

Association between psychiatric hospitalizations, coverage of psychosocial care centers (CAPS) and primary health care (PHC) in metropolitan regions of Rio de Janeiro (RJ) and São Paulo (SP), Brazil

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Abstract *To analyze the association between the coverage of psychosocial care centers (CAPS) and Primary Health Care (PHC) and the number of psychiatric hospitalizations in the metropolitan regions of the capitals of Rio de Janeiro (RJ) and São Paulo (SP) states. This is an ecological time-series study with population consisting of dwellers of metropolitan areas of the municipalities of RJ and SP hospitalized in the Unified Health System (SUS). Secondary data were collected from DATASUS and IBGE portal and indicators calculated (CAPS supply, PHC coverage, provision of psychiatric beds and psychiatric hospitalization rates). Indicators' time trends and the association between CAPS and PHC coverage and hospitalization rates were calculated. Reduced psychiatric hospitalizations rates and psychiatric beds and increased CAPS and PHC coverage were observed in the two location under study, with inverse and statistically significant association. Results confirmed the hypothesis of association between increasing CAPS and PHC supply with decreased psychiatric hospitalization rates, in the study's period and regions. This finding reinforces the importance of continuous and improved health and psychiatric reform-related policies.*

Key words *Mental health, Primary health care, Hospitalization*

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Introduction

In Brazil, psychiatric and health reforms movements occurred in parallel. They started in the 1970s and their fundamental proposals were changes in the health care model, equity and participation of users and workers in the management process. The Psychosocial Care Centers (CAPS) emerged in Brazil in the 1980s and were regulated in 1992 through Ordinance MS 224/92¹ with a view to ensuring a territory-based care and replacing hospital services, offering intensive care to psychic suffering carriers².

Family Health³ was the priority strategy to expand and consolidate the National Primary Health Care Policy, which includes care for people with mental disorders. The prevalence of mental disorders is high in the adult population – a Brazilian systematic review found values between 20% and 56%, with a major impact on women and workers⁴. Considering not only the frequency, but also the longitudinal development of these diseases, we can conclude that they are a major contributor to the burden of total disease worldwide⁵.

In 2011, there were important changes in the Unified Health System (SUS) with the establishment of the Health Care Networks strategy, and the Psychosocial Care Network (RAPS) was one of the priorities. This status provided the largest financial investment, of 200 million reais, both for the cost of the existing network and the improvement of existing services⁶.

As public policies are implemented, studies are required to evaluate the implementation and effectiveness of services, as well as the development of indices and rates for this analysis. Despite the relevance, studies that evaluate the effectiveness of substitutive services to asylum institutions are scarce. Some studies that related the implantation of CAPS and its effects in the psychiatric hospitalizations found divergent results, sometimes evidencing a positive association between the implementation of CAPS and other RAPS components and decreasing number of hospitalizations, and some other times not finding any association whatsoever⁷⁻¹¹.

Another factor that needs to be considered in this analysis since it may influence the number of psychiatric hospitalizations is the availability of hospitalization beds. In Brazil, there were fewer beds available for psychiatric hospitalization, dropping from 51,393 in 2002 to 32,284 in 2011. This fall is compatible with the precepts of the Psychiatric Reform¹². A study by Fagun-

des Júnior¹³ shows a reduction of approximately 2,400 psychiatric beds in the city of Rio de Janeiro in the last fifteen years; in the same period, hospitalizations fell from 42,762 in 2002 to 20,404 in 2012¹³. The state of São Paulo has also the largest number of psychiatric hospitals in the country, with 55 facilities, representing 29% of the national total, followed by the state of Rio de Janeiro, with 29, representing 15%. In the southern and southeastern regions of Brazil, a third of psychiatric hospitals are large, mostly consisting of chronic hospitalization beds¹⁴. According to the Ministry of Health, the focus of the bed reduction policy is centered on those with long-term stay¹⁴. Thus, a priori, the reduced number of beds would not be sufficient to explain the falling numbers of psychiatric hospitalizations in most of the settings; however, this factor should be considered in the analysis. The study conducted by Gastal *et al.*⁹ found results that corroborate with this assertion.

This study is justified by the scarce works that aim to evaluate the association between the psychosocial and primary health care network coverage indicators and outcomes related to psychiatric hospitalizations. It aims to analyze the association between increased coverage of CAPS and PHC and decreased number of psychiatric hospitalizations in the metropolitan regions of the capitals of the states of Rio de Janeiro and São Paulo.

