Hiring Mental Health Professionals: Evidence from a Large-Scale Primary Care Policy in Brazil

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Abstract

This paper assesses the impact of a large-scale national policy (the NASF program) that broadened the scope of services provided by Brazil's main primary healthcare program, integrating mental health services into it. Using a difference-in-differences design that exploits the roll-out of the program across municipalities over time, we show that the NASF program had a positive effect on the supply of non-medical health professionals in primary care services and utilization of services delivered by them, but had smaller effects on the supply of specialist physicians – for mental health professionals, we document a large impact on the supply of psychologists and occupational therapists, and a smaller impact on the supply of psychiatrists. We do not observe any impacts of the policy neither on mental health-related nor on non-mental health related deaths, hospitalizations and days on sick leave. Together, the results indicate that increasing the supply of more scarce health professionals in primary care settings, like psychiatrists, who have higher wage premiums, might be particularly challenging in primary care services, and that increasing the supply of healthcare professionals in primary care and service utilization might not be enough to improve more extreme mental health outcomes.

Resumo

Este trabalho avalia o impacto dos Núcleos de Apoio à Saúde da Família (NASF), uma política que expandiu o leque de serviços oferecidos pelo principal programa de atenção primária à saúde no Brasil, a Estratégia de Saúde da Família, incluindo serviços de saúde mental. Utilizando o método de diferença-em-diferenças, que explora a implementação progressiva no tempo da política nos municípios brasileiros, mostramos que os NASF tiveram um impacto positivo sobre a oferta de profissionais da saúde não-médicos em serviços de atenção primária e sobre a utilização de serviços entregues por eles, mas teve um impacto menor na oferta de médicos especialistas – para profissionais da saúde mental, documentamos um impacto grande sobre a oferta de psicólogos e terapeutas ocupacionais, e um impacto menor sobre a oferta de psiquiatras. Não observamos nenhum impacto da política em óbitos, internações e dias de afastamento por causas relacionadas à saúde mental nem por outras causas. Os resultados sugerem que aumentar a oferta em serviços de atenção primária de profissionais de saúde mais escassos e com salários mais elevados, como psiquiatras, é um desafio e que aumentar a oferta de profissionais e a utilização de serviços pode não ser suficiente para melhorar desfechos mais extremos.

1 Introduction

In the last decades, the global burden of disease attributable to mental disorders has risen rapidly (Patel et al. 2018). Mental and substance-use disorders account for more than 17% of the years lived with disability globally,[1] while suicide mortality remains high (Vos et al. 2020). This is aggravated by the fact that mental and physical health are connected. When mental and physical impairments coexist, health outcomes tend to be worse and associated costs higher. Also, mental disorders may affect decision-making through impaired cognitive function or altered preferences and beliefs (Ridley et al. 2020).

Despite the high burden of mental disorders, substance use disorders and self-harm, the treatment gap in mental health remains very large. In low– and middle–income countries, between 79 and 93% of people with depression and between 85 and 95% of people with anxiety do not access treatment (Esponda et al. 2020). On average, countries spend 1.7% of their health budgets on mental health, and those funds are largely spent on specialized mental hospitals without connections with routine healthcare platforms (Ridley et al. 2020; Patel et al. 2018). To tackle this issue and bridge the treatment gap, the *World Health Organization* advocates for the integration of mental health care across all levels of health care. This entails including mental health services within the basic primary health care packages (WHO 2019). In principle, primary healthcare could contribute to the identification of mental and behavioral disorders as well as to the provision of basic psychosocial and pharmacological services, and to the referral to more specialized care when needed. Yet, these interventions require the presence of mental health professionals in primary care services for the direct provision of care as well as for the supervision and training of other primary healthcare professionals. The supply and recruitment of mental health professionals capable of delivering specialized care in primary healthcare settings nevertheless remain a major challenge for bridging the mental health treatment gap (Patel et al. 2018).

In this article, we investigate the effects of the Family Health Support Nuclei (*Núcleos de Apoio à Saúde da Família*, NASF), a policy that expanded the services provided by Brazil's largest primary healthcare program through the hiring of specialized health professionals. While the policy included different new services into primary healthcare, policy guidelines emphasized mental health as a priority and recommended the inclusion of mental health professionals in all NASFs — psychiatrists, psychologists and occupational therapists (Brazil/Ministry of Health 2010). In that sense, the NASF program should

[1] Results from the Global Burden of Disease study for 2019. Data avalilable on: http://ghdx.healthdata.org/gbd-results-tool.

attract and hire specialized professionals to act at the point of delivery in primary health-care services.

Our empirical strategy exploits the roll-out of NASFs across Brazilian municipalities over time in a staggered difference-in-differences framework. We use the approach proposed by Chaisemartin and D'Haultfœuille (2020), which provides consistent estimators when treatment effects are heterogeneous over time. We provide evidence that supports validity of the underlying parallel trends assumptions in the form of placebo tests that show the absence of pre-treatment trends. We also evaluate different model specifications and provide falsification tests that support the robustness of our results.

We first analyze the impacts of NASFs on the supply of mental health professionals at the municipal level, within and outside primary care services. More specifically, we assess whether the policy increased the supply of professionals, both at the extensive (number of professionals) and at the intensive (mean number of hours worked per professional) margins. We observe an increase in the supply of psychologists and occupational therapists in primary care services. These effects are large in magnitude, persistent over time and robust to different model specifications. For most professionals with increased supply, we also observe that NASFs impacted positively utilization, in the form of more outpatient visits delivered by those professionals. Effects of the policy on the supply of specialist physicians, including psychiatrists, are smaller and imprecisely estimated. We provide descriptive evidence suggesting two factors behind those results. On the one hand, the policy set fixed financial incentives from the federal government to the municipalities, independent of the professionals they hired. Together with higher wages needed to attract physicians, the incentives may have implied recruitment and hiring of less specialized professionals. On the other hand, the results may reflect a higher availability of non-medical health professionals at the local labor market and who are typically not employed in healthcare services. Finally, we assess the effects of NASFs on mortality, hospitalization, and days on sick leave for conditions related to mental health, conditions amenable to primary healthcare and other conditions. We do not observe any significant impacts.

The results have implications for policies aimed at broadening the scope of services delivered in primary healthcare through improved supply of health professionals. Specifically, the results indicate that flat incentives might be insufficient for attracting more qualified professionals that typically rely on better outside options. This is of particular importance for developing countries, such as Brazil, where attracting physicians to primary healthcare in undeserved areas is challenging and requires specific incentives (Costa, Nunes, and Sanches 2019). Regarding mental health interventions specifically, the results are particularly relevant given the relative scarcity of psychiatrists and the higher wage premiums for specialty doctors compared with non-medical professionals. Additionally, the results show that increasing the supply of healthcare professionals and service utilization may not be enough to curb more extreme health outcomes, such as mortality or hospitalizations. Yet, it is important to highlight that mortality and hospitalizations are rather extreme outcomes, even more for mental and behavioral disorders. In that sense, it could be possible that the inclusion of mental healthcare professionals in primary healthcare had positive effects at other relevant dimensions —e.g., better management of care for common mental disorders such as less severe cases of depression or anxiety— that are typically difficult to measure and unfortunately not observable in our data.

This paper contributes to different strands of the health economics literature. First, it contributes to the literature on the supply of health workers (Costa, Nunes, and Sanches 2019; Carrillo and Feres 2019; Ashraf et al. 2020; Antonazzo et al. 2003). Like Carrillo and Feres (2019), we assess the impacts of a policy aimed at increasing the supply of health professionals in the Brazilian primary healthcare sector. While the authors evaluate the impact of a program that focused exclusively on general physicians (the More Physicians Program), we assess the impact of a program that included non-medical professionals and specialty physicians mainly targeted at mental health conditions. Similar to them, we find that increasing the supply of physicians and service utilization might not impact related health outcomes.

The second contribution is to the growing body of research on the impact of large-scale public policies and local interventions on mental health (Ridley et al. 2020; Dias and Fontes 2020; Baranov et al. 2020; Anstreicher 2021; Lang 2013; Haushofer, Mudida, and Shapiro 2020). Reviewing experimental evidence, Ridley et al. (2020) show the positive effects of antipoverty programs on mental health and evidence from Haushofer, Mudida, and Shapiro (2020) suggests those impacts can be higher than the impact of psychotherapy interventions. Baranov et al. (2020) provided experimental evidence on persistent effects of a psychotherapy intervention for depressed pregnant women on reduction of depression rates seven years after delivery. Evidence from large-scale policies suggests that interventions aimed at increasing access to mental health care can have a positive effect. Lang (2013) found that laws mandating the inclusion of mental health benefits in health insurance coverage led to a 5% decrease in suicide rates across states in the United States. Anstreicher (2021) found that the introduction of health centers specialized in mental health and substance use disorders was associated with small reductions in disability insurance enrollment in rural counties in the United States.

In the Brazilian context, Dias and Fontes (2020) showed that the introduction of mental healthcare centers that provide specialized outpatient services for severe cases of mental health and substance use disorders led to reductions in hospitalization from schizophrenia and in mortality from alcoholic liver disease. Our study is related to theirs, as the policy whose impact we assess (NASFs) constituted a public effort to introduce mental health care into primary healthcare services, which should refer severe cases to the specialized mental health centers whose impact they analyze. The fact that we do not find any impacts on health outcomes even when looking exclusively at municipalities with those specialized centers —and that we do not observe any impact of NASFs on outpatient procedures delivered at those centers— suggests a lack of coordination between the two policies.

The remainder of the paper is structured as follows. Section 2 presents an overview of healthcare in Brazil, focusing on primary healthcare provided by the Unified Health System, and of the NASF program. Section 3 describes the data and Section 4 presents the empirical strategy. Section 5 presents the results of our analysis on the effects of NASFs on the supply of healthcare professionals and health outcomes, focusing on mental health. The robustness of main results is discussed in Section 6. Finally, Section 7 concludes the paper.

2 Background

2.1 The Brazilian Health System and Access to Health Care

The 1988 Brazilian Constitution established health as a universal right for every citizen. With the new constitution, provision of health care became a government obligation, pushing for the creation of the Unified Health System (*Sistema Único de Saúde*, SUS) (Castro et al. 2019; Paim et al. 2011). The SUS is a tax-funded public healthcare system that provides preventive and curative health care services that are free-of-charge at the point of access at all levels of care.[2]

The SUS has been successful in expanding access to health care, improving health outcomes and reducing health inequalities (Castro et al. 2019). A key element for that success was primary healthcare programs designed by the federal government —mainly the Family Health Program/Strategy (FHP/FHS),[3] which was created in 1994 with the aim of

[2]While any person residing in Brazil can use any services provided by SUS, there exists also a private healthcare market for ambulatory and hospital services where consumers can access care either through out-of-pocket spending or through health insurance. Approximately one quarter of the Brazilian population is covered by private health insurance (Paim et al. 2011).

[3]The program was initially named Family Health Program and renamed as Family Health Strategy in 2006.

providing preventive and curative health care through the deployment of Family Health Teams (FHT) in municipalities across Brazil. The Family Health Program/Strategy largely expanded access to primary care in Brazil. The number of FHTs grew from approximately 2000 in 1998 to 42,875 in 2018, increasing coverage from 7 million individuals (4% of the population) to 130 million individuals (62%). Evidence suggests that the roll-out of FHTs had a positive impact on population health (Rocha and Soares 2010; Bhalotra, Rocha, and Soares 2020; Mrejen et al. 2021). Despite that success, access to specialist care remains a major bottleneck for SUS, resulting in unmet demand, long waiting times, and delays in diagnoses (Castro et al. 2019).

Mental healthcare is one of those bottlenecks (Brazil/Ministry of Health 2010). Mental health policy in Brazil has undergone major shifts since the psychiatric reform of 2001 (Brazil 2001; Athié et al. 2016). The reform promoted the creation of specialized mental health centers, the Centers of Psychosocial Care (CAPS), which provide outpatient services for severe cases of mental and substance use disorders. The expansion of those specialized mental health centers reduced long-term hospitalizations for schizophrenia and deaths from alcohol liver disease (Dias and Fontes 2020). However, diagnosis, tracking and treatment of less severe cases remains a challenge and motivated the creation of NASF, the Family Health Support Nuclei (detailed below).

2.2 The Labor Market of Health Professionals

While the private market and SUS provide the same services, access to specialist care remains a bottleneck in the public sector (Castro et al. 2019), where health workers are hired mostly through public hiring procedures with pre-specified working conditions and wages—but frequently not as statutory public servants. In the private market, health professionals participate as independent providers and/or as employees of healthcare firms. Health care professionals are free to choose where to work and they can have joint appointments in the public and private sectors, and more than one employment relationship at the same time (Costa, Nunes, and Sanches 2019).

A challenge for SUS has been to attract health workers and physicians to areas with shortage of these professionals (Costa, Nunes, and Sanches 2019). In the last 20 years, different policies were created to support or complement primary healthcare programs. In 2008, the government induced the creation of multi-professional support teams for FHT, the *Núcleos de Apoio à Saúde da Família*, NASF. In 2013, the More Physicians Program was launched, which was successful in increasing the supply of general practitioners in primary health care in Brazilian municipalities (Carrillo and Feres 2019; Fontes, Conceição, and Jacinto 2018).

2.3 The NASF Program

The Family Health Support Nuclei program was created in January 2008 to expand the scope of services provided by Family Health Teams. Family Health Teams (FHTs), which are the main providers of primary healthcare in Brazil, are composed by a physician, a nurse, a nurse assistant, and four to six community health workers (CHWs) and are responsible for providing outpatient care for approximately 1,000 families (between 3,000 and 4,500 individuals) of the area. The NASFs are multidisciplinary teams, composed of medical and non-medical professionals, specifically designed to provide support to FHTs —i.e., to complement the basic healthcare provided by FHTs with specialized care. The support provided by NASFs, named *matrix support*, works in two complementary ways. Health care professionals from FHTs can refer patients to professionals of the NASFs to receive specialized care. Additionally, NASFs provide technical-pedagogical assistance to FHTs through case discussion, supervision of treatment plans, continuous training in the management of specific conditions and assistance in the planning of health care and health prevention actions (Brazil/Ministry of Health 2010).

The NASF program is a policy from the federal government to subsidize the hiring of healthcare specialists in primary healthcare settings. Municipalities that opt-in receive monthly transfers from the federal government plus a one-time transfer when they implement the policy. Municipalities are free to choose what professionals they hire, within the parameters defined by the program guidelines. Since the beginning of the program, specialist physicians (psychiatrists, pediatricians, gynecologist-obstetricians, acupuncturist physicians, and homeopathic physicians) and non-medical health professionals (psychologists, occupational therapists, social assistants, pharmacists, physiotherapists, phonoaudiologists, dietitians, and physical education professionals) were eligible. In 2011, some professional categories were added to the program: geriatricians, internists, veterinarians, art educators and public health professionals (Brazil/Ministry of Health 2011).[4] Policy guidelines specify that psychologists, psychiatrists and occupational therapists can act as mental health professionals and recommend that at least one of them is included in every NASF. All municipalities can opt-in the NASF program, as long as they have a Family Health Team (FHT). By 2005, the beginning of our period of analysis, over 90% of the municipalities had already received a FHT (Bhalotra, Rocha, and Soares 2020). The number of professionals that can be hired for NASFs depends on the number of FHTs acting in the municipality.[5]

[4]Public health professionals are any healthcare professional with post-graduate studies in public health.

