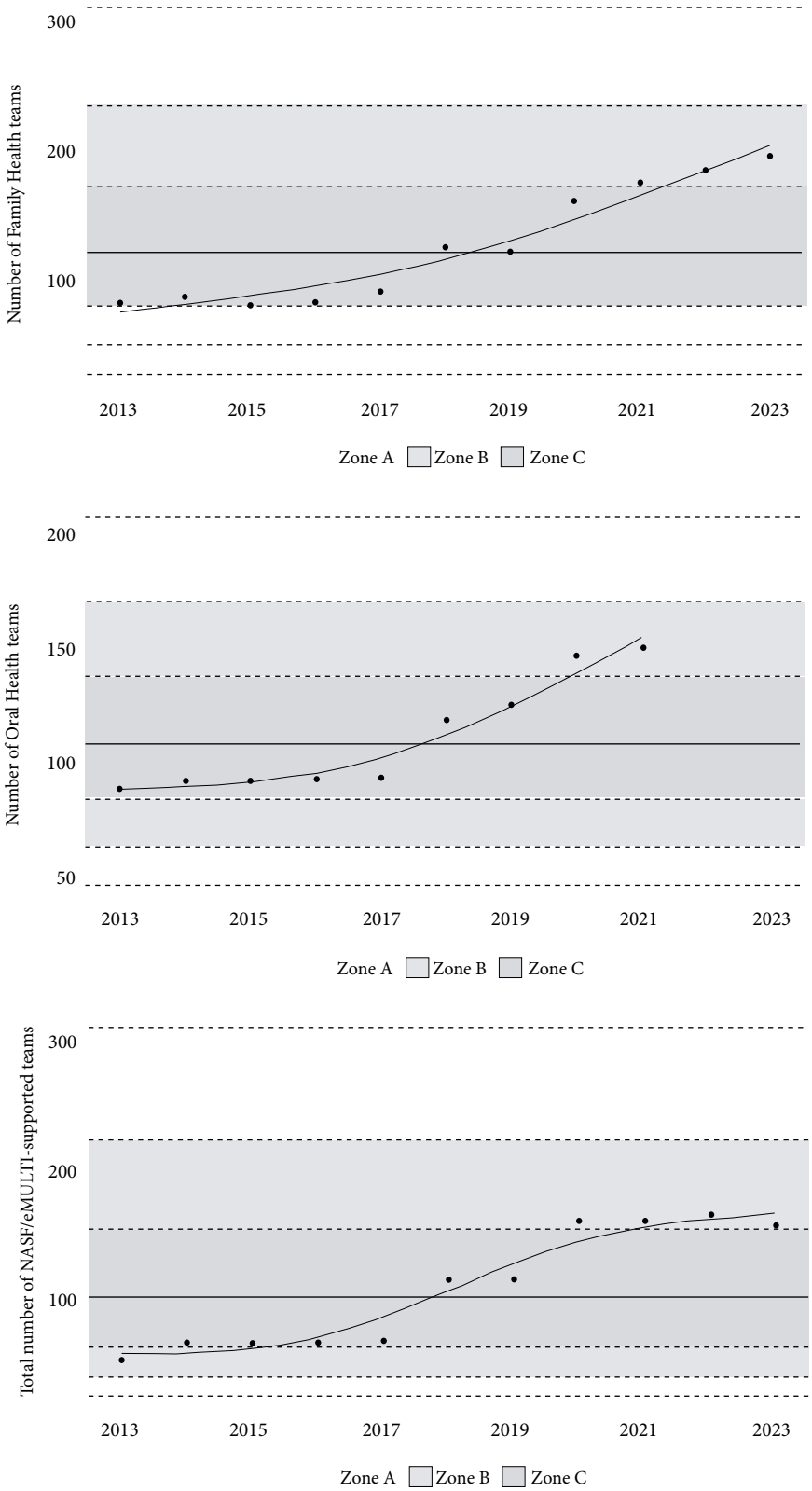


Figure 1. Control chart and generalized additive model (GAM) – black line, adjusted for the number of eSF, eSB, and eMULTI in Campo Grande-MS from 2013 to 2023.