Methodology

The study population was composed of residents of the metropolitan areas of the municipalities of Rio de Janeiro (RMRJ) and of São Paulo (RMSP) hospitalized under the SUS. Main diagnosis hospitalizations were classified according to the International Statistical Classification of Diseases and Related Health Problems - 10th edition (ICD-10), in groups F10 to F19 (mental and behavioral disorders due to the use of psychoactive substance), F20 to F29 (schizophrenia, schizotypal disorders and delusional disorders) and F30 and 39 (mood disorders). The choice of study location was due to both the better quality of data in the region and the population representation.

This is an ecological time-series study that analyzes the effects of psychiatric and health reforms over time and in this context. The 2008-2015 period was limited by data availability. The hypothesis tested was that there is an association between the supply of CAPS and PHC and hos-

pitalization rates in these two metropolitan regions.

Data sources used were the Hospital Information System of the SUS (SIH-SUS), the National Registry of Health Establishments (CNES), the PHC Information System (SIAB) and the Demographic Census made available through the DATASUS portal (<http://www2.datasus.gov.br>) and the Brazilian Institute of Geography and Statistics (IBGE) (<http://censo2010.ibge.gov.br>). Data obtained were number of CAPS, proportion of PHC coverage, number of psychiatric hospitalizations discriminated by ICD10 as F10 to 39, number of psychiatric beds and resident populations in the studied areas. This information was used to calculate CAPS supply, PHC coverage, psychiatric bed supply, and psychiatric hospitalization rate indicators.

The CAPS supply was calculated by the ratio of the median number of CAPS to the resident population, multiplied by one million inhabitants. The median was used to reduce swings at the extremities of each year, since DATASUS data are made available monthly. Due to the small number of CAPS, the indicator was defined for 1 million inhabitants, allowing a better interpretation of the results. We chose not to use the "CAPS coverage rate" indicator in DATASUS as this information covered a period shorter than the study period. PHC coverage is one of the indicators defined by the Ministry of Health, which is calculated by adding the total number of complete and equivalent family health teams and 3,000 over the population in the same place and period multiplied by 100¹⁵. The supply of psychiatric beds was calculated by the ratio between the number of psychiatric beds and the resident population per hundred thousand inhabitants. The rate of psychiatric hospitalizations was obtained from the ratio between the number of psychiatric hospitalizations and the resident population per hundred thousand inhabitants. The resident population of the studied metropolitan regions was used for the denominator of indicators, since the services analyzed work under the territory rationale.

The annual female census ratios and estimates made available by IBGE were used for stratification by gender between 2008 and 2012. Since these estimates are not available in the period 2013-2015, the gender ratio was considered and a prediction model was used to estimate the proportions between genders. For each RM, a cubic spline with 5 degrees of freedom was adjusted to female proportions between 2000 and 2012.

The female proportions for 2013-2015 were obtained from the predictions of this model.

Time trends were calculated in the period studied for the supply of CAPS, PHC coverage, psychiatric beds and psychiatric hospitalization rates. Linear regression models were used for rates' natural logarithm to estimate the association between CAPS and PHC coverage and hospitalization rates. This transformation allows the interpretation of regression coefficients in terms of percentage variation. The supply of beds and PHC coverage were considered as an adjustment for the association between CAPS and hospitalization rates, but due to the high collinearity between beds supply, AB and CAPS, these could not be maintained in the multivariate model and, therefore, we opted for independent analyses for these variables.

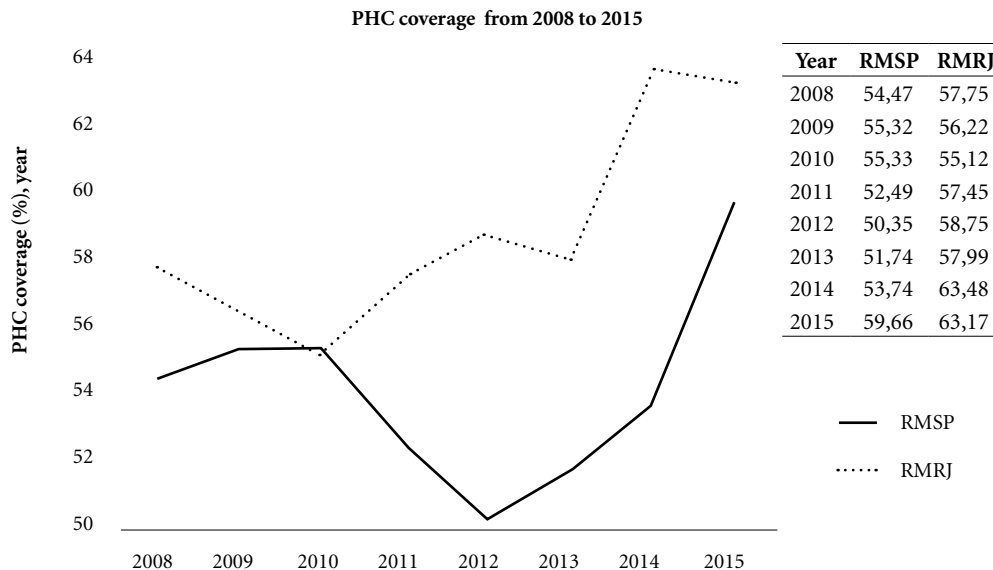
This observational study was conducted entirely based on aggregate population data for outcomes, exposures, and confounding variables and, therefore, posed no risk to individuals. Thus, this has been performed within ethical standards.