[5]Municipalities with five or more FHTs adopt NASF type 1 (NASF-1) —i.e., at least 200 total work-hours from specialists included in the program per week, with no professional working less than 20 hours and no professional category totaling more than 80 hours per week. Municipalities with three or four FHTs adopt NASF type 2 (NASF-2) —i.e., at least 120 total work-hours per week, with no professional working

Figure 1 shows the roll-out of the program. By 2018, the end of our period of analysis, 4582 municipalities (82% of our sample) had received a NASF (panel a). The acceleration in the roll-out after 2012 was driven by the inclusion in the program of all municipalities with at least one FHT.[6]

While NASFs provide support to FHTs in different areas (e.g., mental health, rehabilitation services, food and nutrition, pharmacy, maternal and child health), mental health care is of particular relevance and program guidelines recommend that every NASF includes a mental healthcare professional —i.e., psychologists, occupational therapists and psychiatrists (Brazil/Ministry of Health 2008). NASFs provide support to FHTs in the management of patients with non-severe mental and behavioral disorders, either providing specialized care or through planning and supervision of care directly provided by other primary healthcare workers. Additionally, they act as a link with CAPS, which remain the locus of provision of specialized care for more severe cases Brazil/Ministry of Health (2010) and Athié et al. (2016).

We conjecture that the first impact of the NASF policy should be to increase the supply in primary healthcare settings of professionals eligible to the program. As municipalities can choose which professionals they hire, and financial incentives do not vary with that choice, it is relevant to analyze what their choices are. Additional impacts of the policy would be improving the detection of mental disorders, through broader access to mental health specialists, and the quality of care, through better coordination between primary healthcare and other mental health services (Saraiva et al. 2020).

3 Data

In this paper we assess whether the introduction of NASFs affected the availability of mental health care and other specialized professionals in primary health care services as well as service utilization and mental health outcomes. We draw upon an array of data sources to create a balanced panel of yearly data at the municipality level over the period from 2005 throughout 2018.

less than 20 hours and no professional category totaling more than 40 hours. Municipalities with one or two FHTs adopt NASF type 3 (NASF-3) —i.e., at least 80 work-hours per week with no professional working less than 20 hours and no professional category totaling more than 40 hours.

[6] NASF-3 were created in 2012 (Brazil/Ministry of Health 2012). Before that year, only municipalities with at least three FHTs could opt-in the NASF program. Also, between 2008 and 2011, NASF-2 could be adopted only by municipalities with less than 100,000 residents, low population density and at least 3 FHTs and could only include non-medical professionals. The restrictive population-density criteria led to 90% of NASFs adopted between 2008 and 2011 being NASF-1 (Figure 1).

3.1 Data on NASFs and on Health Care Professionals

We obtain data on primary health care services financed by the federal government from the Secretariat of Primary Health Care of the Ministry of Health of Brazil (e-Gestor AB/MoH). Data are available on monthly frequency and include the number and type of NASFs financed by the federal government for every municipality since 2008, the first year of the program. For each municipality, we identify the year when it received a NASF for the first time and define that year as the beginning of treatment.

We use microdata from the National Registry of Health Facilities (CNES/Datasus), an administrative dataset that contains information on every health facility in Brazil on a monthly basis since 2003. Our period of analysis starts in 2005, when CNES gained a new and more complete version. The data include the location, type of services provided and the human resources available in each facility. Auxiliary microdata also include an individual identification number for each professional, which allows us to identify the number of different professionals enrolled in each facility as well as their average number of hours worked per week.

While CNES data is expected to include information on all healthcare facilities of the country, small and independent private practices are less likely to provide high quality data to the system or to be included in the registry at all. In that sense, when a professional is included for the first time in the NASF, it could be either that he/she was previously not working in a healthcare facility or that he/she was working only in a facility that did not report it to the CNES system —likely, a small and independent private practice.

We compute the number of professionals and the mean hours worked, for each type of professional at the municipality-by-year level. We focus on professionals eligible for the NASF program. We also compute the same indicators separately for professionals acting in primary healthcare facilities and in other levels of healthcare.[7] The variables in our analysis are defined as the number of professionals per 100,000 residents and the mean number of hours worked by these professionals. Professional categories eligible for the NASF program and identified in the data encompass mental health professionals (psychologists, occupational therapists, and psychiatrists), other non-medical health professionals (physiotherapists, dietitians, phonoaudiologists, social assistants and pharmacists) and other physicians (pediatricians, gynecologists-obstetricians, homeopathic physicians, and acupuncture physicians).[8] In Appendix Figures and Tables we also present estimates for professionals made eligible for the NASF program after 2011 (veterinarians,

[7]As any healthcare professional can work both in primary healthcare and in other levels of care, the sum of professionals working at both levels is expected to exceed the total number of professionals in the municipality.

[8]We exclude physical educators as codes identifying this category were not available before 2007

geriatricians, internist physicians, and occupational physicians) and professionals that were never eligible for the program (nurses, community health workers and surgeons).

3.2 Data on Service Utilization

We measure service utilization by using administrative microdata from the National Ambulatory Information System (SIA/Datasus), which contains information on all outpatient care services funded by SUS. Microdata from SIA include information at the procedure level related to health prevention and promotion, diagnosis, consultation, and other outpatient procedures publicly funded in Brazil. We use data since 2008, as procedure codes and information on professionals responsible for delivering services before that year are not readily compatible with data after that year. We specifically use data on individual consultations delivered by each professional category eligible for the NASF program. We also include specific mental health related procedures, such as dispensing of anti-depressive drugs and psychosocial procedures, independently of the professional that delivered them.[9] In all cases, we compute the yearly number of procedures delivered at the municipality level per 100,000 residents.

3.3 Data on Health Outcomes

We rely on different sources of data to measure health outcomes related to mental health conditions. First, we obtain microdata from the National System of Information on Mortality (SIM/Datasus) between 2005 and 2018, which includes official registries of all deaths recorded in Brazil. The microdata include the municipality of residence, gender, and age of the deceased, as well as the ICD-10 code for the main cause of death. We consider codes related to alcoholic liver diseases and cirrhosis (ICD-10 K70, K73-74), suicide (X60-84, Y87.0) and overdoses (X40-45, Y10-15, Y45, 47, 49) as deaths related to mental health. The use of these codes was suggested by Case and Deaton (2015) and later termed by them as *deaths of despair* (Case and Deaton 2020). In additional analyses, we also assess deaths from causes considered amenable to primary health care by the Brazilian Ministry of Health (Alfradique et al. 2009) and from other causes (neither related to mental health conditions nor amenable to primary health care). For all causes, we count the number of deaths per year by municipality of residence of the deceased and compute the death rate per 100,000 residents.

[9] Psychosocial procedures are delivered mostly at CAPS, which are health care facilities specialized in the provision of outpatient care for severe cases of mental and substance use disorders.

Second, we obtained microdata from the National System of Information on Hospitalizations (SIH/Datasus) between 2005 and 2018, which includes all hospitalizations publicly funded by SUS. The microdata include the ICD-10 for the main cause of hospitalization, municipality of residence, gender and age of patient. We focus on mental and behavioral disorders (ICD-10 F00-F99). In more detailed analyses, we also assess mental and behavioral disorders due to psychoactive substance use (F10-F19), schizophrenia, schizotypal and delusional disorders (F20-F29), and mood disorders (F30-F39) —i.e., the most common mental-health related causes of hospitalization (Da Rocha et al. 2021). Analogously to death rates, we also examine hospital admissions from causes considered amenable to primary health care and from other causes (neither related to mental health conditions nor amenable to primary health care). For all causes, we count the number of hospitalizations per year by municipality of residence and compute the hospitalization rate per 100,000 residents.

Finally, we obtain microdata from the Brazilian National Institute of Social Security (INSS) on all requests of sick leave submitted by formal workers between 2010 and 2017. The data include the municipality of residence, ICD-10 code for the cause of leave, if the request was granted, and the number of days of leave authorized. We focus on the same codes as in the case of hospital admissions and compute the number of days on sick leave per 100,000 residents according to the municipality of residence of the beneficiary.

3.4 Auxiliary Data

We use data from the Brazilian Institute of Geography and Statistics (IBGE) on the number of residents and the GDP for each municipality-year between 2005 and 2018. We also use data from the 2010 national census (last available, also from IBGE) on the number of health professionals and average earnings per professional category. We obtain data from the Ministry of Health on municipality population per age group, on the coverage of Family Health Teams, on the number of general physicians working in the More Physicians Program, and on the number of CAPS. We use yearly municipality data from the Ministry of Social Development on expenditure on the *Bolsa Família* Program, the main social assistance program in Brazil, and from the National Agency of Supplementary Health (ANS) on private health insurance coverage. Finally, we obtain data from the System of Information on Notifiable Diseases (SINAN) on inter-personal and self-inflicted violence.

3.5 Descriptive Statistics

Our final sample size is composed of 77,896 observations (5,564 municipalities observed over 14 years). Table 1 shows summary statistics at baseline for all variables related with the supply of health care professionals used in our analysis. Among mental health professionals, psychologists (mean of 7.11 per 100,000 residents) were comparatively much more abundant than occupational therapists (0.66) and psychiatrists (0.84). While the supply of psychologists was comparatively larger in primary healthcare at the extensive margin; the supply of occupational therapists and psychiatrists was larger outside primary healthcare. The relative scarcity of psychiatrists can also be highlighted when compared to gynecologist-obstetricians and pediatricians, which are around 5 times more abundant. For most professionals, the mean number of hours worked is larger outside primary healthcare than in primary healthcare. Table 2 shows summary statistics for the other variables used in the analysis, including outcomes. Hospitalizations for mental and behavioral disorders accounted for 2.2% of all hospitalizations and *deaths of despair* for 2.9% of all deaths at the baseline. While those figures could be deemed low, it is worth remembering even though mental health impairments are highly prevalent and disabling they do not frequently result in hospitalizations or deaths. The fact that 8.5% of days on sick leave at the baseline were due to mental health related causes somewhat reflects that.

4 Empirical Strategy

We exploit the staggered introduction of NASFs across municipalities since 2008 and adopt a difference-in-differences (DiD) strategy to assess program impacts on the availability of health care professionals, service utilization and health outcomes at the municipality-by-year level. We consider municipalities as the treatment unit because the program is designed to be implemented at the municipal level. The sequential process of implementation of the policy allows us to use the evolution of outcomes in municipalities that were either never treated or not yet treated at any specific point in time as a counterfactual for what would have been the evolution in treated municipalities had they not been included in the program.

Recent advances in the literature have discussed the challenges for adopting a DiD strategy in such settings. As shown in Goodman-Bacon (2018), when the timing of treatment varies, the usual fixed-effect estimator recovers a weighted average of all possible pairs of the underlying DiD estimator. If treatment effects change over time or across units, however, weights might be negative and such estimators biased even if the assumption of underlying parallel trends holds (Goodman-Bacon 2018; Chaisemartin and D'Haultfœuille 2020; Lindner and McConnell 2021). In our analysis we use the dynamic estimator proposed by Chaisemartin and D'Haultfœuille (2020), which allows us to retrieve unbiased estimates if treatment effects are heterogeneous.

More specifically, let $D_{m,t-l}$ be a *dummy* treatment variable indicating if a municipality m received a NASF for the first time in year $t-l$. We are interested in the contemporaneous ($l=0$) and dynamic ($l>0$) average treatment effects across the municipalities that sequentially received a NASF such that $D_{m,t-l}=1$ and $D_{m,t-l-1}=0$ for any pair of consecutive time periods $t-l-1$ and $t-l$. The estimator proposed by Chaisemartin and D'Haultfœuille (2020) uses the evolution of outcomes among groups whose treatment status is stable to infer the trends that those outcomes would have followed in the groups whose treatment status switches if it had not switched. We formally define $A_m = min\{t : NASF_{mt} = 1\}$ as the year when the municipality received a NASF for the first time and $A_m = \infty$ for municipalities that were never treated. We estimate contemporaneous and dynamic treatment effects θ_l^{ATT} such that:

$$\theta_l^{ATT} = \sum_{\{m:A_m=t-l\}} \frac{Y_{m,t} - Y_{m,t-l-1}}{\#\{m : A_m = t-l\}} - \sum_{\{m:A_m>t\}} \frac{Y_{m,t} - Y_{m,t-l-1}}{\#\{m : A_m > t\}} \tag{1}$$

Where the term $Y_{m,t}$ refers to an outcome in municipality m in year t. θ_l^{ATT} are DiD estimators comparing the evolution of outcomes from period $t-l-1$ to period t between groups that become treated in $t-l$ and groups that remain untreated at period t. We estimate θ_l^{ATT} for $0 \leq l \leq 4$ and report the results both for each l in figures and the average of estimates at all l in tables.

Under the underlying parallel trends assumption, where trends in outcomes of municipalities that have either not been treated yet or that were never treated serve as counterfactual for the trends in outcomes that would have occurred in treated municipalities if they had not received a NASF, θ_l^{ATT} in equation (1) is an unbiased estimator of the average treatment effect among municipalities that switched treatment status from non-treated to treated l years ago. To assess the credibility of that assumption, we use placebo estimators defined by Chaisemartin and D'Haultfœuille (2020) to compare the evolution of outcomes in treated municipalities before they switch treatment status to the evolution of outcomes in municipalities that are either not treated yet or that remain untreated during the whole period of analysis. We estimate placebo effects for the four years before municipalities receive treatment and present each placebo effect in figures and average placebo effects in tables as well, together with treatment effects. The presence of significant placebo effects, implying divergent pre-treatment trends between treated and untreated or not-yet-treated municipalities before treatment, would indicate a threat to the plausibility of the underlying parallel trends assumption.

A generalization of equation (1) allows for the inclusion of covariates (Chaisemartin and D'Haultfœuille 2020). Our baseline model includes municipality and year fixed-effects to account for time-invariant differences across municipalities and common trends. In more saturated specifications, we also add non-parametric time trends (state-specific year fixed-effects), which are potentially relevant since allocation of funding and health policies are in part defined at the state level, and time-varying controls —the population coverage of FHT, the municipality GDP per capita, the share of the population with private health insurance, per capita expenditure on the *Bolsa Família* program, population age and sex structure, number of general physicians hired under the More Physicians Program and number of CAPS per 100,000 residents. In all cases, standard errors are clustered at the municipality level, to account for the possibility of serial correlation and heteroscedasticity, and computed using a bootstrap procedure with 50 replications.

Our estimates are robust to the inclusion of fixed-effects, non-parametric trends and covariates. We also show that placebo estimates are generally stable around zero and statistically insignificant, providing supportive evidence to the plausibility of the underlying parallel trends assumption and mitigating the concern that our results are led by differential trends across switchers and non-switchers. However, while the evidence indicates that the timing of the introduction of NASFs is quasi-random, there is still the possibility of competing time-varying economic factors and policy interventions that may be simultaneously correlated with the introduction of NASFs and outcome variables. We show that point estimates are remarkably stable when conditioned upon relevant covariates, in particular upon economic indicators (i.e., GDP per capita) and concurrent policies (i.e., FHT coverage, per capita expenditure on *Bolsa Família*, number of general physicians hired under the More Physicians Program per 100,000 residents and number of CAPS per 100,000 residents), thus lending support to the assumption that the timing of the introduction of NASFs is also orthogonal to other relevant time-varying non-observables.

5 Results

5.1 Health Care Professionals: Extensive Margin

We start by analyzing the effect of NASFs on the supply of health professionals eligible for the program. Figure 2 plots placebo and dynamic estimates that show effects for mental health professionals over an eight-year span around the time of treatment for three different model specifications. Table 3 shows average treatment effects and average placebo effects from simple averages of point estimates of the model with covariates and non-parametric time trends depicted in Figure 2. Results indicate that NASFs increased the supply of psychologists in 5.4 professionals per 100,000 residents (significant at 1%) and of occupational therapists in 0.6 professionals per 100,000 residents (significant at 5%). These point estimates correspond to increases of 75.8% and 87.1% of the mean for all municipalities in our sample at baseline, respectively. Both the plot and the average placebo effects indicate nonexistence of significant pre-treatment trends. Estimates for the effect on the supply of psychiatrists are noisier, but suggest an increased supply of 0.3 psychiatrists per 100.000 residents (significant at the 10% level). That means a non-trivial 33% increase relative to the mean at baseline.