Source: Annual Management Report of the Municipality of Campo Grande-MS, 2013 to 2023.

that represents the adjusted GAM model (Figure 1) shows a growth phase in the number of teams until 2020, followed by a stabilization until 2023. Growth can be noted in the municipality of 42 primary care teams supported in 2013 to 160 in 2020 (an increase of 281.4%), fluctuating around this number until 2023, indicating stability.

Data from teams created each year were also analyzed (Table 2). We observe that 105 eSFs and 76 eSBs were created in the period studied, with 41.9% and 53.9% of eSFs and eSBs, respectively, created in 2018. The second year with the most significant expansion of teams was 2020, with an increase of 16.2% and 21.1% in eSFs and eSBs, respectively. Regarding eSFs, considerable growth was also observed in 2019 (11.4%) and 2023 (11.4%). Concerning eMULTI teams created, no significant trends were observed over time either. However, the most significant expansion years were 2018 (43.1% of new teams) and 2020 (40.7% of new teams). In May 2023, the publication of Ordinance GM/MS 635 led to need to adapt the existing teams for approval by the Ministry of Health. The modality adopted, workload composition, link with the number of teams, and existing human resources were considered. Thus, nine primary care teams previously supported and not within the criteria set out in the Ordinance were no longer supported by the eMULTI.

Figure 2 shows how the expansion of PHC teams occurred in the neighborhoods of Campo Grande from 2013 to 2023, the units that existed before 2013, and the areas that did not have coverage of primary care services. It also presents the map of Campo Grande with the SEI by neighborhood of Sauer *et al.*[10] for comparison purposes with data found in this study.

Figure 3 shows the expansion of teams in the municipality from 2013 to 2023 by SEI of the neighborhoods. In the period analyzed, 24.8%, 27.6%, and 25.2% of expansions in eSFs, eSBs, and eMULTIs, respectively, occurred in neighborhoods with more significant social exclusion (SEI between 0.74 and 0.96). While 41.0% 39.5%, and 32.5% occurred in neighborhoods with SEI between 0.45 and 0.61. The municipality has 3 (three) health units in rural areas, which were not categorized by SEI.

The number of eSFs created annually by SEI can be seen in Table 3. Considering the SEI, we can observe a variation in the expansion distribution between the years. For example, in 2022, 75.0% of eight teams created were established in neighborhoods with high social vulnerability. In 2023, 75.0% of the 12 teams created were in neighborhoods with lower social vulnerability, characterized by SEI between 0.45 and 0.61, while the remaining 25.0% were implemented in neighborhoods with SEI ranging from 0.61 and 0.74. Table 3 also presents the expansions of the eSB. Also, in this case, there is a variation in the annual expansion distribution, considering the

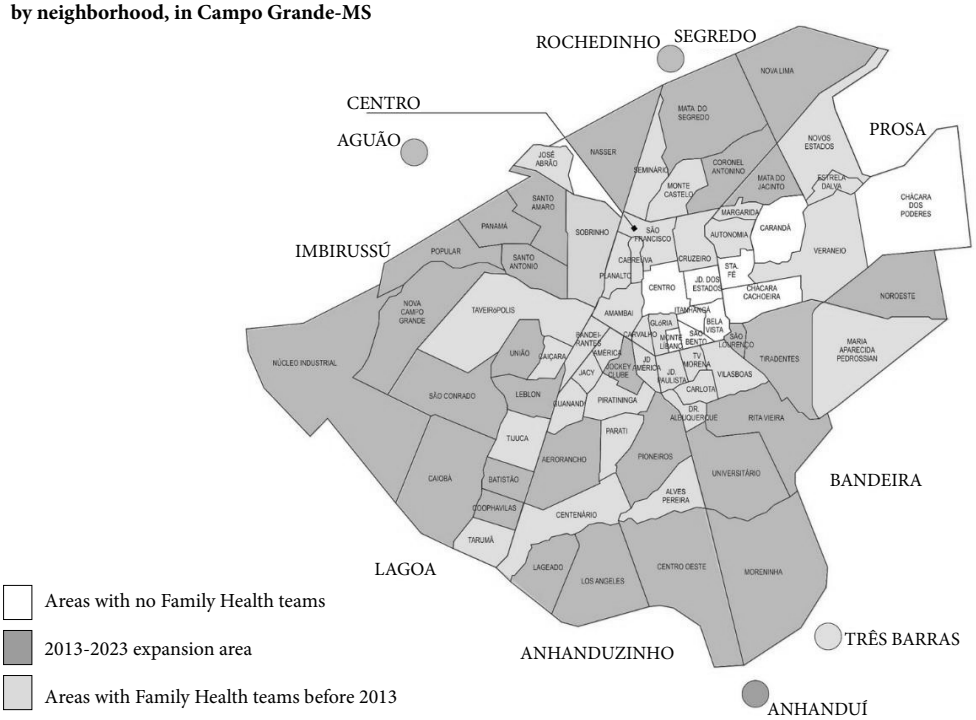
Table 2. Number of supported Family Health, Oral Health and eMULTI-supported teams created in Campo Grande-MS, from 2013 to 2023.