Results

Reduced rates of psychiatric hospitalizations were observed in the two metropolitan areas studied. The group of psychotic disorders was the one that showed the highest rates of hospitalizations, as well as a more pronounced drop, especially in the years 2008 to 2009. Regarding gender, there was a predominance of males in the psychotic disorders and the alcohol and other drugs groups, and females in the group of mood disorders (Graph 1).

The hypotheses of a decreasing trend in the number of hospitalizations were tested and the fall was statistically significant in all the groups for RMRJ, as well as for the groups of psychotic disorders between men and mood disorders in both genders in the RMSP. In the latter, the time trend was stable for the group of alcohol and other drugs in both genders and psychotic disorders among women. Among the diagnostic groups, the most homogeneous in reduced hospitalization rates were mood disorders, with negative and statistically significant regression coefficients for both genders and in the two metropolitan regions (Graph 2).

CAPS coverage increased in both metropolitan regions as of 2009. At the onset of the period, the RMRJ showed greater CAPS coverage than RMSP. As of 2011, this ratio was reversed.



Graph 1. CAPS coverage (3A), PHC coverage (3B) in the metropolitan areas of São Paulo and Rio de Janeiro, from 2008 to 2015.

PHC increased in the two regions studied, starting in 2012 in the RMSP and 2010 in the RMRJ, with the latter region displaying higher values throughout the period. The number of beds provided for hospitalization for psychiatric disorders showed higher numbers in RMRJ in relation to RMSP. Both showed declines in these values in the period studied, and the first one had a more pronounced fall from 2011 (Graph 3).

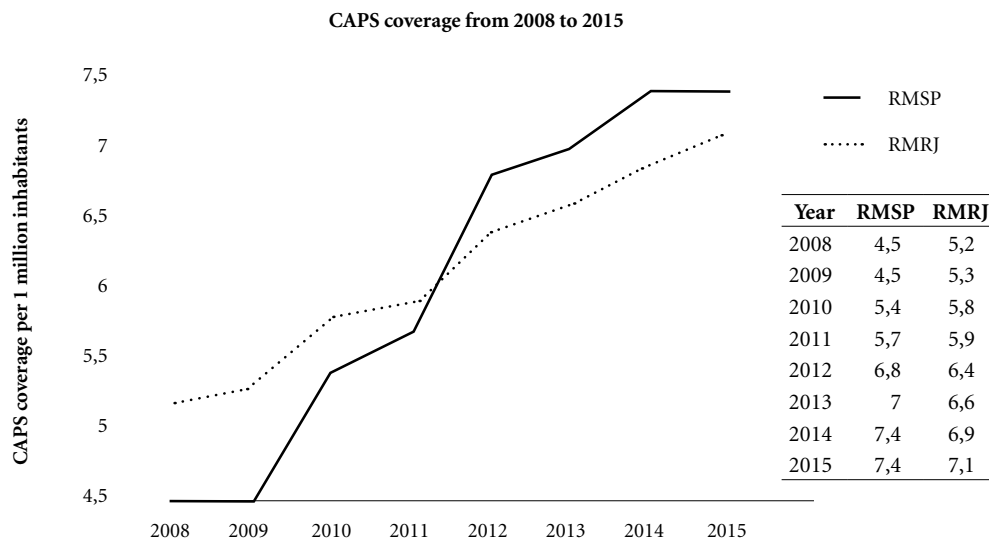
When analyzing the relationship between CAPS supply and hospitalization rates, the results pointed to an inverse and statistically significant association for all the diagnostic groups studied, for both males and females, in the two metropolitan regions, except for the alcohol and other drugs group in the RMSP. Second-degree polynomial terms for assessing non-linear trends were tested in all analyses and found to be non-significant (Graph 4).