Figure 3 and Table 4 show the results for other non-medical health professionals and other physicians eligible for the NASF program. The results show significant and large increases in the supply of most non-medical health professionals (physiotherapists, dietitians, social assistants and phonoaudiologists), and no significant effects on the supply of physicians (pediatricians, gynecologist-obstetricians, acupuncturist physicians and homeopathic physicians). Estimates for the supply of pediatricians point to a positive effect of NASFs, but they are too noisy and fail to reach significance at any of the conventional levels. Again, effects for non-medical professionals are significant and large in magnitude —the only exception are pharmacists, for which no significant effect was found. NASFs increase the supply of physiotherapists in 5.1 (65.3% relative to mean at baseline), of dietitians in 4.3 (227%), of phonoaudiologists in 1.5 (59%) and of social assistants in 3.5 (70%) professionals per 100,000 residents. Appendix Figure A1 and Table B1 show results for professional categories made eligible for the NASF program in 2011 —i.e., internists,[10] geriatricians, occupational physicians, and veterinarians. NASFs had no significant impact on the supply of any of them.

If the increase in the supply of professionals in healthcare services comes from the NASF program, we expect that the net increase in the supply at the municipal level comes from an increase in the number of professionals working in primary healthcare. Tables 5 and 6 show that is the case both for mental health and other health professionals, respectively. We see large and significant increases in the supply of non-medical health professionals (with the exception of pharmacists) in primary healthcare facilities while estimates are much smaller and non-significant in all cases for the supply in other healthcare services. For psychiatrists, the effect on the supply in primary healthcare is large (50.1% of mean

[10]The codes classifying professional categories changed in 2007. Before then, the code for internists was the same as the code for general practitioners. We therefore group internists and general physicians together for the whole period.

at baseline) and significant at the 10% level. There are not any significant effects for the supply of other physicians neither in primary healthcare nor outside primary healthcare, and point estimates are comparatively much smaller. Figures A2 and A3 show that there are not pre-treatment trends in the four years before treatment and that effects are persistent up to four years after treatment.[11]

Two relevant questions arise on the large and significant effects of the NASF program on the supply of non-medical professional in healthcare services and the smaller or no effects on the supply of most categories of physicians. First, where do those professionals come from? We measure large net increases in the supply in healthcare services, coming from increased presence in primary healthcare services without decreases in other levels of care. Panel (a) in Figure 4 sheds light on this issue. We compare data from the last national census (carried out in 2010) and of the National Registry of Health Facilities (CNES), which we used to construct our panel. We focus on professional categories identifiable in both datasets.[12] We see that for all categories the number of professionals is larger in the census, which identifies all professionals, per municipality of residence, in the year 2010. This is expected as many professionals work outside healthcare services and are therefore not registered in CNES —for example, physicians that work as researchers or university professors or psychologists that work in private companies outside the healthcare sector. Additionally, it could be possible that some professionals work in small private practices which are presumably more likely to be unreported in CNES. The gap between census and CNES data is much larger for non-medical professionals. This is probably due to a higher share of those professionals working outside the healthcare sector and, to some extent, due to higher shares of small private practices not registered in CNES.

The second relevant question is why municipalities did not hire more physicians to be part of NASF support teams. Panel (b) of Figure 4 helps explain this issue. Municipalities receive transfers from the federal government with fixed values depending on the type of NASF they adopt and they are free to choose which professionals to hire, within program rules and guidelines. As the mean income of physicians is 2.7 times higher than for psychologists and more than 3 times higher than for other non-medical profession-

[11]Results are in the same line when looking at the effect of each type of NASF separately (see Tables B2, B3 and B4). In general, effect sizes are larger for NASF-3 than for NASF-2 and larger for NASF-2 than for NASF-1. This is expected, as NASF-3 provide support to 1 or 2 Family Health Teams, NASF-2 to 3 or 4 FHTs and NASF-1 to at least 5 FHTs —i.e., the effects of NASF on the supply of professionals in primary care is largest in municipalities with less FHTs, where the ratio of support teams to family health teams is larger. Results are also in the same line when looking separately to the period before and after 2012 (Table B5) —before that year, NASF-3 did not exist and only NASF-1 could include specialist physicians. In general, effect sizes are larger after the reform, which is expected because smaller municipalities were included.

[12]Census data does not allow to identify the specialty of physicians. It is only possible to identify if they are general physicians or specialists. Additionally, some categories like occupational therapists are not individually identifiable with census data.

als, municipalities would have to offer higher wages to attract them. However, the values they receive from the federal government are fixed and they would have to use own resources to match wages that physicians could obtain elsewhere. This is probably behind the larger effects found for non-medical health professionals and smaller effects for physicians.

5.2 Health Care Professionals: Intensive Margin

After analyzing the impact of NASFs on the extensive margin of healthcare professionals supply in Brazilian municipalities, we assess how the policy impacted supply at the intensive margin. Table 7 shows the average placebo and treatment effects for mental health professionals. On average, we see an increase of 2.1 hours worked per psychologist per week (6.3% of the mean value at baseline). Figure 5 shows that pre-trends are negligible. We do not observe any effects on the mean number of hours worked by occupational therapists and psychiatrists. Table 8 and Figure 6 present the results for other health professionals. We see a significant increase on the mean number of hours worked per professional among dietitians, phonoaudiologists and social assistants, but not among physicians of any specialty, physiotherapists or pharmacists.

Table B6 shows that the increase in the mean number of hours worked by psychologists comes entirely from professionals working in primary healthcare facilities. Outside primary healthcare, the coefficient is negative but insignificant. Table B7 shows results in the same line for other physicians and health professionals: detectable impacts of the NASF program on mean hours worked by dietitians, phonoaudiologists, social assistants, and pharmacists in primary healthcare and no impact in other levels of care or for specialty physicians eligible for NASFs. In general, estimates are positive for the mean number of hours worked by all categories in primary healthcare, but in many cases they are small and imprecisely estimated to reach significance. Appendix Figures A4 and A5 show the absence of any detectable trends before treatment.

5.3 Service Utilization

Next, we look at the impact of NASF on service utilization. We restrict out analysis to the 2008–2017 period, for which we were able to make data on the number of individual consultations with each professional category eligible for the NASF program compatible, and exclude municipalities that were treated that year. Additionally, we look at other outpatient procedures included in SIA/Datasus for which we could make data compatible: procedures of provision of anti-depressive drugs and psychosocial procedures that are mostly delivered at CAPS — the facilities that deliver specialized care for more severe cases of mental and substance use disorders.[13]

Table 9 shows average treatment effects and average placebo effects for mental-health related outpatient procedures, and Table 10 for individual consultations with other health professionals. For mental health-related procedures, results show a significant and large increase in the number of individual consultations with psychologists (477 consultations per 100,000 residents, 98% of mean at baseline). No significant effects were found for individual consultations with occupational therapists, psychiatrists or other outpatient procedures related to mental health. Note that professionals in NASFs do not act exclusively through providing care services directly to patients and that care services go beyond individual consultations —e.g., rehabilitative procedures. While point estimates are too noisy, Figure A6 suggests an increment in the provision of anti-depressive drugs. We also see large and significant effects on the number of consultations with physiotherapists, social assistants, phonoaudiologists and dietitians. Figures A6 and A7 show that results are robust to model specification, do not present pre-trends and effects are persistent over time. Note also that data on health services utilization in Brazil is restricted to publicly funded services and we therefore cannot measure if there was any offset in private utilization. However, as only around one quarter of the population has private health insurance and likely access specialized services in the private sector, we would expect that offset to be relatively small.

5.4 Population Health Outcomes

After assessing the impact of NASFs on the availability of health care professionals and on the provision of outpatient procedures, we turn to the program's impact on health outcomes. We start by looking at outcomes related to mental health. High prevalence of mental and behavioral disorders in Brazil and among users of primary health care services was one of the motivations for the program, which prioritized the inclusion of mental health professionals in all NASF teams (Brazil/Ministry of Health 2008, 2010).

Table 11 displays average placebo effect and average treatment effect of NASFs on the number of days on sick leave paid by the National Institute of Social Security (INSS), the number of hospitalizations covered by the Unified Health System (SUS) and the number of deaths for causes related to mental health. We observe no impact of NASF adoption on hospitalizations and days on sick leave for any condition (columns 1 and 5 of Table

[13] If NASF increased the linkage between FHTs that act in primary healthcare and CAPS that provide specialized outpatient care for severe cases of mental and substance-use disorders, we would expect to see an increase in the number of psychosocial procedures.

11), nor on *deaths of despair* (column 9). Looking at a more disaggregated level, we observe no impact on hospitalizations or days on sick leave from substance use disorders, mood disorders or schizophrenia (columns 2–4 and 6–8 of Table 11), nor for mortality from alcohol-related causes, overdose or suicide (columns 10-12).[14] Figure 7 and Appendix Figure A9 display estimates for each period before and after treatment and show that results are robust to different model specifications. We also evaluate the impact of NASFs on mental health-related hospitalizations and mortality according to the network of mental healthcare services available in the municipality (measured by the presence of a CAPS in 2008) and do not find any significant effect of the program (Appendix Table B10).

In Appendix Table B11 we look at additional outcomes that could be related with mental health and substance use disorders: deaths from assault and transport accidents, and the number of violent episodes reported (total, against women and self-inflicted). Again, we do not find any statistically significant effects. NASFs could also impact non-mental health related health outcomes. In fact, one of the main goals behind the program was to broaden the scope of services provided in primary health care settings and to increase the effectiveness of Family Health Teams. A common indicator for measuring the performance of Family Health Teams is the number of hospitalizations for causes amenable to primary health care. Table B12 displays the impact of NASFs on days on sick leave, hospitalizations and mortality from conditions amenable to primary health care as well as from other conditions —i.e., not related with mental health conditions nor amenable to primary health care. Again, we do not find any effects of NASFs on outcomes.

It is important to highlight that mortality and hospitalizations are rather extreme outcomes, even more for mental and behavioral disorders. Additionally, days on sick leave might not be affected by policies aimed at expanding services provided publicly in primary healthcare settings, as informal employment is widespread in Brazil and many formal workers receive private health insurance through their firms. Finally, it could be possible that the inclusion of mental healthcare professionals in primary healthcare had positive effects in other relevant dimensions —e.g., better management of care for common mental disorders like less severe cases of depression or anxiety— that are unfortunately not observable in our data.

[14]The results are similar when we divide the sample by type of NASF adopted (Appendix Table B8) and when we look separately at the impact before and after the 2012 reform (Appendix Table B9). We do not find any effects of the program on days on sick leave, hospitalizations and mortality for any of the studied causes related to mental health.

6 Robustness checks

We have already shown robustness of the point estimates to the addition of non-parametric time-trends (state-specific year fixed effects) and municipality-level controls, and found no evidence of pre-trends for most outcomes. However, a potential concern could be the existence of differences in some non-observable time-varying determinants of the supply of healthcare professionals across Brazilian municipalities —for example, changes in other dimensions of municipal health policy. We look at the impact of NASF on the supply of healthcare professionals that should not have been affected by the policy: Community Health Workers (CHWs), nurses, and surgeons. Assessing the impact of NASFs on the supply of CHWs and nurses is a relevant falsification exercise because they are health workers that are part of Family Health Teams and non-observable changes in local health policy could arguably affect their supply in primary healthcare settings.[15] Results for this falsification exercise, shown in Appendix Table B13 and Appendix Figure A8, give us confidence on our main results being driven by the NASF program and not by other non-observable time-varying determinant of health workers supply.

7 Final Comments

This paper assessed the impact of a policy —the NASF program— that expanded services offered in Brazil's main primary healthcare program and integrated mental health into it. Using rich data and econometric techniques that leverage temporal and geographical variation in the roll-out the policy, we identified an impact on the supply of non-medical health professionals but smaller effects on the supply of specialist physicians eligible for the program. For mental health workers, we found a large impact on the supply of psychologists and occupational therapists, and a smaller and imprecisely estimated impact on the supply of psychiatrists. We found that those effects come from increased supply in primary healthcare, as expected. In most cases, service utilization increased together with the supply of professionals. We hypothesize that the differential impact for non-medical and for medical professionals comes from a policy design that provided flat incentives, in the form of fixed transfers from the federal government to municipalities without distinction between medical and non-medical staff. However, as specialist physicians working outside the healthcare sector are more scarce and have higher wage premiums in comparison to non-medical professionals, attracting those professionals to primary healthcare would demand higher wages or specific incentives.

[15] In Appendix Figure A1 and Table B1 we have already shown that NASFs did not affect the supply of general physicians, who are also part of FHTs.

We also assessed the impact of the policy on mental health and non-mental health related deaths, hospitalizations and days on sick leave. We did not find any impact of the policy on those dimensions. For mental-health related outcomes, the absence of impacts does not depend on the presence of more specialized care services for severe cases of mental and substance use disorders in the municipality. These results hint to the existence of challenges in the coordination between mental health services provided in primary healthcare and other layers of mental health care.

The results have implications for policies aimed at improving the supply of health workers and that broaden the scope of primary healthcare services. Specifically, they show that incentives embedded in policies need to be designed according to the type of professional whose supply they intend to increase. This is particularly relevant for professionals that are more scarce and/or have higher wage premiums, like specialist doctors. Additionally, the results show that increasing healthcare professionals supply and service utilization might not be enough to improve health outcomes. For common mental disorders, like less severe cases of anxiety or depression, that have high prevalence and are highly disabling but frequently do not lead to deaths or hospitalization, the results also highlight the necessity of more detailed data on the prevalence and burden of those diseases.