Ano	Family Health Teams created		Oral Health Teams created		eMULTI-supported teams created	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
2013	1	1.0%	1	1.3%	-	-
2014	1	1.0%	1	1.3%	15	12.2%
2015	3	2.9%	2	2.6%	0	0.0%
2016	2	1.9%	2	2.6%	0	0.0%
2017	0	0.0%	1	1.3%	0	0.0%
2018	44	41.9%	41	53.9%	53	43.1%
2019	12	11.4%	6	7.9%	0	0.0%
2020	17	16.2%	16	21.1%	50	40.7%
2021	5	4.8%	2	2.6%	0	0.0%
2022	8	7.6%	4	5.3%	5	4.1%
2023	12	11.4%	0	0.0%	-9*	*
Total	105	100.0%	76	100.0%	123	100.0%

*Reducing nine eMULTI teams to adapt to the new Ministerial Ordinance.

Source: Annual Management Report of the Municipality of Campo Grande-MS, 2013 to 2023 and e-Gestor AB/MS.

Perception of areas covered by Family Health teams, by neighborhood, in Campo Grande-MS



Perception of areas covered by the Oral Health teams, by neighborhood, in Campo Grande-MS

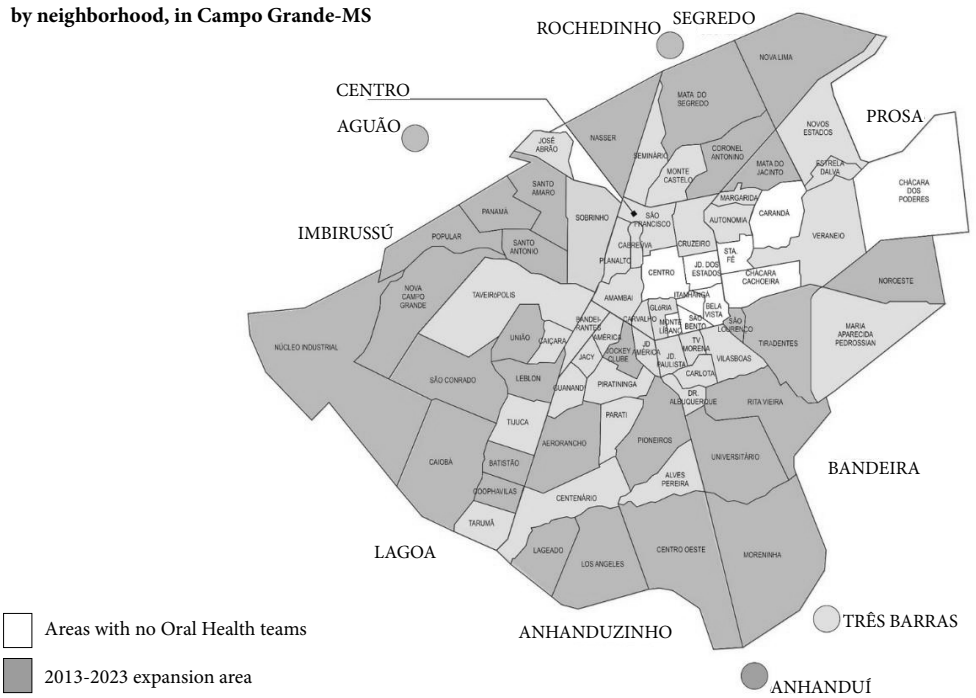


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Figure 2. Map demonstrating the expansion of Family Health, Oral Health, and eMULTI teams and social exclusion index map, by neighborhood in Campo Grande-MS.