When analyzing the relationship between PHC supply and hospitalization rates, an inverse and statistically significant association was found for alcohol and other drug groups among males in both metropolitan regions and female mood disorders in RMRJ (Graph 5).

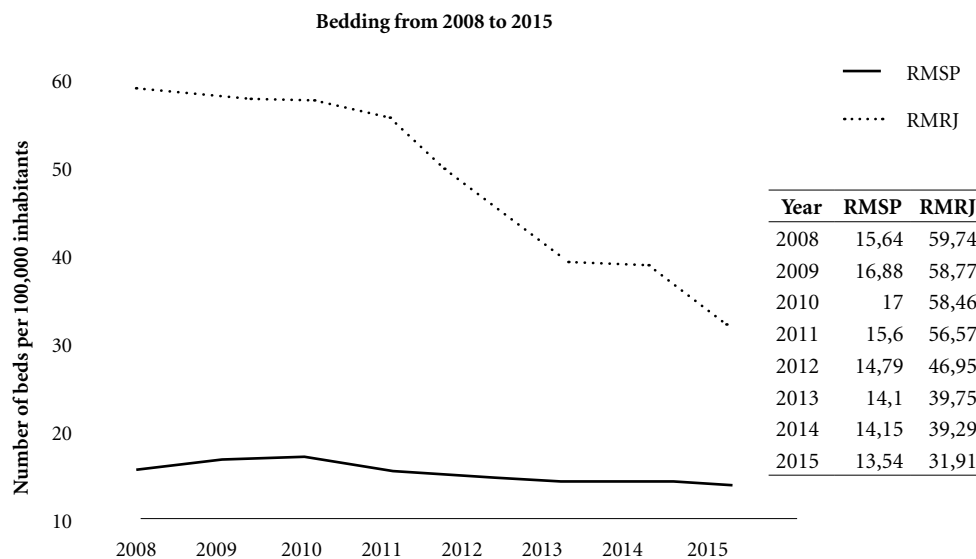
Discussion

When differentiated by diagnostic groups, hospitalization rates were higher in the group of psychotic disorders, followed by alcohol and other drug disorders in males and mood disorders in females. Other studies also found psychotic disorders as the most frequent diagnostic grouping in psychiatric hospitalizations, with the other two diagnostic groups alternating in prevalence in these studies¹⁶⁻¹⁸.

Hospitalization rates were different when stratified by gender. The higher rate of male hospitalizations in the cluster of alcohol and other drug disorders is a finding already described in the literature and can be explained both by sociocultural aspects that contribute to explain the higher prevalence of these disorders in males, as well as by the greater number of psychiatric beds for this gender. In the group of mood disorders evidenced a predominance of females, and male predominance was found in the cluster of psychotic disorders, which is compatible with the higher prevalence of these genders in the respective disorders^{4,11}.



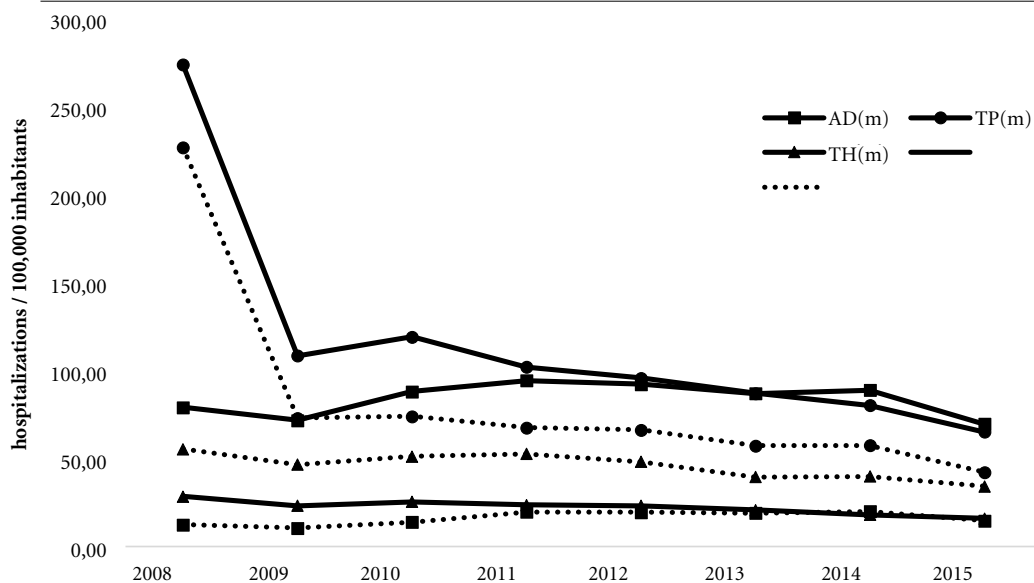
Graph 2. CAPS coverage (3A), PHC coverage (3B) in the metropolitan areas of São Paulo and Rio de Janeiro, from 2008 to 2015.