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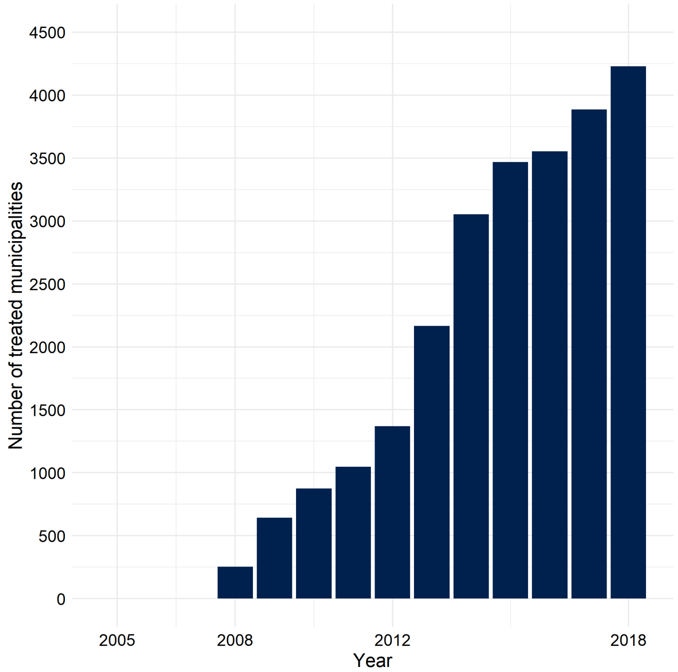
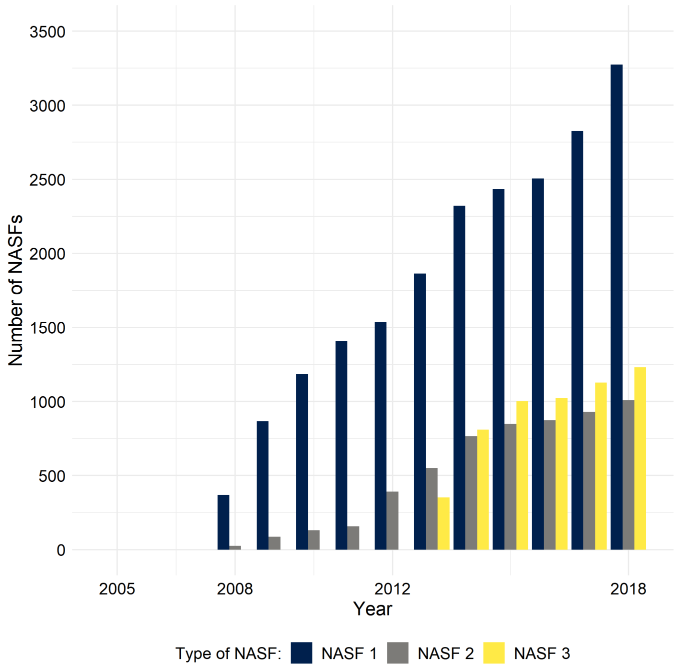
Main Figures

Figure 1: Roll-out of NASF program (2005-2018)

(a) Treated Municipalities



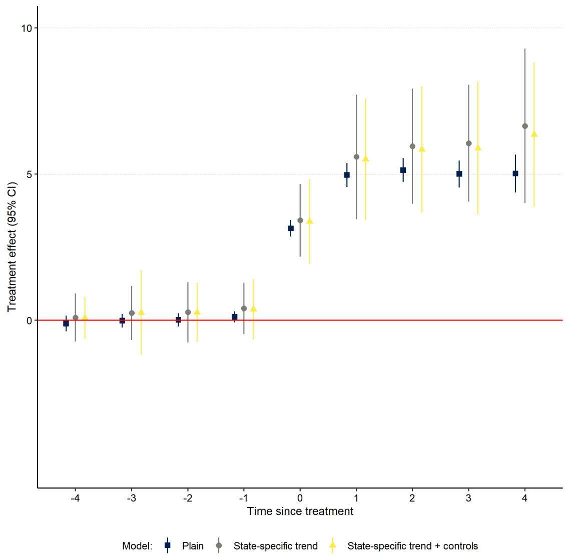
(b) Number of NASF



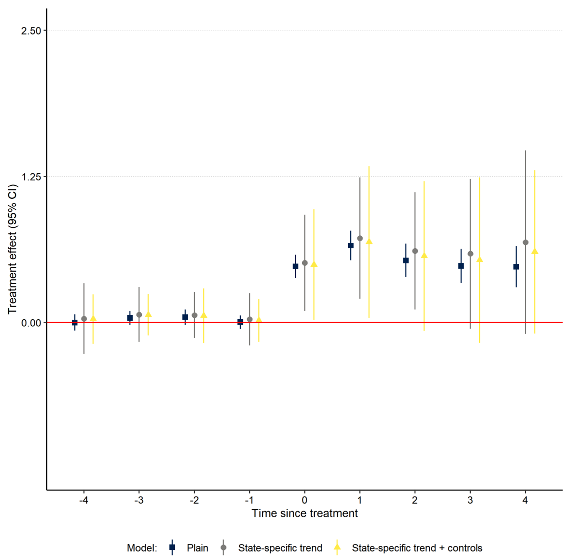
Note: The graph shows: (a) the accumulated number of municipality that had received a NASF by year; and (b) the total number of existing NASFs by type of NASF and year.

Figure 2: Impact of NASF on supply of mental health professionals

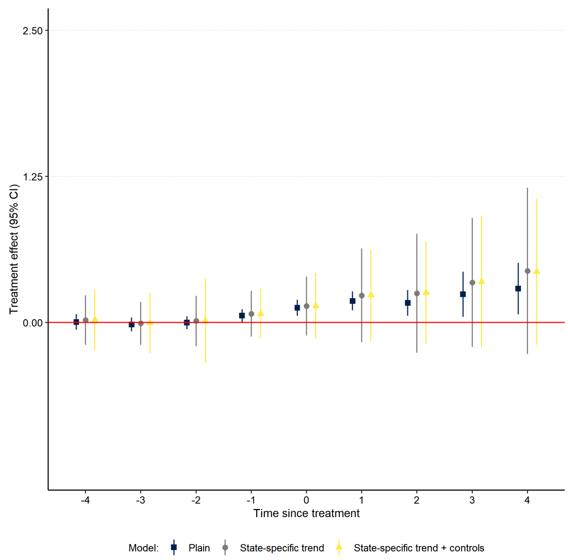
(a) Psychologists



(b) Occupational Therapists

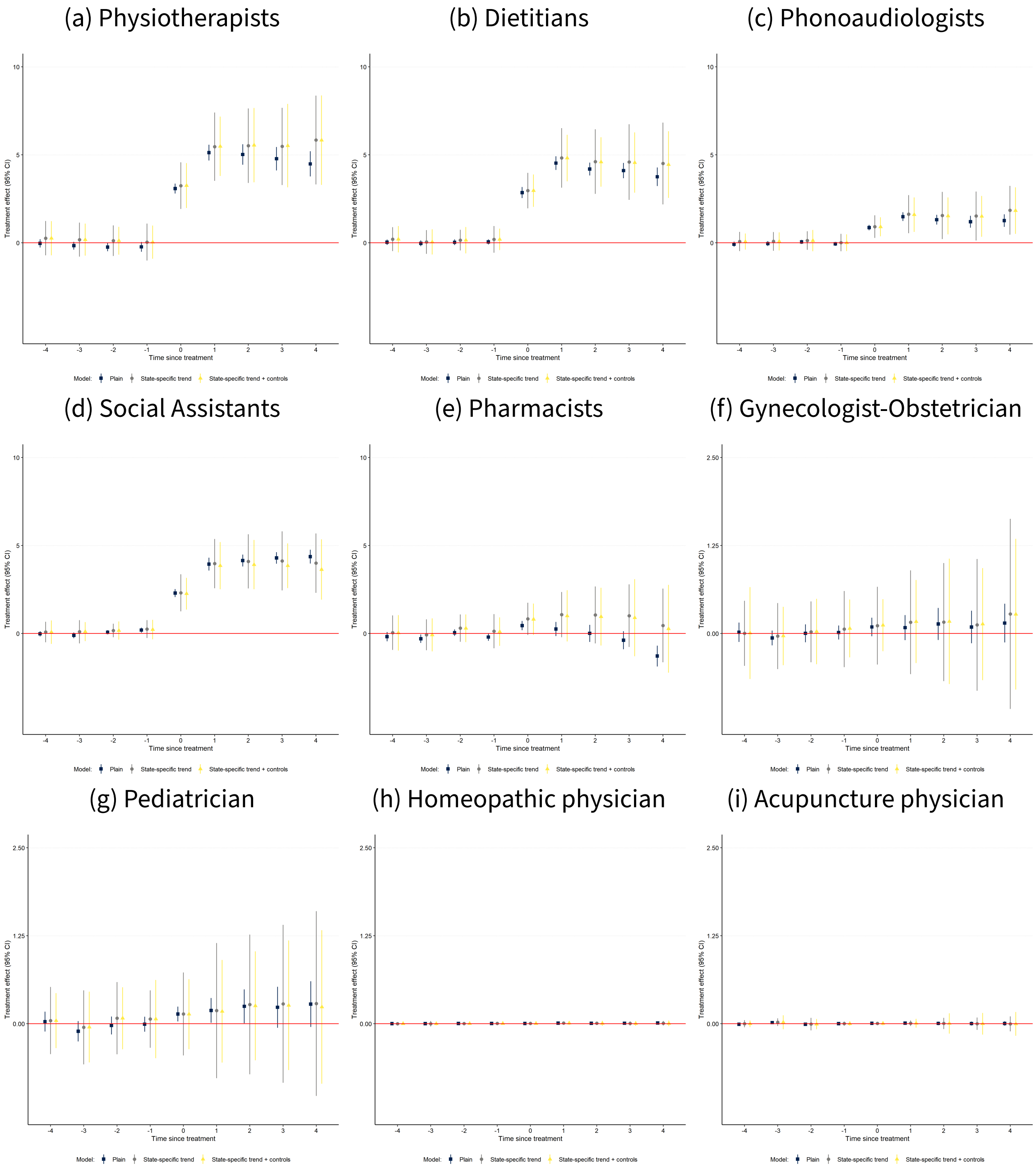


(c) Psychiatrists



Note: The graph shows placebo and dynamic two-way fixed effects estimators proposed by Chaisemartin and D'Haultfœuille (2020) over four years before and after a NASF is introduced in a municipality for the first time on the total supply of mental health professionals eligible for the NASF program. Supply is measured as the number of professionals per 100,000 residents. Vertical bars show 95% confidence intervals (CIs) around the coefficients. Results related to three different specifications are displayed. The first includes only municipality and year fixed effects. The second adds non-parametric state-specific time trends. The third adds the following controls: municipal GDP per capita (in 2010 R$), per capita expenditure with the *Programa Bolsa Família* (PBF), share of the population in the age groups 10–19, 20–29, 30–39, 40–49, 50–59, and 60 years or older, share of the population that is female, share of the population covered by private health insurance, share of the population covered by Family Health Teams (FHTs), number of CAPS per 100,000 residents, and number of physicians hired under the More Physicians Program per 100,000 residents. Standard errors are clustered at the municipality level and estimated by a bootstrap procedure in 50 replications. The sample is composed of yearly data for 5564 municipalities between 2005 and 2018.

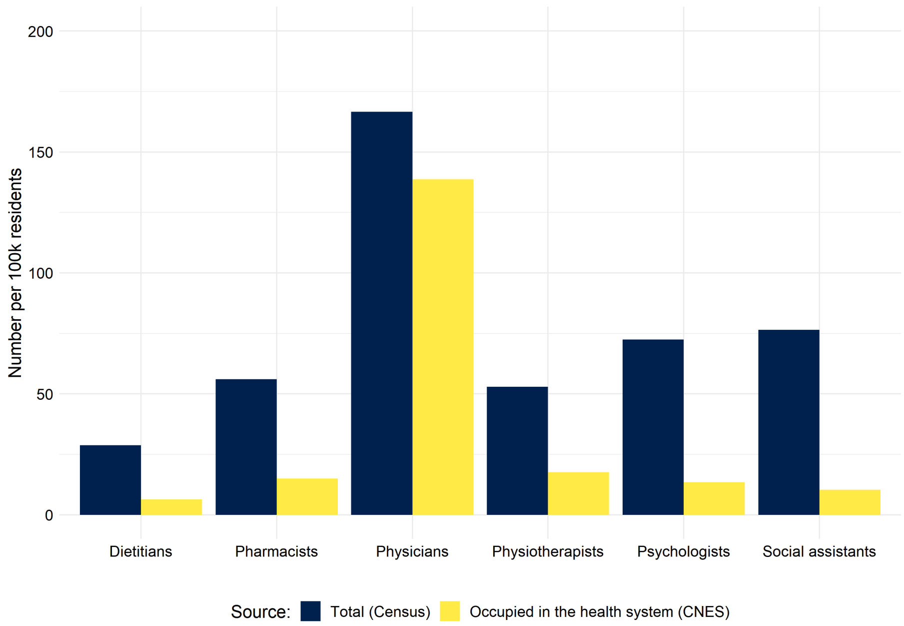
Figure 3: Impact of NASF on supply of other health professionals



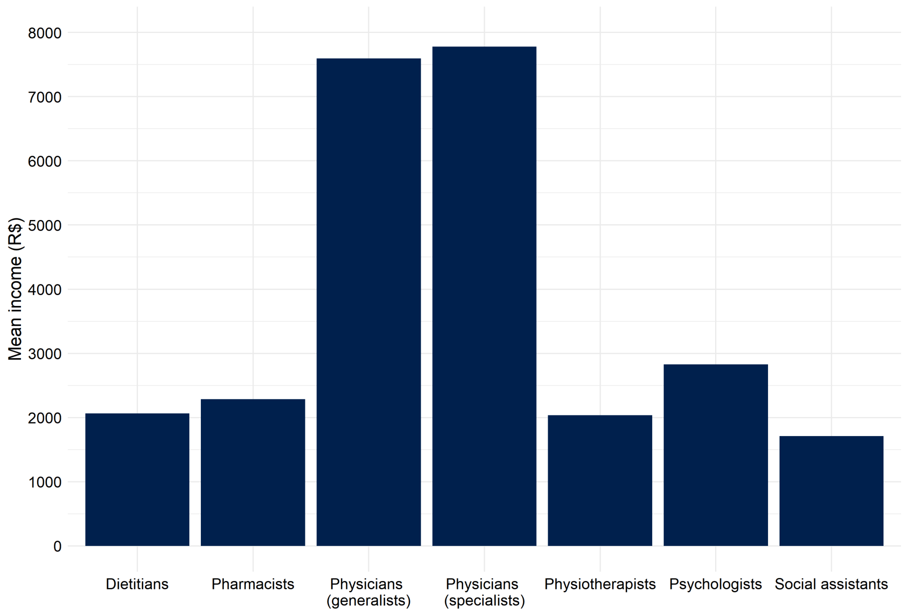
Note: The graph shows placebo and dynamic two-way fixed effects estimators proposed by Chaisemartin and D'Haultfœuille (2020) over four years before and after a NASF is introduced in a municipality for the first time on the supply of other health professionals eligible for the NASF program. Supply is measured as the number of professionals per 100,000 residents. Vertical bars show 95% confidence intervals (CIs) around the coefficients. Results related to three different specifications are displayed. The first includes only municipality and year fixed effects. The second adds non-parametric state-specific time trends. The third adds the following controls: municipal GDP per capita (in 2010 R$), per capita expenditure with the PBF, share of the population in the age groups 10–19, 20–29, 30–39, 40–49, 50–59, and 60 years or older, share of the population that is female, share of the population covered by private health insurance, share of the population covered by FHTs, number of CAPS per 100,000 residents, and number of physicians hired under the More Physicians Program per 100,000 residents. Standard errors are clustered at the municipality level and estimated by a bootstrap procedure in 50 replications. The sample is composed of yearly data for 5564 municipalities between 2005 and 2018.