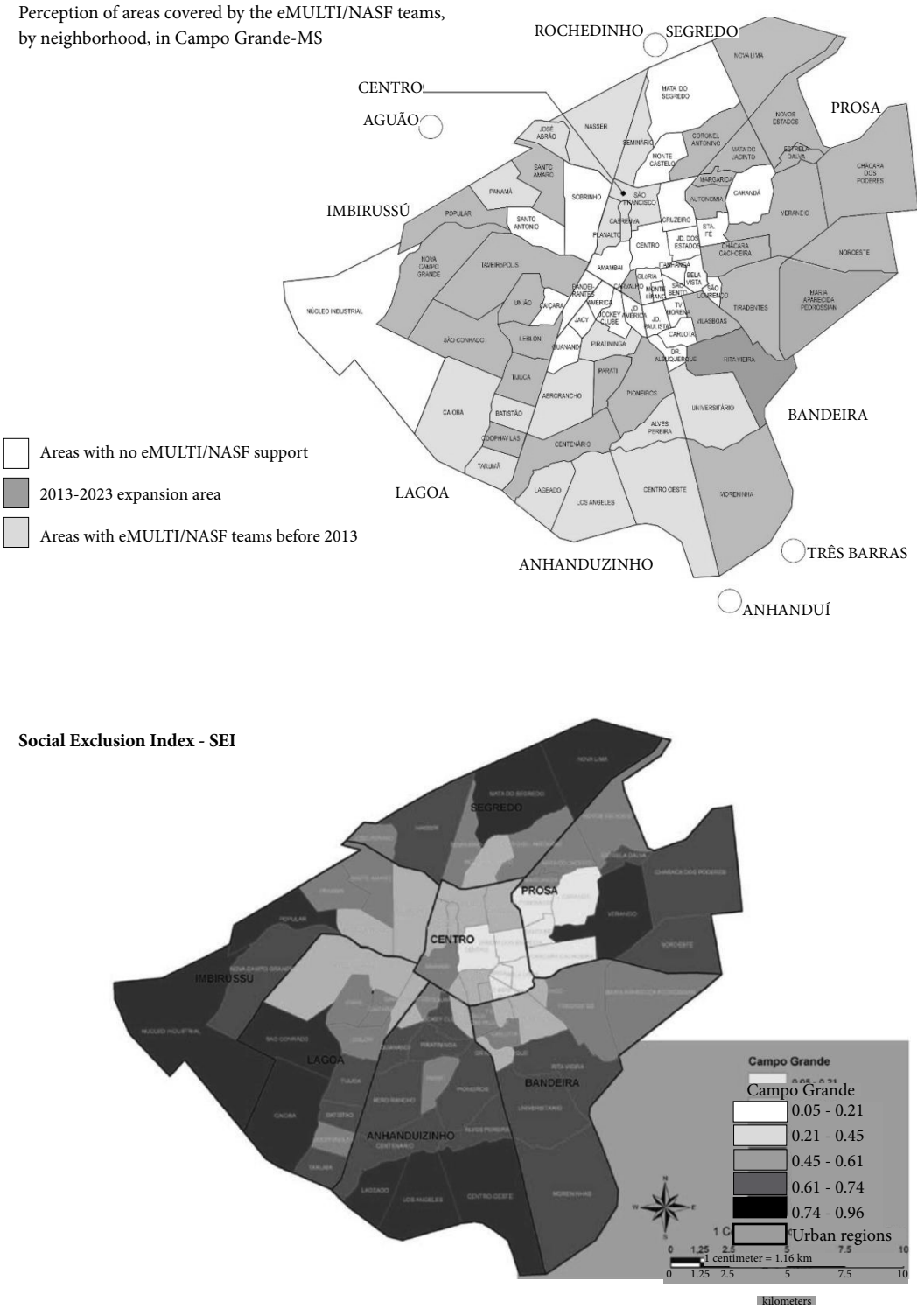


Figure 2. Map demonstrating the expansion of Family Health, Oral Health, and eMULTI teams and social exclusion index map, by neighborhood in Campo Grande-MS.

Source: Annual Management Report of the Municipality of Campo Grande-MS and Sauer *et al.*[10].

SEI. In 2021, for example, two teams were created in neighborhoods with SEI between 0.61 and 0.74, and in 2022, four teams were created in more vulnerable neighborhoods (SEI between 0.74 and 0.96). Regarding the eMULTI-supported teams, expansions were observed in 2014 (with 80.4% in neighborhoods with greater social vulnerability), 2018 (with 18.9% in neighborhoods with greater social vulnerability), 2020 (with 18.0% in neighborhoods with greater social vulnerability), and 2022 (with none in more vulnerable neighborhoods), as per Table 3.

Figure 4 corresponds to the potential coverage of Primary Care by Health District in Campo Grande-MS. This coverage corresponds to all PHC teams, including eSF teams, Prison Primary Care teams (eAPP), Street Clinic teams (eCR), and Primary Care teams (EAP), reaching 86.75% coverage relative to the population of 916,001 inhabitants (e-GESTOR), per the Technical Note N° 301/2022-CGESF/DESF/SAPS/MS, showing the potential increase in the municipality's coverage, of 35% on average before 2013, increasing to 86.75% in 2023.

Discussion

Campo Grande-MS provides services as recommended by the Ministry of Health, under Ordinance No. 2436 of September 21,2017[6], and primary care units (EAP), family health units (eSF), Prison PHC (eAPP), and Street Clinic (eCR) coexist in PHC. Currently, in 2023, the Primary Care Network comprises 74 health units distributed in the seven Health Districts, 197 eSFs, 147 oral health teams in the eSF (eSB), 55 EAPs, 20 EAPs with Oral Health, 7 eAPPs, 1 eCR, and 14 eMULTIs.

A significant increase was observed in the number of eSFs in Campo Grande from 2013 to 2023 ($p<0.0001$; $R^2=0.9411$) after adopting the family health model in 1999. The number of eSFs increased from 86 in 2013 to 197 in 2023. We also noted a significant growth in the number of eSBs in Campo Grande from 2013 to 2021 ($p<0.0001$; $R^2=0.9416$). The number of eSBs increased from 88 in 2013 to 150 in 2021. The municipality's most significant expansion of eSFs and eSBs was recorded in 2018, with 44 eSFs and 41 eSBs being created. However, this increase occurred due to the transformation of the existing