Graph 3. Association between the CAPS supply and the psychiatric hospitalization rate (absolute values and confidence intervals) due to alcohol and other psychotic and mood disorders in the metropolitan regions of RJ and SP.

The results pointed to increased PHC and CAPS coverage and lower number of beds, which are consistent with the process of implementing services according to the health and psychiatric

reform rationale. These findings corroborate data already submitted by other authors^{12,19,20}. In 2011, the Health Care Networks strategy was established with priority for the Psychosocial Care



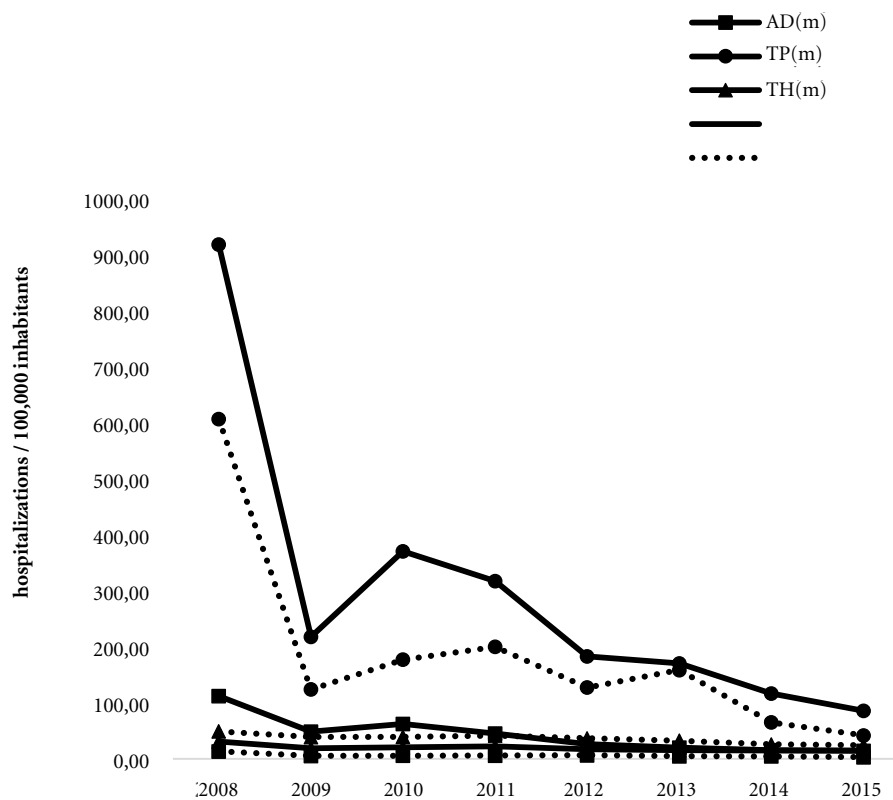
Year	AD(m)	AD(f)	TP (m)	TP (f)	TH(m)	TH(f)
2008	79,68	12,54	275,49	228,27	28,59	55,78
2009	72,13	10,59	109,05	73,49	23,30	46,82
2010	88,62	14,06	119,89	74,38	25,63	51,59
2011	94,95	19,88	102,67	68,06	23,80	53,05
2012	92,86	19,60	96,34	66,77	23,38	48,46
2013	87,53	19,23	87,74	57,61	20,89	39,80
2014	89,51	20,17	80,79	57,92	18,12	40,04
2015	70,09	14,74	65,62	42,56	16,17	34,40

Graph 4. Time distribution of hospitalization rates by gender and main diagnosis of alcohol and other psychotic and mood disorders from 2008 to 2015 in RMSP (1A) and RMRJ (1B).