Figure 4: Availability of health professionals (2010)

(a) Total number of professionals / professionals in CNES



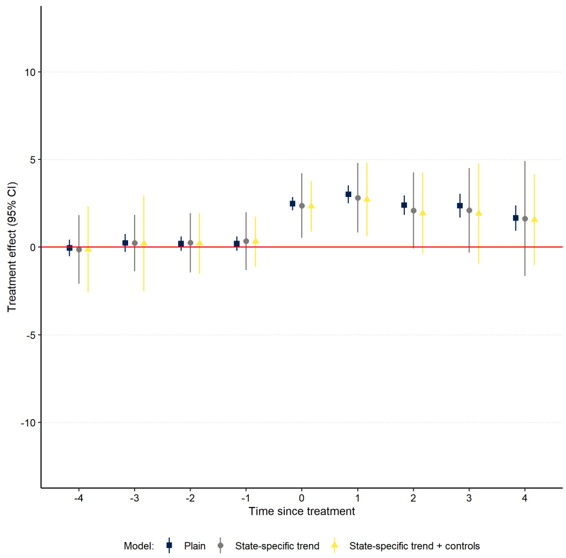
(b) Mean income



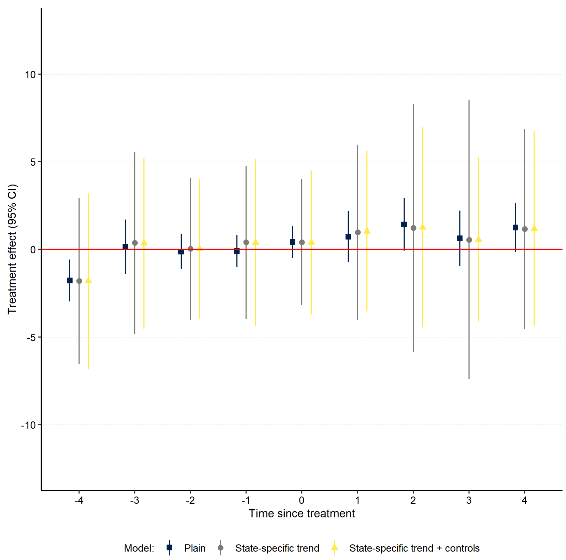
Note: The graph shows: (a) the total number of health professionals (Census data) and the total number of health professionals occupied in the health system (registered in CNES) in 2010 (last year with census data available); and (b) the mean income from the main occupation in 2010. Professionals categories selected are categories available in the 2010 census and eligible for the NASF program

Figure 5: Impact of NASF on hours worked per professional (mental health)

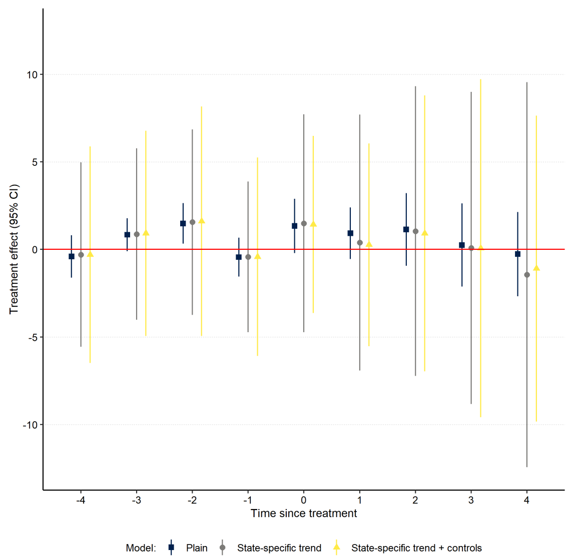
(a) Psychologists



(b) Occupational Therapists

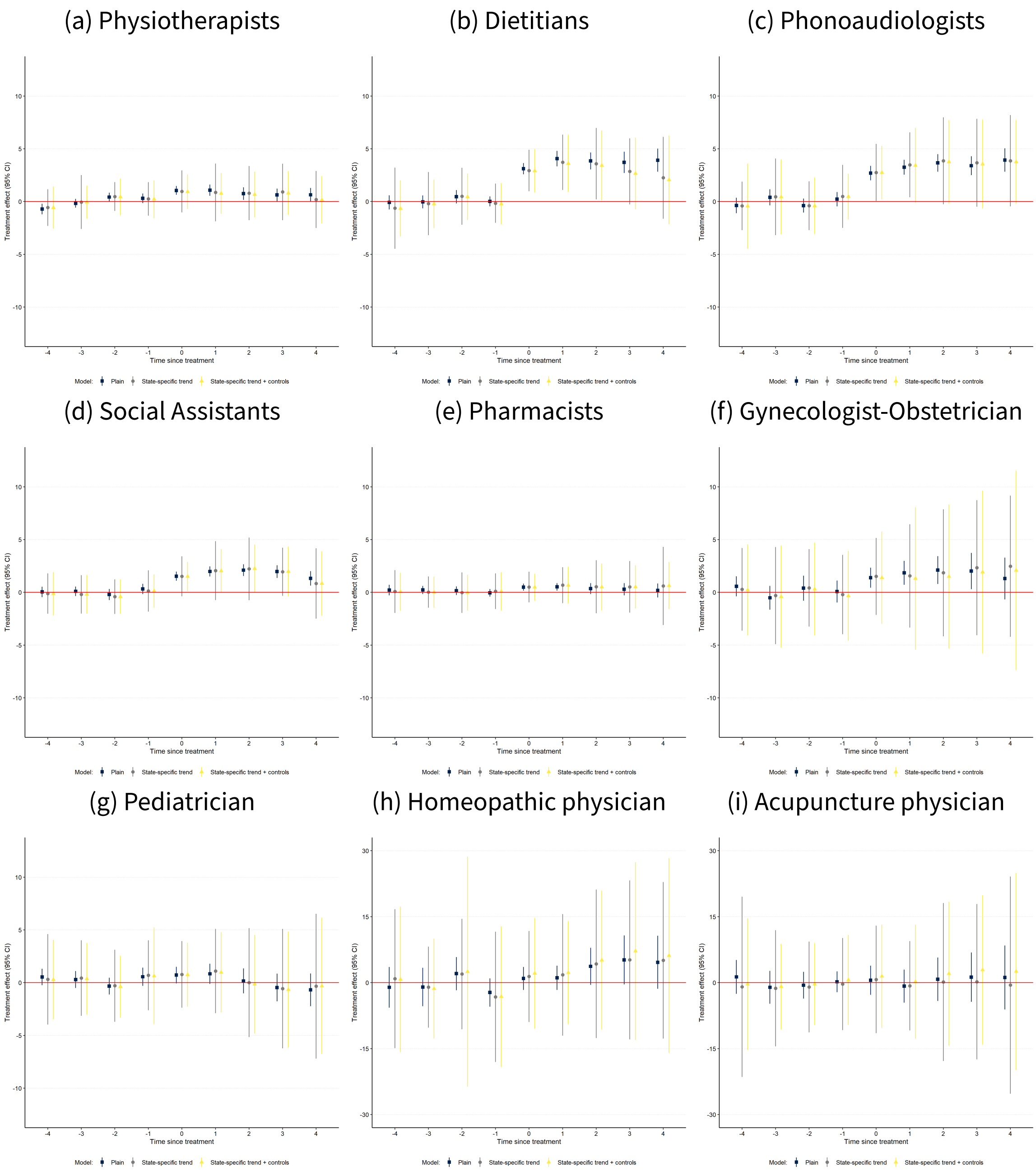


(c) Psychiatrists



Note: The graph shows placebo and dynamic two-way fixed effects estimators proposed by Chaisemartin and D'Haultfœuille (2020) over four years before and after a NASF is introduced in a municipality for the first time on the mean number of hours worked per professional by mental health professionals eligible for the NASF program. Vertical bars show 95% confidence intervals (CIs) around the coefficients. Results related to three different specifications are displayed. The first includes only municipality and year fixed effects. The second adds non-parametric state-specific time trends. The third adds the following controls: municipal GDP per capita (in 2010 R$), per capita expenditure with the PBF, share of the population in the age groups 10–19, 20–29, 30–39, 40–49, 50–59, and 60 years or older, share of the population that is female, share of the population covered by private health insurance, share of the population covered by FHTs, number of CAPS per 100,000 residents, and number of physicians hired under the More Physicians Program per 100,000 residents. Standard errors are clustered at the municipality level and estimated by a bootstrap procedure in 50 replications. In each case, the sample is composed of yearly data for all observations with at least one professional of the corresponding category occupied between 2005 and 2018.

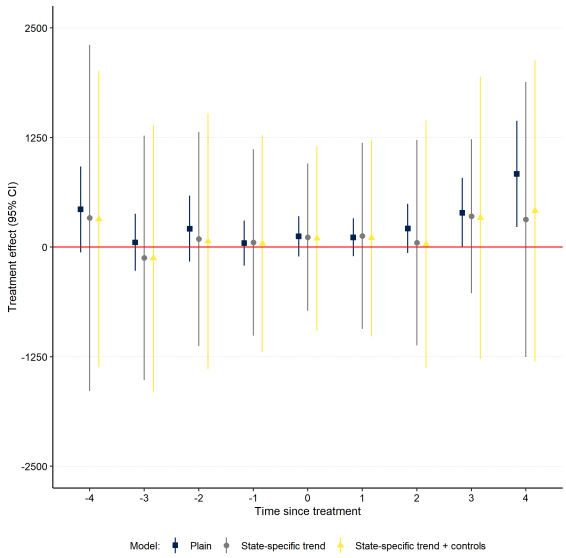
Figure 6: Impact of NASF on hours worked per professional (other)



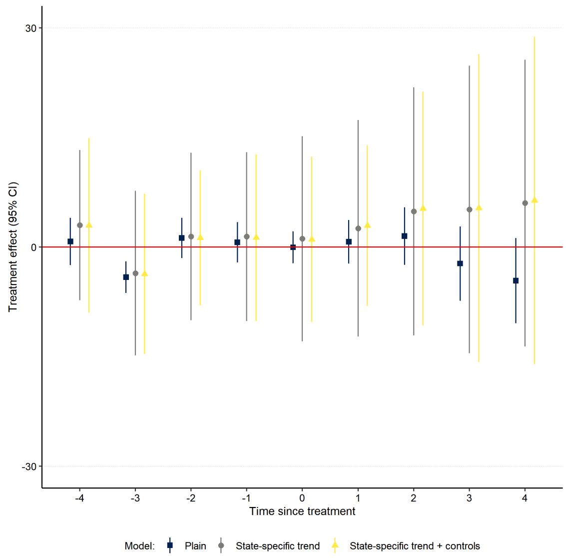
Note: The graph shows placebo and dynamic two-way fixed effects estimators proposed by Chaisemartin and D'Haultfœuille (2020) over four years before and after a NASF is introduced in a municipality for the first time on on the mean number of hours worked per professional by other health professionals eligible for the NASF program. Vertical bars show 95% confidence intervals (CIs) around the coefficients. Results related to three different specifications are displayed. The first includes only municipality and year fixed effects. The second adds non-parametric state-specific time trends. The third adds the following controls: municipal GDP per capita (in 2010 R$), per capita expenditure with the PBF, share of the population in the age groups 10–19, 20–29, 30–39, 40–49, 50–59, and 60 years or older, share of the population that is female, share of the population covered by private health insurance, share of the population covered by FHTs, number of CAPS per 100,000 residents, and number of physicians hired under the More Physicians Program per 100,000 residents. Standard errors are clustered at the municipality level and estimated by a bootstrap procedure in 50 replications. In each case, the sample is composed of yearly data for all observations with at least one professional of the corresponding category occupied between 2005 and 2018.

Figure 7: Impact of NASF on mental-health-related days on sick leave, hospitalizations and mortality

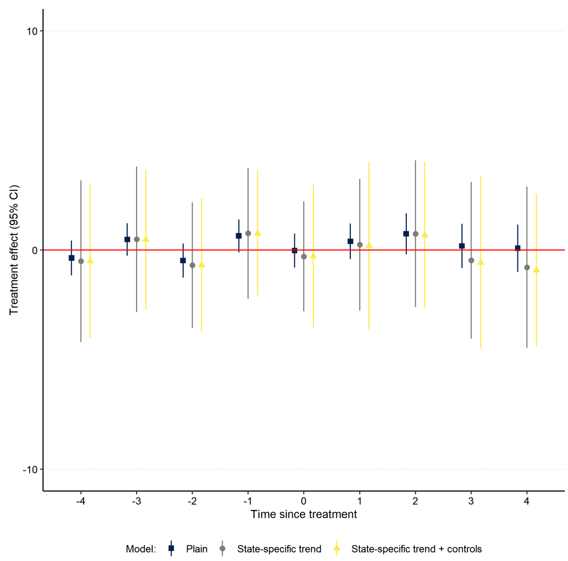
(a) Sick leave: mental



(b) Hospitalizations: mental



(c) Mortality: deaths of despair



Note: The graph shows placebo and dynamic two-way fixed effects estimators proposed by Chaisemartin and D'Haultfœuille (2020) over four years before and after a NASF is introduced in a municipality for the first time on the hospitalization and mortality rates (per 100,000 residents) and over three years before and after a NASF is introduced on the number of paid sick leave (per 100,000 residents) for mental-health-related conditions. Vertical bars show 95% confidence intervals (CIs) around the coefficients. Results related to three different specifications are displayed. The first includes only municipality and year fixed effects. The second adds non-parametric state-specific time trends. The third adds the following controls: municipal GDP per capita (in 2010 R$), per capita expenditure with the PBF, share of the population in the age groups 10–19, 20–29, 30–39, 40–49, 50–59, and 60 years or older, share of the population that is female, share of the population covered by private health insurance, share of the population covered by FHTs, number of CAPS per 100,000 residents, and number of physicians hired under the More Physicians Program per 100,000 residents. Standard errors are clustered at the municipality level and estimated by a bootstrap procedure in 50 replications. The sample is composed of yearly data for 5564 municipalities between 2005 and 2018 for hospitalizations and mortality and for 4688 municipalities between 2010 and 2017 for paid sick leave.

Main Tables

Table 1: Summary statistics (at baseline): supply of health professionals

	Total		Primary healthcare		Outside Primary Healthcare	
	Mean	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
	Healthcare Professionals per 100,000 residents (2005-2007)					
Mental health						
Psychologists	7.11	11.90	5.09	10.93	2.78	6.64
Occupational therapists	0.66	2.31	0.14	1.20	0.57	2.13
Psychiatrists	0.84	3.03	0.60	2.82	0.68	2.71
Other healthcare professionals						
Physiotherapists	7.85	11.71	4.51	10.68	4.70	8.42
Dietitians	1.88	5.06	1.26	4.80	0.93	2.72
Phonoaudiologists	2.50	5.97	1.51	5.38	1.33	3.82
Social Assistants	5.00	9.90	3.55	9.25	1.86	4.76
Pharmacists	6.47	9.43	3.89	8.23	3.54	6.47
Other physicians						
Gynecologist-Obstetrician	4.84	8.86	4.92	9.64	3.37	6.46
Pediatricians	4.33	8.59	4.06	8.59	3.07	6.47
Homeopathic physicians	0.04	0.48	0.02	0.37	0.04	0.39
Acupuncture physicians	0.02	0.38	0.02	0.51	0.03	0.31
	Mean hours worked per professional (2005-2007)					
Mental health						
Psychologists	33.30	16.93	29.13	15.27	30.72	16.28
Occupational therapists	36.02	19.01	29.16	15.23	34.81	18.73
Psychiatrists	37.12	24.38	22.67	17.54	34.13	22.43
Other healthcare professionals						
Physiotherapists	36.83	18.85	29.47	15.59	33.45	18.07
Dietitians	35.31	19.07	29.30	17.63	32.66	17.48
Phonoaudiologists	31.28	18.36	26.87	15.74	29.20	17.94
Social Assistants	37.43	16.79	33.86	15.39	34.48	16.70
Pharmacists	33.54	17.05	28.94	15.53	30.03	15.83
Other physicians						
Gynecologist-Obstetrician	44.63	26.97	26.99	19.21	36.33	23.15
Pediatricians	41.70	25.01	27.26	18.25	30.62	20.08
Homeopathic physicians	26.19	20.90	22.19	13.70	21.05	20.08
Acupuncture physicians	28.92	24.45	21.10	16.01	19.85	18.30

Note: The table shows summary statistics for variables related with the supply of health professionals in Brazilian municipalities before the implementation of NASFs. All data comes from the National Registry of Health Facilities (CNES).