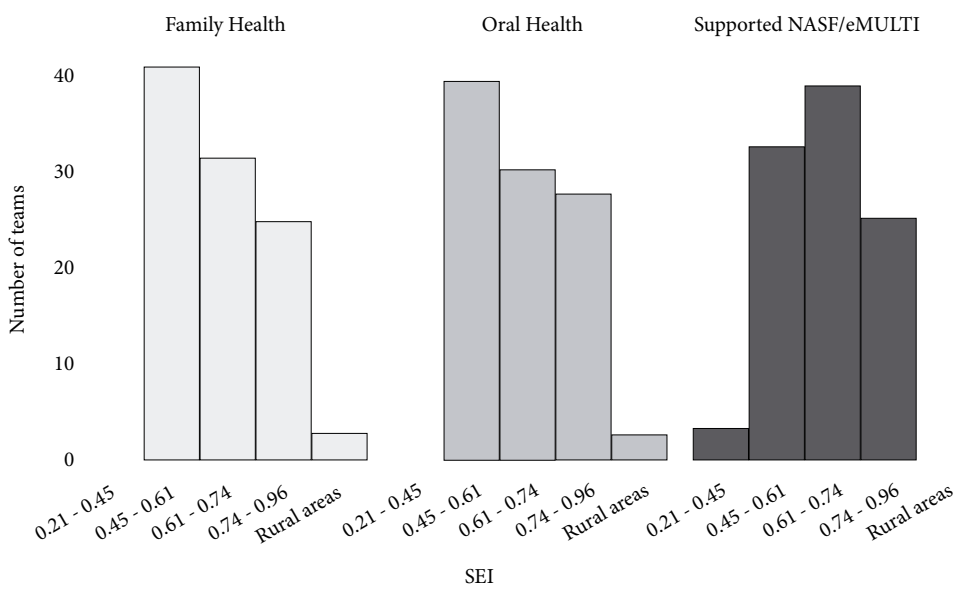


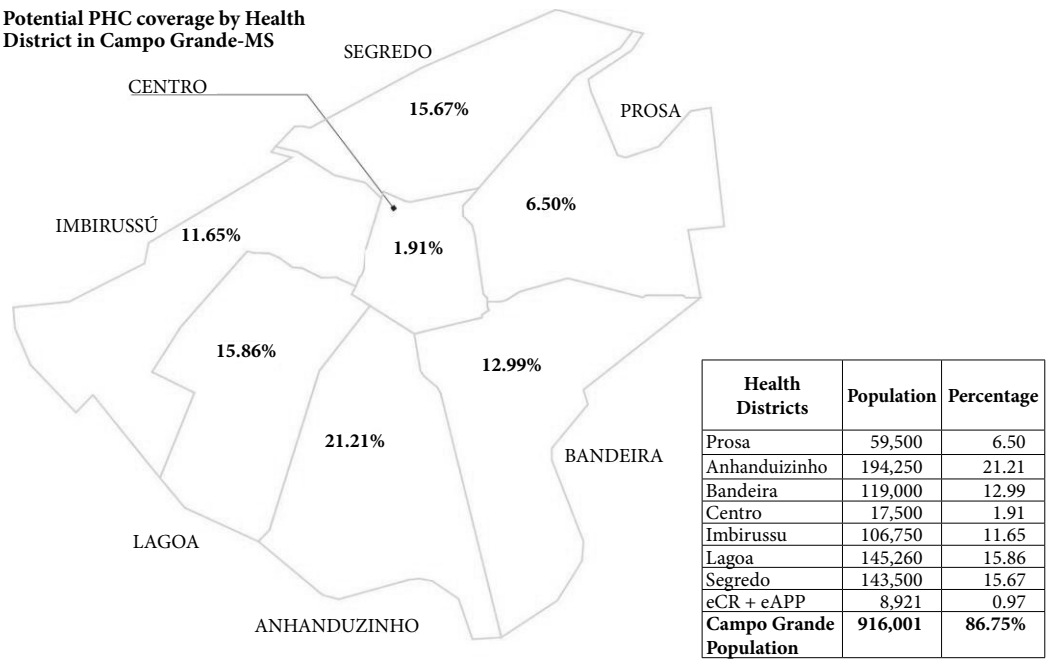
Figure 3. Distribution of ESF and Oral Health teams created in Campo Grande-MS, from 2013 to 2023, by social exclusion index (SEI).

Source: Annual Management Report of the Municipality of Campo Grande-MS and e-Gestor AB/MS.

Table 3. Number and percentage of supported Family Health, Oral Health, and eMULTI-supported teams created in Campo Grande-MS, by category of the social exclusion index (SEI) from 2013 to 2023.