Network (RAPS)⁶. This consists of nine components, among them the PHC and the psychosocial network, whose main constitutive services are CAPS. In that year, R\$ 200 million were injected to expand and better equip RAPS services, and in parallel, gradually reduce psychiatric beds¹². The association between increased CAPS coverage and reduced hospitalizations was found for all diagnostic groups studied, except for the alcohol and other drugs group in the RMSP. This finding reinforces positively recommendations by the psychiatric reform that provides treatment for people with mental disorders in community-based services. Although CAPS did not show a defined diagnostic profile and were mainly intended for the care of severe patients, patients with psychotic disorders are an important part of these cases. The Psychosocial Care

Centers specifically aimed at the treatment of users of alcohol and other drugs users (CAPS AD) are more recent⁶ and this care network still has important gaps. A study that analyzed the provision of alcohol and other drug services in the city of Rio de Janeiro observed access barriers for 24-hour specialized public services and a shortage of psychiatrists in multidisciplinary teams, as well as the experimental dissemination of private religious or not-religious services and public shelters, in response to the new demands²¹. Patients with mood disorders are found in the different types of CAPS, however, in a smaller amount when compared to the aforementioned diagnostic groups.

The association between reduced number of hospitalizations and increased PHC coverage was significant for the group of alcohol and other



Graph 5. Time distribution of hospitalization rates by gender and main diagnosis of alcohol and other psychotic and mood disorders from 2008 to 2015 in RMSP (1A) and RMRJ (1B).

drug disorders in males in the two metropolitan regions and in the group of mood disorders in females in RMRJ. The literature points to a high prevalence of mood disorders in the population, especially depressive disorders, which are more common in females, as well as alcohol and other drug disorders in males⁴. According to the Ministry of Health (2013), about one in four people

seeking PHC have some mental disorder according to ICD-10. If we consider subclinical cases, this ratio reaches one in every two; when only alcohol-related problems and other drugs are accounted for, these reach approximately one in every ten adults seeking PHC²². Thus, we can reasonably assume that increased PHC supply and coverage would enable more users in psychic suf-

fering to have access to health and treatment services and to develop less frequently towards a deteriorated condition and ensuing hospitalization.

The Brazilian list of hospitalizations for conditions sensitive to primary care was elaborated by the Ministry of Health and aims to establish another tool for PHC evaluation in the country. The current list does not include mental health-related conditions, unlike the three previous Brazilian versions from Minas Gerais, Ceará and Curitiba; such exclusion was justified by the complex Brazilian psychiatric reform process and the heterogeneous implantation of psychiatric care services in different regions of the country. It is important to emphasize that there is no consensus about which diseases should be included in this indicator and what future lists should consider the inclusion of conditions that became subject to the FHT throughout the development of this policy²³.

The association between the number of beds and hospitalization rates was not statistically significant in all analyses. Other studies also showed that bed reduction was not sufficient to explain the lower numbers of hospitalizations, since closed beds are primarily of chronic patients who are often asylum residents^{9,14}.

Limitations of this study were the short time cutout, since public mental health policies with an emphasis on reformist actions were implemented on a larger scale at the national level as of 2001. However, this process is still underway and its monitoring is relevant.

The lack of discrimination of CAPS types to account for the CAPS rate can be considered a negative factor for this indicator, since it is not possible to exclude the Child and Youth Psychosocial Care Centers, which serve a population that hardly contributes to the number of hospitalizations. However, as we are comparing the

regions over time and not between them, this can still be considered a good tool.

The Family Health Care Centers (NASF) were established through Administrative Rule GM154/08 and mainly aim to have as main reason to broaden the scope and outreach of PHC actions, among them mental health actions, increasing its resolution²⁴. Another way to assess the relationship between PHC and psychiatric hospitalizations would be to use quantitative NASF data. The short time between the establishment of these devices and the time cutout chosen for the study, as well as the limited availability of these data in DATASUS made us choose not to use them in this research.

In the period studied, the Federal Government invested in other actions, programs and therapeutic devices, other than the Psychosocial Care Centers and PHC. Mental Health data released by the Ministry of Health show, both in absolute numbers and in available resources, increased residential therapeutic services, NASF, De Volta Para Casa (“*Back Home*”) program, social inclusion through work program, Street Clinics, clinical institutional supervisions, school of supervisors, damage reduction school, among others¹². All of these ultimately aim to provide increased quality of care to mental health network users and their way of working is somehow linked to CAPS or PHC.