Table 2: Summary statistics (at baseline): service utilization, health outcomes and control variables

	Mean	Std. Dev.	Min	Max	Source
	Service utilization per 100,000 residents (2008)				
Mental health					
Consultations with psychologists	491.2	1314.8	0.0	16070.3	SIA/Datasus
Consultations with occupational therapists	22.7	145.3	0.0	6105.4	SIA/Datasus
Consultations with psychiatrists	317.4	950.9	0.0	19793.2	SIA/Datasus
Psychosocial procedures	37.0	228.9	0.0	11174.2	SIA/Datasus
Provision of anti-depressive drugs	24.2	240.4	0.0	7250.3	SIA/Datasus
Consultations with other health professionals					
Physiotherapists	133.7	801.3	0.0	22478.8	SIA/Datasus
Dietitians	255.8	943.2	0.0	18543.5	SIA/Datasus
Phonoaudiologists	114.6	429.6	0.0	7545.1	SIA/Datasus
Social Assistants	370.9	1311.6	0.0	31495.4	SIA/Datasus
Pharmacists	45.0	826.4	0.0	48116.6	SIA/Datasus
Gynecologist-Obstetrician	2344.3	4191.4	0.0	43091.9	SIA/Datasus
Pediatricians	789.9	1658.2	0.0	23172.1	SIA/Datasus
Homeopathic physicians	7.3	119.2	0.0	6286.2	SIA/Datasus
Acupuncture physicians	4.3	66.7	0.0	2344.7	SIA/Datasus
	Health outcomes (per 100,000 residents) Hospitalizations (2005 - 2007)				
Mental					
Total	140.6	165.6	0.0	2567.5	SIH/Datasus
Substance use	47.5	77.3	0.0	911.9	SIH/Datasus
Schizophrenia	54.6	75.1	0.0	2174.1	SIH/Datasus
Mood disorders	20.3	36.4	0.0	635.1	SIH/Datasus
Other causes					
Amenable to PHC	2047.0	1404.8	0.0	31995.5	SIH/Datasus
Other	4461.2	1428.4	0.0	28539.6	SIH/Datasus
	Mortality (2005 - 2007)				
Deaths of despair					
Total	15.2	17.0	0.0	233.0	SIM/Datasus
Suicide	6.2	11.4	0.0	197.4	SIM/Datasus
Alcohol-related	8.8	12.1	0.0	223.0	SIM/Datasus
Overdose	0.1	1.4	0.0	58.4	SIM/Datasus
Other causes					
Amenable to PHC	154.0	78.7	0.0	729.9	SIM/Datasus
Other	366.1	127.5	0.0	1226.3	SIM/Datasus
	Days on sick leave (2010)				
Mental					
Total	6765.0	9250.3	0.0	93969.7	INSS
Substance use	1136.9	2696.8	0.0	56033.9	INSS
Schizophrenia	1025.6	2005.2	0.0	35825.6	INSS
Mood disorders	3587.4	6067.9	0.0	70080.4	INSS
Other causes					
Amenable to PHC	4938.2	4859.6	0.0	61357.3	INSS
Other	74580.2	56875.6	0.0	550933.3	INSS
	Controls (2005 - 2007)				
FHT coverage (%)	0.73	0.34	0.00	1.00	Ministry of Health
GDP per capita (in 2010 R$1000)	11.28	13.54	1.80	341.40	IBGE
Per capita expenditure in PBF (in R$)	60.38	39.47	0.00	372.63	Ministry of Social Development
Population with private health insurance (%)	0.06	0.10	0.00	2.97	ANS

Note: The table shows summary statistics for variables related with service utilization, health outcomes and control variables used in the analysis.

Table 3: Impact of NASF on supply of mental health professionals

	Psychologists (1)	Occupational Therapists (2)	Psychiatrists (3)
Average Treatment Effect	5.394	0.577	0.282
	(0.833)***	(0.257)**	(0.171)*
Average Placebo Effect	0.242	0.041	0.026
	(0.226)	(0.045)	(0.071)
Municipality & Year FE	Yes	Yes	Yes
State-specific trend	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Mean at baseline	7.112	0.662	0.844

Note: The table shows the simple average of the placebo and the dynamic two-way fixed effects estimators proposed by Chaisemartin and D'Haultfœuille (2020) over four years before and after a NASF is introduced in a municipality for the first time on the total supply of mental health professionals eligible for the NASF program. State-specific trends are state-specific year fixed-effects. Controls included are: municipal GDP per capita (in 2010 R$), per capita expenditure with the *Programa Bolsa Família* (PBF), share of the population in the age groups 10–19, 20–29, 30–39, 40–49, 50–59, and 60 years or older, share of the population that is female, share of the population covered by private health insurance, share of the population covered by FHT's, number of CAPS per 100,000 residents, and number of physicians hired under the More Physicians Program per 100,000 residents. Standard errors are clustered at the municipality level and estimated by a bootstrap procedure in 50 replications. The sample is composed of yearly data for 5564 municipalities between 2005 and 2018. Mean at baseline refers to 2005-2007, the period before the introduction of NASFs, and is measured as a rate per 100,000 residents. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 4: Impact of NASF on supply of other health professionals

	Other health professionals					Other Physicians			
	Physiotherapists	Dietitians	Phonoaudiologists	Social Assistants	Pharmacists	Gynecologists-Obstetricians	Pediatricians	Homeopathic physicians	Acupuncture physicians
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Average Treatment Effect	5.129	4.276	1.471	3.503	0.783	0.172	0.213	0.005	0.002
	(0.797)***	(0.571)***	(0.404)***	(0.522)***	(0.688)	(0.292)	(0.314)	(0.012)	(0.053)
Average Placebo Effect	0.144	0.145	0.066	0.14	0.086	0.017	0.035	0.001	0.003
	(0.235)	(0.193)	(0.102)	(0.152)	(0.208)	(0.11)	(0.114)	(0.004)	(0.021)
Municipality & Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State-specific trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mean at baseline	7.853	1.883	2.495	5.004	6.472	4.837	4.327	0.042	0.023

Note: The table shows the simple average of the placebo and the dynamic two-way fixed effects estimators proposed by Chaisemartin and D'Haultfœuille (2020) over four years before and after a NASF is introduced in a municipality for the first time on the total supply of other health professionals eligible for the NASF program. State-specific trends are state-specific year fixed-effects. Controls included are: municipal GDP per capita (in 2010 R$), per capita expenditure with the PBF, share of the population in the age groups 10–19, 20–29, 30–39, 40–49, 50–59, and 60 years or older, share of the population that is female, share of the population covered by private health insurance, share of the population covered by FHT's, number of CAPS per 100,000 residents, and number of physicians hired under the More Physicians Program per 100,000 residents. Standard errors are clustered at the municipality level and estimated by a bootstrap procedure in 50 replications. The sample is composed of yearly data for 5564 municipalities between 2005 and 2018. Mean at baseline refers to 2005–2007, the period before the introduction of NASFs, and is measured as a rate per 100,000 residents. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 5: Impact of NASF on supply of mental health professionals according to level of care

	Psychologists (1)	Occupational Therapists (2)	Psychiatrists (3)
		Primary Healthcare	
Average Treatment Effect	5.687	0.688	0.308
	(0.524)***	(0.179)***	(0.167)*
Average Placebo Effect	0.14	0.011	0.003
	(0.19)	(0.033)	(0.05)
Mean at baseline	5.094	0.14	0.604
		Outside Primary Healthcare	
Average Treatment Effect	0.36	0.111	0.122
	(0.419)	(0.168)	(0.128)
Average Placebo Effect	0.117	0.031	0.013
	(0.123)	(0.039)	(0.051)
Mean at baseline	2.777	0.573	0.683
Municipality & Year FE	Yes	Yes	Yes
State-specific trend	Yes	Yes	Yes
Controls	Yes	Yes	Yes

Note: The table shows the simple average of the placebo and the dynamic two-way fixed effects estimators proposed by Chaisemartin and D'Haultfœuille (2020) over four years before and after a NASF is introduced in a municipality for the first time on the supply of mental health professionals eligible for the NASF program in primary healthcare /outside of primary healthcare. State-specific trends are state-specific year fixed-effects. Controls included are: municipal GDP per capita (in 2010 R$), per capita expenditure with the PBF, share of the population in the age groups 10–19, 20–29, 30–39, 40–49, 50–59, and 60 years or older, share of the population that is female, share of the population covered by private health insurance, share of the population covered by FHT's, number of CAPS per 100,000 residents, and number of physicians hired under the More Physicians Program per 100,000 residents. Standard errors are clustered at the municipality level and estimated by a bootstrap procedure in 50 replications. The sample is composed of yearly data for 5564 municipalities between 2005 and 2018. Mean at baseline refers to 2005–2007, the period before the introduction of NASFs, and is measured as a rate per 100,000 residents. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 6: Impact of NASF on supply of other health professionals according to level of care

	Other health professionals					**Other Physicians**			
	Physiotherapists (1)	Dietitians (2)	Phonoaudiologists (3)	Social Assistants (4)	Pharmacists (5)	Gynecologist-Obstetrician (6)	Pediatrician (7)	Homeopathic physician (8)	Acupuncture physician (9)
	Primary Healthcare								
Average Treatment Effect	6.26	4.923	1.834	3.919	0.918	0.347	0.048	0.008	-0.003
	(0.896)***	(0.676)***	(0.374)***	(0.529)***	(0.608)	(0.404)	(0.301)	(0.011)	(0.026)
Average Placebo Effect	0	0.065	0.064	0.095	-0.131	-0.038	-0.012	-0.001	0.004
	(0.255)	(0.141)	(0.115)	(0.124)	(0.198)	(0.153)	(0.132)	(0.003)	(0.01)
Mean at baseline	4.507	1.256	1.508	3.554	3.886	4.918	4.057	0.019	0.019
	Outside Primary Healthcare								
Average Treatment Effect	0.253	-0.051	-0.012	-0.045	-0.175	-0.102	0.132	-0.004	0.003
	(0.78)	(0.36)	(0.218)	(0.391)	(0.518)	(0.228)	(0.36)	(0.012)	(0.016)
Average Placebo Effect	0.147	0.092	0.044	0.037	0.202	0.022	0.041	0	-0.001
	(0.292)	(0.091)	(0.068)	(0.115)	(0.231)	(0.062)	(0.11)	(0.007)	(0.008)
Mean at baseline	4.699	0.931	1.331	1.862	3.543	3.374	3.071	0.04	0.032
Municipality & Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State-specific trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: The table shows the simple average of the placebo and the dynamic two-way fixed effects estimators proposed by Chaisemartin and D'Haultfœuille (2020) over four years before and after a NASF is introduced in a municipality for the first time on the supply of other health professionals eligible for the NASF program in primary healthcare facilities/outside of primary healthcare facilities. State-specific trends are state-specific year fixed-effects. Controls included are: municipal GDP per capita (in 2010 R$), per capita expenditure with the PBF, share of the population in the age groups 10–19, 20–29, 30–39, 40–49, 50–59, and 60 years or older, share of the population that is female, share of the population covered by private health insurance, share of the population covered by FHT's, number of CAPS per 100,000 residents, and number of physicians hired under the More Physicians Program per 100,000 residents. Standard errors are clustered at the municipality level and estimated by a bootstrap procedure in 50 replications. The sample is composed of yearly data for 5564 municipalities between 2005 and 2018. Mean at baseline refers to 2005–2007, the period before the introduction of NASFs, and is measured as a rate per 100,000 residents. ***$p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 7: Impact of NASF on hours worked per professional (mental health professionals)

	Psychologists (1)	Occupational Therapists (2)	Psychiatrists (3)
Average Treatment Effect	2.091	0.884	0.316
	(0.828)**	(1.677)	(2.717)
Average Placebo Effect	0.145	-0.26	0.452
	(0.416)	(1.155)	(1.287)
Municipality & Year FE	Yes	Yes	Yes
State-specific trend	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Mean at baseline	33.296	36.024	37.118

Note: The table shows the simple average of the placebo and the dynamic two-way fixed effects estimators proposed by Chaisemartin and D'Haultfœuille (2020) over four years before and after a NASF is introduced in a municipality for the first time on the number of hours worked per professional by mental health professionals eligible for the NASF program. State-specific trends are state-specific year fixed-effects. Controls included are: municipal GDP per capita (in 2010 R$), per capita expenditure with the PBF, share of the population in the age groups 10–19, 20–29, 30–39, 40–49, 50–59, and 60 years or older, share of the population that is female, share of the population covered by private health insurance, share of the population covered by FHT's, number of CAPS per 100,000 residents, and number of physicians hired under the More Physicians Program per 100,000 residents. Standard errors are clustered at the municipality level and estimated by a bootstrap procedure in 50 replications. In each case, the sample is composed of yearly data for all observations with at least one professional of the corresponding category occupied between 2005 and 2018. Mean at baseline refers to 2005–2007, the period before the introduction of NASFs, and is measured as the mean number of hours worked per occupied professional. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 8: Impact of NASF on hours worked per professional (other health professionals)

	Other health professionals					Other Physicians			
	Physioterapists	Dietitians	Phonoaudiologists	Social Assistants	Pharmacists	Gynecologist-Obstetrician	Pediatrician	Homeopathic physician	Acupuncture physician
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Average Treatment Effect	0.669	2.93	3.448	1.722	0.561	1.641	0.119	4.572	1.831
	(0.668)	(1.243)**	(1.293)***	(0.822)**	(0.705)	(2.556)	(1.712)	(6.424)	(6.41)
Average Placebo Effect	0.007	-0.164	0.019	-0.152	0.025	-0.053	0.23	-0.327	-0.239
	(0.376)	(0.505)	(0.639)	(0.403)	(0.39)	(1.029)	(0.933)	(3.27)	(2.595)
Municipality & Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State-specific trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mean at baseline	36.832	35.307	31.282	37.432	33.538	44.632	41.702	26.194	28.918

Note: The table shows the simple average of the placebo and the dynamic two-way fixed effects estimators proposed by Chaisemartin and D'Haultfœuille (2020) over four years before and after a NASF is introduced in a municipality for the first time on the number of hours worked per professional by other health professionals eligible for the NASF program. State-specific trends are state-specific year fixed-effects. Controls included are: municipal GDP per capita (in 2010 R$), per capita expenditure with the PBF, share of the population in the age groups 10–19, 20–29, 30–39, 40–49, 50–59, and 60 years or older, share of the population that is female, share of the population covered by private health insurance, share of the population covered by FHTs, number of CAPS per 100,000 residents, and number of physicians hired under the More Physicians Program per 100,000 residents. Standard errors are clustered at the municipality level and estimated by a bootstrap procedure in 50 replications. In each case, the sample is composed of yearly data for all observations with at least one professional of the corresponding category occupied between 2005 and 2018. Mean at baseline refers to 2005–2007, the period before the introduction of NASFs, and is measured as the mean number of hours worked per occupied professional. *** p<0.01, ** p<0.05, * p<0.1.