Year	SEI					Total
	0.21-0.45	0.45-0.61	0.61-0.74	0.74-0.96	Rural areas	
Family Health						
2013-2016	0 (0.0%)	2 (28.6%)	1 (14.3%)	2 (28.6%)	2 (28.6%)	7 (100.0%)
2017-2020	0 (0.0%)	31 (42.5%)	24 (32.9%)	18 (24.7%)	0 (0.0%)	73 (100.0%)
2021-2023	0 (0.0%)	10 (40.0%)	8 (32.0%)	6 (24.0%)	1 (4.0%)	25 (100.0%)
Total	0 (0.0%)	43 (41.0%)	33 (31.4%)	26 (24.8%)	3 (2.9%)	105 (100.0%)
Oral Health						
2013-2016	0 (0.0%)	1 (16.7%)	1 (16.7%)	2 (33.3%)	2 (33.3%)	6 (100.0%)
2017-2020	0 (0.0%)	29 (45.3%)	20 (31.2%)	15 (23.4%)	0 (0.0%)	64 (100.0%)
2021-2023	0 (0.0%)	0 (0.0%)	2 (33.3%)	4 (66.7%)	0 (0.0%)	6 (100.0%)
Total	0 (0.0%)	30 (39.5%)	23 (30.3%)	21 (27.6%)	2 (2.6%)	76 (100.0%)
eMULTI						
2013-2016	0 (0.0%)	3 (20.0%)	0 (0.0%)	12 (80.0%)	0 (0.0%)	15 (100.0%)
2017-2020	4 (3.9%)	37 (35.9%)	43 (41.7%)	19 (18.4%)	0 (0.0%)	103 (100.0%)
2021-2023	-3 (-)	-1 (-)	0 (-)	0 (-)	0 (-)	-4 (-)
Total	4 (3.4%)	40 (33.9%)	43 (36.4%)	31 (26.3%)	0 (0.0%)	118 (100.0%)

Source: Annual Management Report of the Municipality of Campo Grande-MS, 2013 to 2023 and e-Gestor AB/MS



Health Districts	Population	Percentage
Prosa	59,500	6.50
Anhanduizinho	194,250	21.21
Bandeira	119,000	12.99
Centro	17,500	1.91
Imbirussu	106,750	11.65
Lagoa	145,260	15.86
Segredo	143,500	15.67
eCR + eAPP	8,921	0.97
Campo Grande Population	**916,001**	**86.75%**

Figure 4. Potential Primary Care Coverage by Health District in Campo Grande-MS, 2023.

Source: e-Gestor and data from the Municipality of Campo Grande-MS.

traditional model Primary Care Units (with resources already working people) into Units with eSF, not impacting the municipality's coverage percentage, which remained below 40%. This growth resulted from a decision by the municipal management to strengthen and improve the PHC

resolution and due to the availability of human resources that already comprised these traditional units without increasing expenses.

The second-greatest expansion was from 2019 to 2020, with both eSFs and eSBs being created, when the RMFC program was also expanded, and the creation of the RMSF Program through an agreement signed between Campo Grande and the RMFC program in Rio de Janeiro and FIOCRUZ, which financed the project and qualified the program, investing in hiring preceptors for residency programs, restructuring the work process in the health units listed to become training settings, and improving physical structures and equipment. Therefore, this expansion through the RMFC and RMFC program promoted a growing number of teams in the municipality with new professionals. This strategy provided the most significant PHC coverage increase. Besides this, residency programs impact the professional qualification of the ESF with results in the quality of care and effective improvement in PHC results[12,13].

Along with the training program for health professionals to strengthen PHC, health units operating under the traditional model were transformed into family health units, culminating with a potential coverage of 86.75% of Primary Care teams in 2023.

Given this evolution of the significant increase in the number of eSFs, eSBs, and eMULTI-supported teams, Campo Grande-MS achieved an admirable evolution in the national ranking of PHC coverage, moving from 27th place among the capitals to sixth place in 2022, as available in the report through the Ministry of Health's e-Gestor system. The expanded family health can improve the guarantee to users for the first contact, care longitudinality, and coordination as teams perform their activities in defined geographical areas with assigned populations, building bonds and recognizing users' needs in that region[14].

The nine units that house the RMFC and RMFC Programs were implemented in areas where the SEI ranges from indices of 0.45 to 0.74, and two units are in areas of greater vulnerability (0.74-0.96) under this same index. The SEI is an essential tool for municipal management as it signals the most significant social exclusion areas, which should receive greater investments to improve the quality of life. Health units in these locations, besides health care actions, can act as a community support resource to request actions from public authorities to improve the living conditions of this population.