Results corroborate with the hypothesis of an association between the increasing trend of CAPS and PHC supply and reduced hospitalization rates in the diagnostic groups under evaluation in the regions and period studied. This finding reinforces the importance of continuity and improvement of policies related to psychiatric and health reform. Other ecological studies with broad time cutouts and in different geographic regions may provide increased scientific knowledge and complement the results found herein.

Collaborations

CR Miliauskas: contribution in the design, interpretation of the results, critical revision, preparation of the text and approval of the final manuscript. DP Faus: contribution in the design, analysis and interpretation of the results, preparation of the text and final approval of the manuscript. L Junkes: contribution in the design, analysis and interpretation of results and approval of the final manuscript. RB Rodrigues: contribution in the conception, interpretation of the results, critical revision, preparation of the text and approval of the final manuscript. W Junger: contribution in the design, analysis and interpretation of results, final approval of the manuscript, guidance and supervision of all phases of the research.

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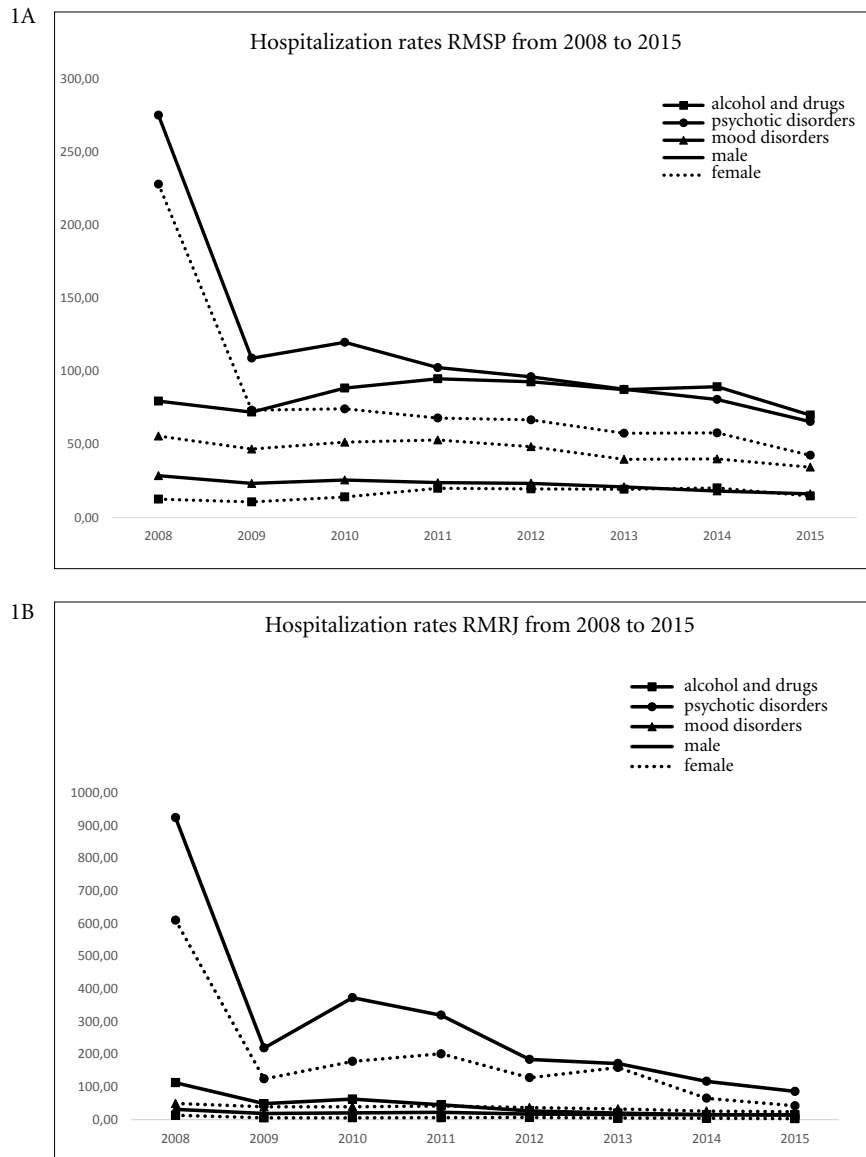


Figure 1. Time distribution of hospitalization rates by gender and main diagnosis of alcohol and other psychotic and mood disorders from 2008 to 2015 in RMSP (1A) and RMRJ (1B).