Table 9: Impact of NASF on service utilization: mental health services

	Individual consultations			Other procedures	
	Psychologists	Occupational Therapists	Psychiatrists	Supply of anti-depressive drugs	Psychosocial procedures
	(1)	(2)	(3)	(4)	(5)
Average Treatment Effect	491.681	6.228	16.292	34.843	-3.606
	(116.304)***	(15.643)	(60.206)	(24.938)	(19.891)
Average Placebo Effect	11.533	-1.406	-3.501	4.317	1.554
	(33.072)	(5.012)	(20.599)	(5.681)	(4.105)
Municipality & Year FE	Yes	Yes	Yes	Yes	Yes
State-specific trend	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
Mean at baseline	491.203	22.689	317.35	24.247	37.024

Note: The table shows the simple average of the placebo and the dynamic two-way fixed effects estimators proposed by Chaisemartin and D'Haultfœuille (2020) over four years before and after a NASF is introduced in a municipality for the first time on the utilization of mental-health related services. State-specific trends are state-specific year fixed-effects. Controls included are: municipal GDP per capita (in 2010 R$), per capita expenditure with the PBF, share of the population in the age groups 10–19, 20–29, 30–39, 40–49, 50–59, and 60 years or older, share of the population that is female, share of the population covered by private health insurance, share of the population covered by FHTs, number of CAPS per 100,000 residents, and number of physicians hired under the More Physicians Program per 100,000 residents. Standard errors are clustered at the municipality level and estimated by a bootstrap procedure in 50 replications. The sample is composed of yearly data for 5310 municipalities between 2008 and 2017. Mean at baseline refers to 2008, the first year with compatible available data on service utilization, and is measured as a rate per 100,000 residents. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 10: Impact of NASF on service utilization: other individual consultations

	Other health professionals					Other Physicians			
	Physioterapists	Dietitians	Phonoaudiologists	Social Assistants	Pharmacists	Gynecologist-Obstetricians	Pediatricians	Homeopathic physicians	Acupuncture physicians
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Average Treatment Effect	514.576	455.768	136.488	302.377	14.355	120.196	8.125	-1.411	-0.042
	(118.634)***	(119.415)***	(42.646)***	(100.939)***	(245.798)	(169.302)	(85.92)	(2.561)	(5.363)
Average Placebo Effect	10.715	24.302	0.625	2.739	1.332	-54.905	-4.275	-0.439	0.406
	(32.103)	(44.7)	(14.488)	(39.121)	(31.339)	(60.193)	(36.71)	(2.025)	(1.058)
Municipality & Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State-specific trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mean at baseline	133.718	255.818	114.602	370.874	44.995	2344.325	789.932	7.347	4.302

Note: The table shows the simple average of the placebo and the dynamic two-way fixed effects estimators proposed by Chaisemartin and D'Haultfœuille (2020) over four years before and after a NASF is introduced in a municipality for the first time on the utilization of other health services. State-specific trends are state-specific year fixed-effects. Controls included are: municipal GDP per capita (in 2010 R$), per capita expenditure with the PBF, share of the population in the age groups 10–19, 20–29, 30–39, 40–49, 50–59, and 60 years or older, share of the population that is female, share of the population covered by private health insurance, share of the population covered by FHTs, number of CAPS per 100,000 residents, and number of physicians hired under the More Physicians Program per 100,000 residents. Standard errors are clustered at the municipality level and estimated by a bootstrap procedure in 50 replications. The sample is composed of yearly data for 5310 municipalities between 2008 and 2017. Mean at baseline refers to 2008, the first year with compatible available data on service utilization, and is measured as a rate per 100,000 residents. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 11: Impact of NASF on mental-health-related days on sick leave, hospitalizations and mortality

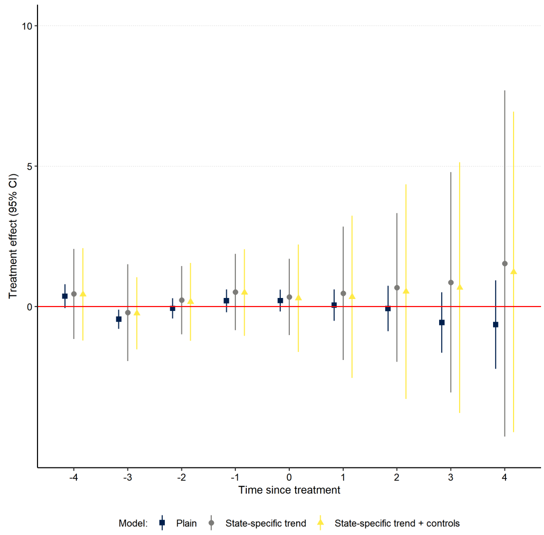
	Days on sick leave				Hospitalizations				Mortality			
	Mental	Substance use	Schizophrenia	Mood disorders	Mental	Substance use	Schizophrenia	Mood disorders	Deaths of despair	Alcohol-related	Overdose	Suicide
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Average Treatment Effect	197.747	-42.154	122.062	32.126	4.203	1.526	2.61	0.061	-0.176	-0.359	0.073	0.111
	(482.019)	(260.303)	(158.857)	(332.963)	(6.256)	(3.144)	(2.659)	(1.894)	(1.156)	(1.033)	(0.12)	(0.819)
Average Placebo Effect	74.813	-20.089	16.027	75.634	0.464	0.403	0.014	0.066	0.011	0.019	0.001	-0.009
	(284.635)	(123.747)	(113.55)	(219.428)	(2.259)	(1.087)	(1.216)	(0.592)	(0.409)	(0.373)	(0.045)	(0.29)
Municipality & Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State-specific trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mean at baseline	7002.999	1162.834	1047.072	3776.966	140.624	47.504	54.628	20.268	15.155	8.786	0.14	6.23

Note: The table shows the simple average of the placebo and the dynamic two-way fixed effects estimators proposed by Chaisemartin and D'Haultfœuille (2020) over four years before and after a NASF is introduced in a municipality for the first time on the hospitalization and mortality rates (per 100,000 residents) and over three years before and after a NASF is introduced on the number of paid sick leave (per 100,000 residents) for mental-health related conditions. Hospitalizations and days on sick leave: mental (ICD10 F00-F99), substance-use (ICD10 F10-F19), schizophrenia (ICD10 F20-F29), and mood diorders (ICD10 F30-F39). Mortality: deaths of despair (ICD10 K70, K73-74, X60-84, Y87.0, X40-45, Y10-15, Y45, 47, 49), alcohol related (ICD10 K70, K73-74), suicide (ICD X60-84, Y87.0), and overdose (ICD X40-45, Y10-15, Y45, 47, 49). State-specific trends are state-specific year fixed-effects. Controls included are: municipal GDP per capita (in 2010 R$), per capita expenditure with the PBF, share of the population in the age groups 10–19, 20–29, 30–39, 40–49, 50–59, and 60 years or older, share of the population that is female, share of the population covered by private health insurance, share of the population covered by FHTs, number of CAPS per 100,000 residents, and number of physicians hired under the More Physicians Program per 100,000 residents. Standard errors are clustered at the municipality level and estimated by a bootstrap procedure in 50 replications. The sample is composed of yearly data for 5564 municipalities between 2005 and 2018 for hospitalizations and mortality and for 4688 municipalities between 2010 and 2017 for days on sick leave. Mean at baseline refers to 2005–2007 (hospitalizations and mortality) or 2010 (days on sick leave), and is measured as a rate per 100,000 residents. ***p<0.01, ** p<0.05, * p<0.1.

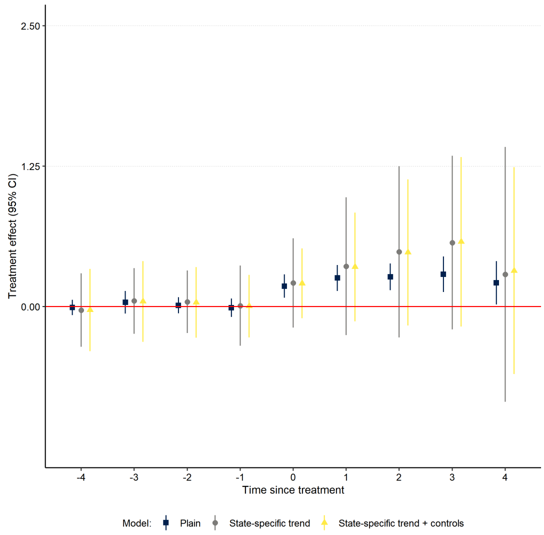
A Supplementary Figures

Figure A1: Impact of NASF on supply of health professionals added to NASF program in 2011

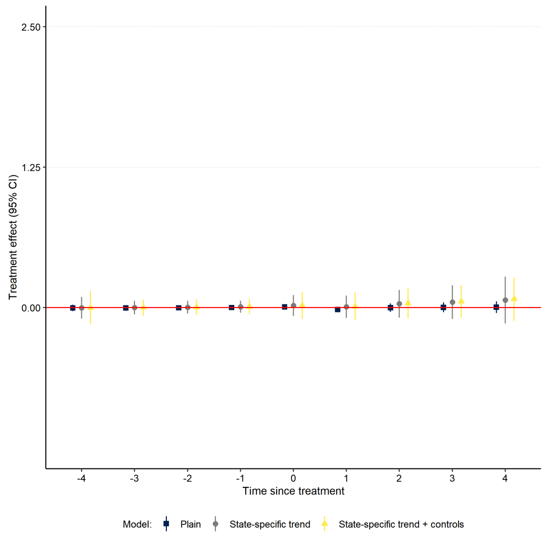
(a) Internists/General practitioners



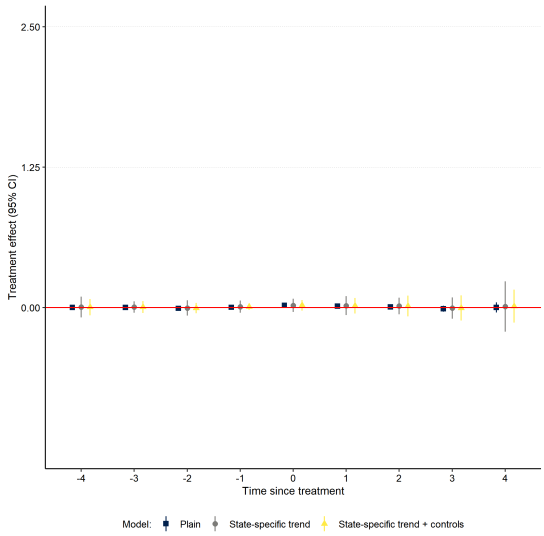
(b) Veterinarians



(c) Occupational physicians



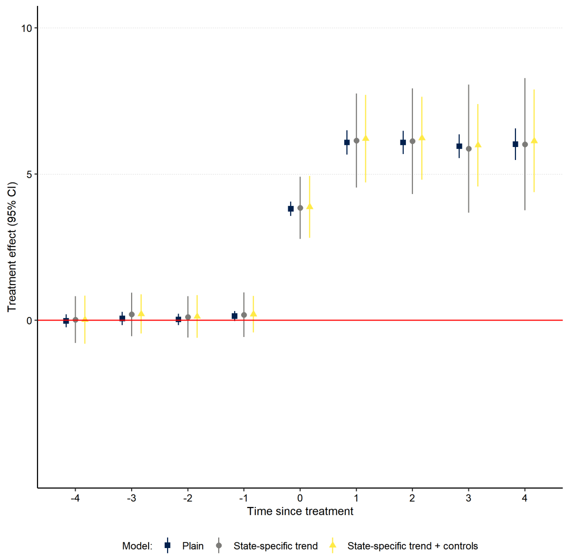
(d) Geriatricians



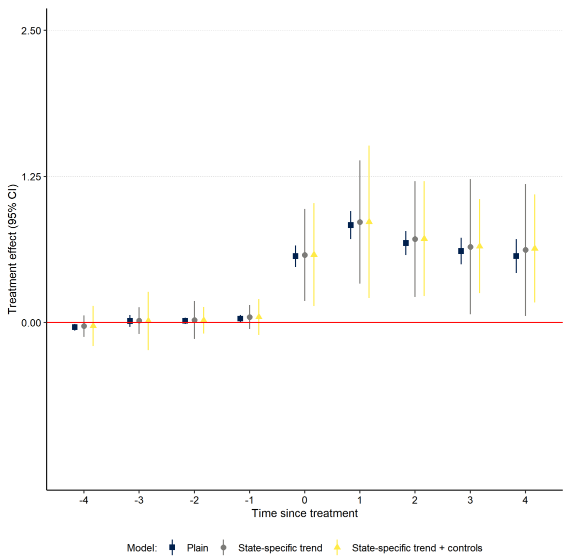
Note: The graph shows placebo and dynamic two-way fixed effects estimators proposed by Chaisemartin and D'Haultfœuille (2020) over four years before and after a NASF is introduced in a municipality for the first time on the total supply of health professionals made eligible for the NASF program in 2011. Supply is measured as the number of professionals per 100,000 residents. Vertical bars show 95% confidence intervals (CIs) around the coefficients. Results related to three different specifications are displayed. The first includes only municipality and year fixed effects. The second adds non-parametric state-specific time trends. The third adds the following controls: municipal GDP per capita (in 2010 R$), per capita expenditure with the PBF, share of the population in the age groups 10–19, 20–29, 30–39, 40–49, 50–59, and 60 years or older, share of the population that is female, share of the population covered by private health insurance, share of the population covered by FHTs, number of CAPS per 100,000 residents, and number of physicians hired under the More Physicians Program per 100,000 residents. Standard errors are clustered at the municipality level and estimated by a bootstrap procedure in 50 replications. The sample is composed of yearly data for 5564 municipalities between 2005 and 2018.