We observed in the study that 24.8%, 27.6%, and 25.2% of eSFs, eSBs, and eMULTIs created in the analyzed period, respectively, occurred in neighborhoods with more significant social exclusion (SEI from 0.74 to 0.96). While 41.0%, 39.5%, and 32.5% of eSFs, eSBs, and eMULTI created in the period analyzed, respectively, occurred in neighborhoods with SEI from 0.45 to 0.61 – this is because, during this study period – the eSFs were expanded and transformed based on the existing units, leaving out the coverage of the territories with lower SEIs. In late 2023, complete coverage was achieved in areas with SEI from 0.74 to 0.96 (most vulnerable). The scope of these coverages can be seen in Figure 2.

The eMULTI teams also increased, especially in 2018 and 2020, a period of more significant expansion, as occurred in the eSFs, due to the decision of the municipal management and the creation of the RMFC Program. In 2023, the number of teams declined against 2022. It is necessary to point out that, in 2019, with the implementation of the then PHC financing model, *Previne Brasil*, the transfer of funds to this type of team was extinguished, leading to the disqualification of these services in municipalities. Municipal management, understanding the relevance of these multidisciplinary teams in PHC, assumed their costs until the publication of Ordinance GM/MS No. 635, of 22/05/2023, which once again pays for multidisciplinary teams to work in PHC, with the transfer of federal incentives[15]. Thus, the reduction mentioned only occurred due to the need to adapt the old NASF teams, per the Ordinance mentioned above, as it increased the workload of each eMULTI team.

These eMULTI teams can expand the scope of practices, improving the resolution of health teams and acting towards comprehensive care, focusing on the needs of the territories. Also, with the publication of this Ordinance, the multidisciplinary teams increased their responsibilities, acting formally as matrix providers of eSFs and remote care.

Regarding the expansion of access in areas of greatest vulnerability, we can observe that in 2023, we identified full family health coverage in the areas with the highest SEI. A study in two developed countries (Canada and the United States) on PHC actions corroborates the relevance of teams working in areas of more significant social exclusion to reduce social risks, besides providing guidance on PHC for the community, expanding equity and social and economic development in that region, focusing on approaches based on the community's potential[16].

Persevering in public policies to expand family health coverage to the entire territory, especially for the most vulnerable, provides better access for the population and minimizes social exclusion. The strategies that Campo Grande-MS adopted with the transformation of traditional family health units and the creation of RMFC and RMSF programs were crucial to the effective expansion of eSFs, eSBs, and eMULTIs.

Therefore, technical and financial articulation for expanding family health is vital for improving the physical structure and materials for the units, and investing in continuing education facilitates the motivation to organize care for the territory. However, the challenge lies in sustaining similar initiatives without the necessary financial support.

Final considerations

Municipal management invested efforts in expanding PHC in the municipality, thus promoting the population's access to these services, especially in recent years, creating new teams in family health units. It also undertook the maintenance of multidisciplinary teams, even without specific funding from the federal level, as it understood the need for such professionals in comprehensive care for the population. Today, 86.75% of the population has access to PHC services in the municipality. This expansion was sustained by outlined strategies for strengthening PHC through medical and multidisciplinary residency programs in order to qualify health professionals and improve the eSFs' resolution. This expansion required continued efforts from the municipality's health management, which at the same time has been readjusting work processes in the territories and monitoring health indicators. Adopting the social exclusion criterion helped management implement eSF in vulnerable areas. Thus, it was possible to reduce inequalities as these populations were recognized and included in social programs such as the *Bolsa Família*, besides having powerful channels to give voice to inadequate living conditions.

Collaborations

APGL Resende contributed to the conception and final draft. LAI Geniole contributed to the research and drafting. TFC Abdo contributed to the methodology and review. AG Galeano contributed to the research and drafting. GA Pereira contributed to the research and drafting. LCL Justino contributed to the drafting and final draft.

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