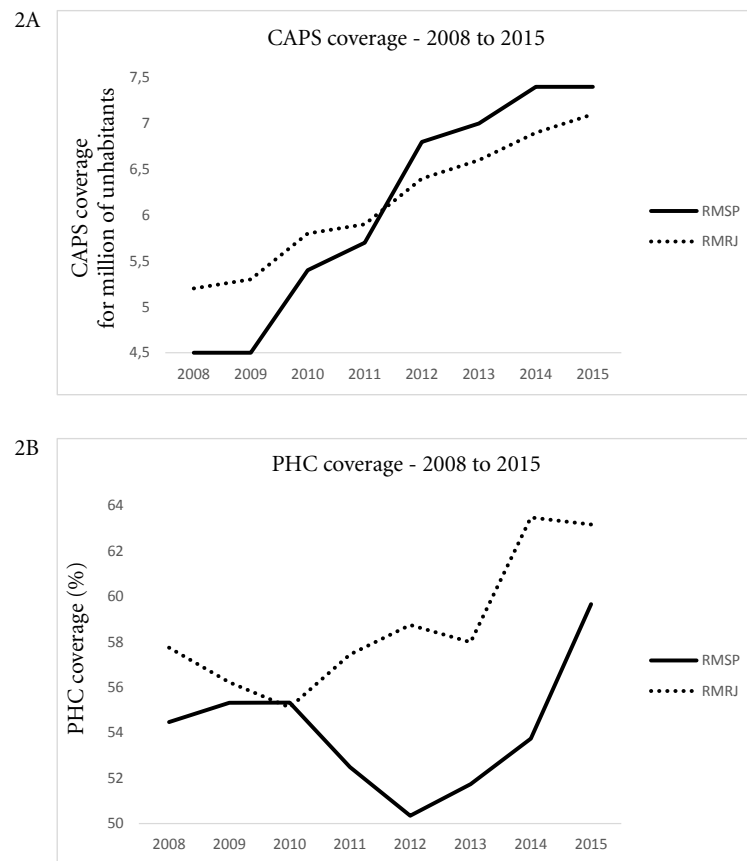


Figure 2. CAPS coverage (2A), PHC coverage (2B) in the metropolitan areas of São Paulo and Rio de Janeiro, from 2008 to 2015.

Table 1. Regression coefficient for trend of series of hospitalization due to alcohol and other drugs, psychotic and mood disorders in the RMRJ and RMSP, from 2008 to 2015.

	Male			Female		
	Alcohol and drugs	Psychotic disorders	Mood disorders	Alcohol and drugs	Psychotic disorders	Mood disorders
RMRJ	-11.96	-84.71	-1.83	-0.93	-52.43	-3.18
RMSP	0.17	-20.39	-1.52	0.94	-17.02	-2.66

bold = $p < 0.05$

Table 2. Association between the CAPS supply and the psychiatric hospitalization rate (absolute values and confidence intervals) due to alcohol and other psychotic and mood disorders in the metropolitan regions of RJ and SP.

		Male								
		Alcohol and drugs			Psychoses			Mood disorders		
		RM	%	CI 95	%	CI 95	%	CI 95		
Hospitalizations	RMRJ	-62.35	-72.95	-47.6	-59.01	-75.98	-30.03	-25.74	-38.59	-10.21
	RMSP	1.89	-7.07	11.72	-23.95	-38.8	-5.48	-11.74	-18.99	-3.85
		Female								
Hospitalizations	RMRJ	-36.06	-56.15	-6.76	-58.95	-79.1	-19.38	-26.65	-36.02	-15.91
	RMSP	16.06	1.18	33.14	-25.66	-43.57	-2.06	-10.22	-17.58	-2.21

Table 3. Association between PHC supply and psychiatric hospitalization rate (absolute values and confidence intervals) due to alcohol and other psychotic and mood disorders in the metropolitan regions of RJ and SP.

		Male								
		Alcohol and drugs			Psychotic disorders			Mood disorders		
		RM	%	CI 95	%	CI 95	%	CI 95		
Hospitalizations	RMRJ	-16.83	-28.8	-2.83	-15.3	-29.07	1.15	-4.5	-10.82	2.27
	RMSP	-3.21	-5.5	-0.86	-2.06	-15.61	13.67	-2.66	-8.27	3.29
		Female								
Hospitalizations	RMRJ	-6.77	-17.1	4.48	-16.33	-30.87	1.27	-6.41	-10.38	-2.25
	RMSP	-4.9	-11.44	2.11	-2.55	-17.97	15.76	-2.48	-7.57	2.9