Figure A2: Impact of NASF on supply of mental health professionals in PHC

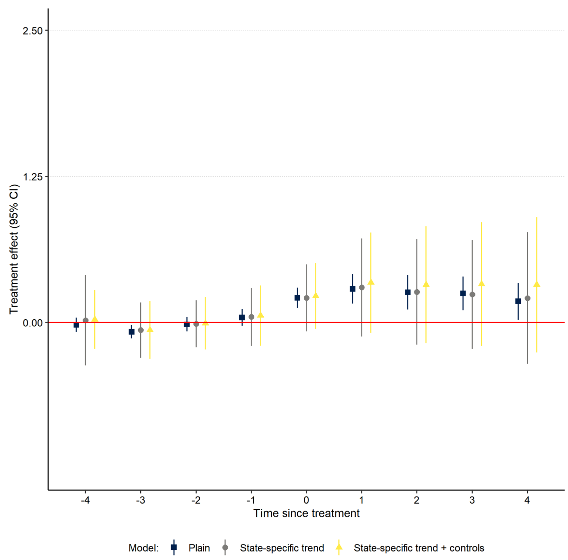
(a) Psychologists



(b) Occupational Therapists



(c) Psychiatrists



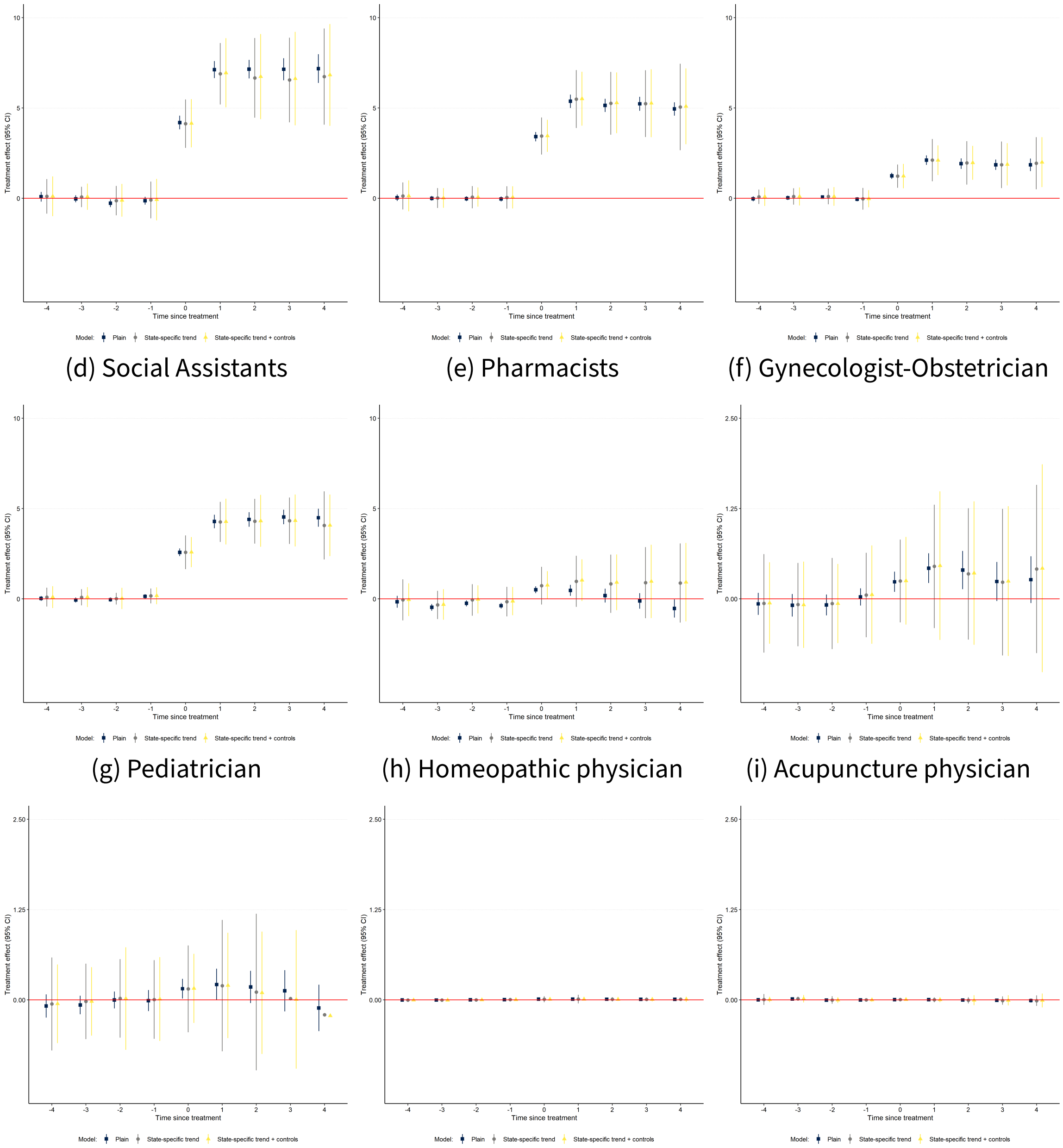
Note: The graph shows placebo and dynamic two-way fixed effects estimators proposed by Chaisemartin and D'Haultfœuille (2020) over four years before and after a NASF is introduced in a municipality for the first time on the supply in primary healthcare of mental health professionals eligible for the NASF program. Supply is measured as the number of professionals per 100,000 residents. Vertical bars show 95% confidence intervals (CIs) around the coefficients. Results related to three different specifications are displayed. The first includes only municipality and year fixed effects. The second adds non-parametric state-specific time trends. The third adds the following controls: municipal GDP per capita (in 2010 R$), per capita expenditure with the PBF, share of the population in the age groups 10–19, 20–29, 30–39, 40–49, 50–59, and 60 years or older, share of the population that is female, share of the population covered by private health insurance, share of the population covered by private health insurance, share of the population covered by FHTs, number of CAPS per 100,000 residents, and number of physicians hired under the More Physicians Program per 100,000 residents. Standard errors are clustered at the municipality level and estimated by a bootstrap procedure in 50 replications. The sample is composed of yearly data for 5564 municipalities between 2005 and 2018.

Figure A3: Impact of NASF on supply of other health professionals in PHC

(a) Physiotherapists (b) Dietitians (c) Phonoaudiologists

(d) Social Assistants (e) Pharmacists (f) Gynecologist-Obstetrician

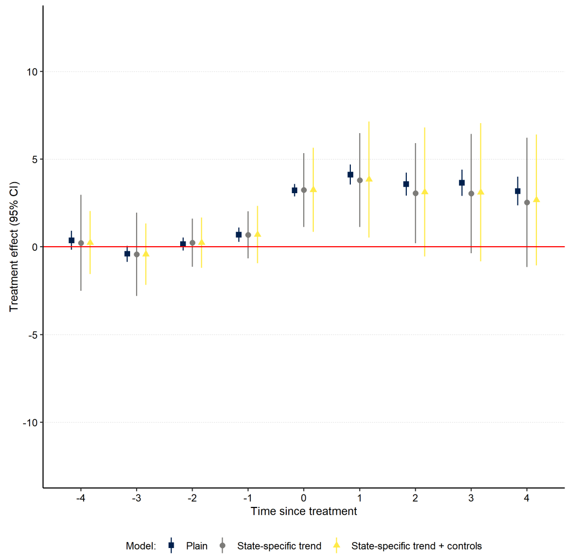
(g) Pediatrician (h) Homeopathic physician (i) Acupuncture physician



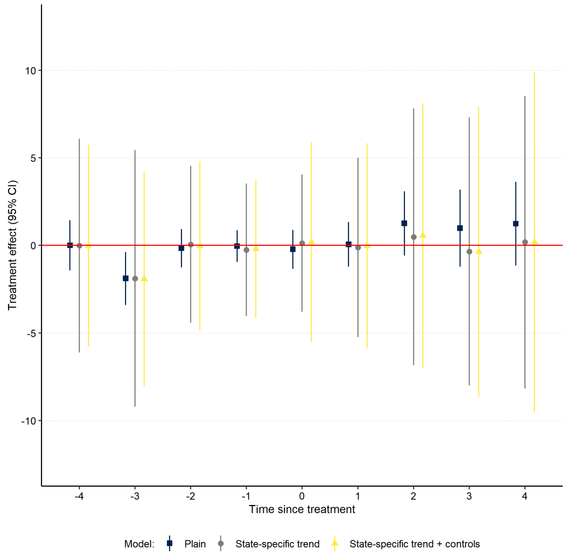
Note: The graph shows placebo and dynamic two-way fixed effects estimators proposed by Chaisemartin and D'Haultfœuille (2020) over four years before and after a NASF is introduced in a municipality for the first time on the supply in primary healthcare of other health professionals eligible for the NASF program. Supply is measured as the number of professionals per 100,000 residents. Vertical bars show 95% confidence intervals (CIs) around the coefficients. Results related to three different specifications are displayed. The first includes only municipality and year fixed effects. The second adds non-parametric state-specific time trends. The third adds the following controls: municipal GDP per capita (in 2010 R$), per capita expenditure with the PBF, share of the population in the age groups 10–19, 20–29, 30–39, 40–49, 50–59, and 60 years or older, share of the population that is female, share of the population covered by private health insurance, share of the population covered by private health insurance, share of the population covered by FHTs, number of CAPS per 100,000 residents, and number of physicians hired under the More Physicians Program per 100,000 residents. Standard errors are clustered at the municipality level and estimated by a bootstrap procedure in 50 replications. The sample is composed of yearly data for 5564 municipalities between 2005 and 2018.

Figure A4: Impact of NASF on hours worked per professional in primary healthcare (mental health)

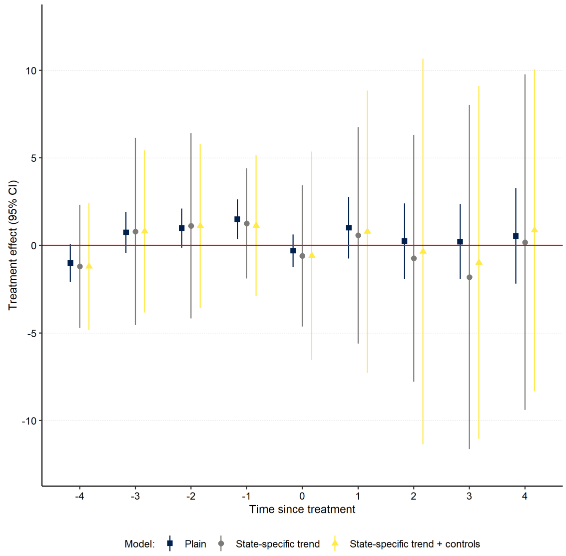
(a) Psychologists



(b) Occupational Therapists

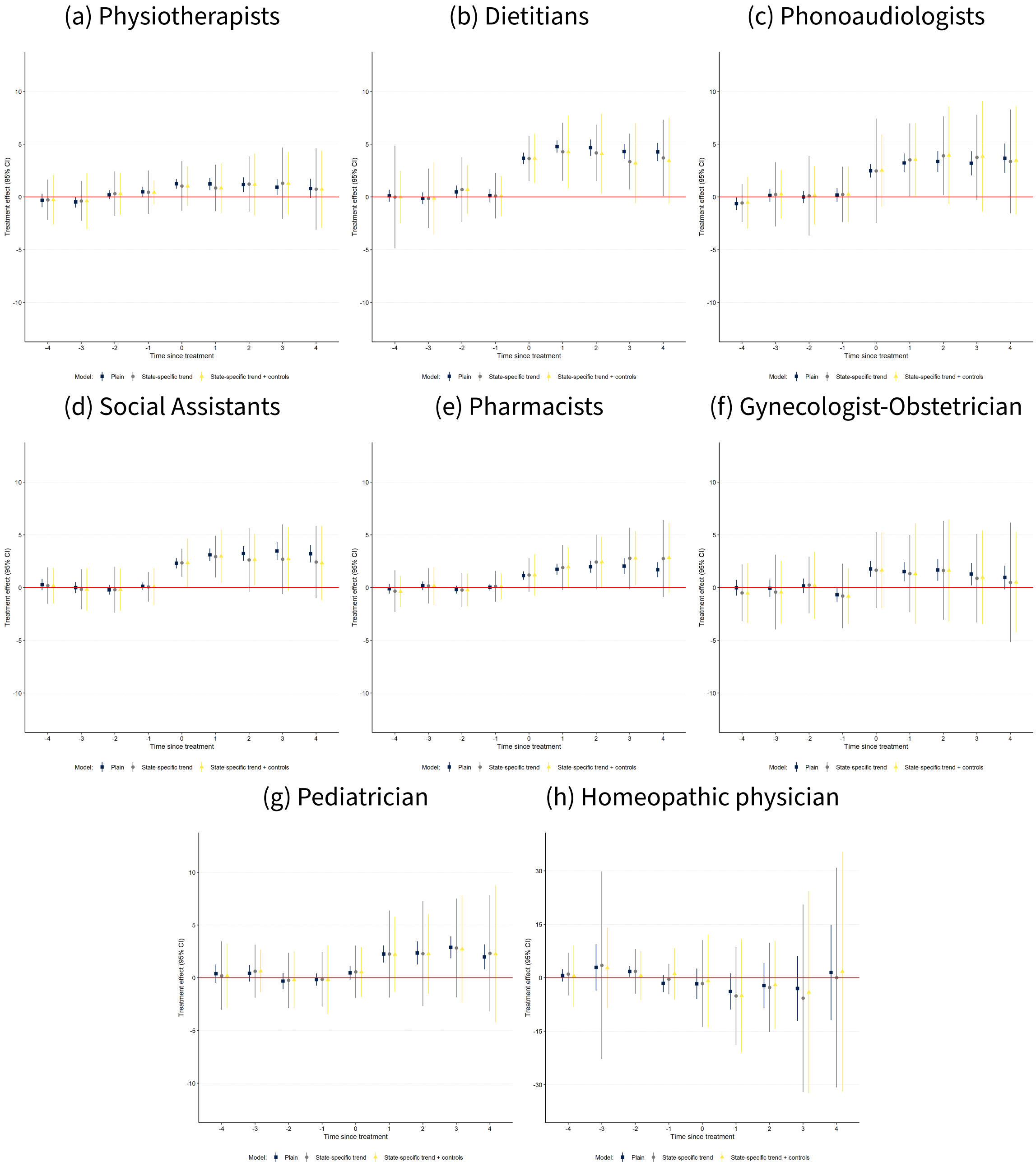


(c) Psychiatrists



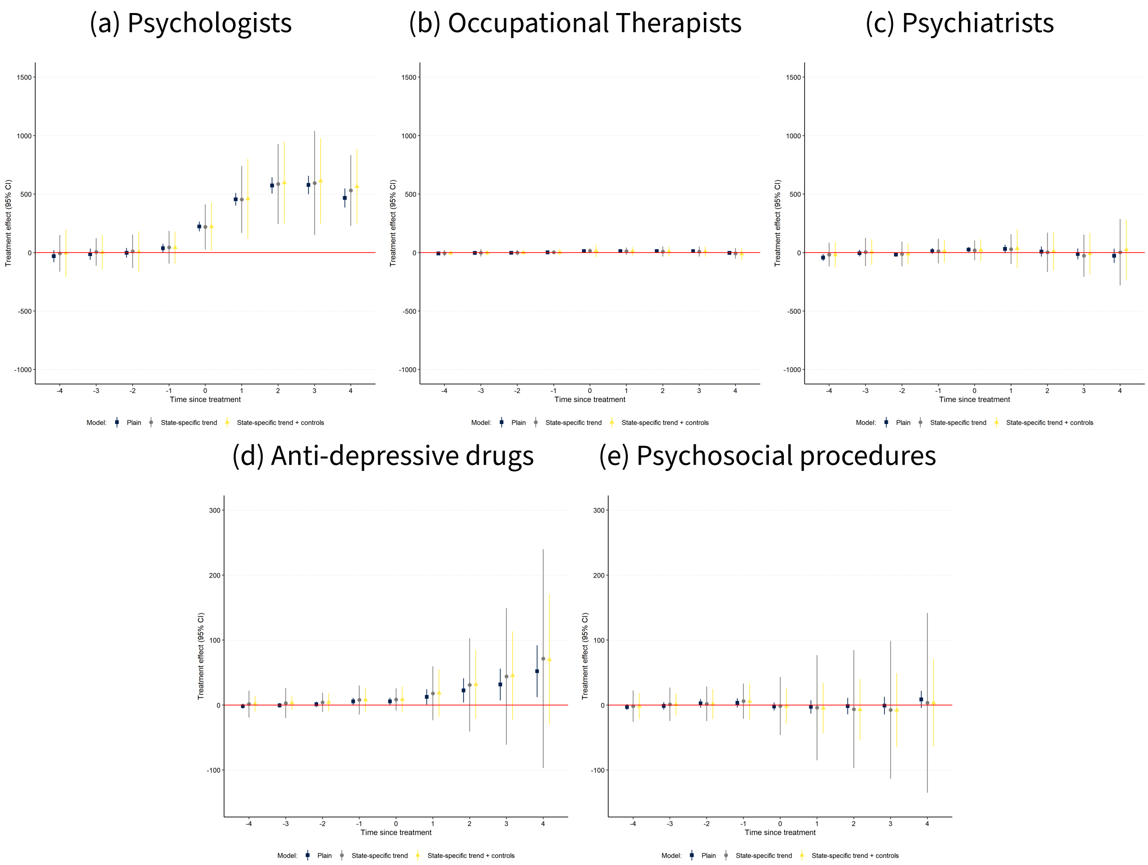
Note: The graph shows placebo and dynamic two-way fixed effects estimators proposed by Chaisemartin and D'Haultfœuille (2020) over four years before and after a NASF is introduced in a municipality for the first time on the number of hours worked per professional in primary healthcare by mental health professionals eligible for the NASF program. Vertical bars show 95% confidence intervals (CIs) around the coefficients. Results related to three different specifications are displayed. The first includes only municipality and year fixed effects. The second adds non-parametric state-specific time trends. The third adds the following controls: municipal GDP per capita (in 2010 R$), per capita expenditure with the PBF, share of the population in the age groups 10–19, 20–29, 30–39, 40–49, 50–59, and 60 years or older, share of the population that is female, share of the population covered by private health insurance, share of the population covered by FHTs, number of CAPS per 100,000 residents, and number of physicians hired under the More Physicians Program per 100,000 residents. Standard errors are clustered at the municipality level and estimated by a bootstrap procedure in 50 replications. In each case, the sample is composed of yearly data for all observations with at least one professional of the corresponding category occupied between 2005 and 2018.

Figure A5: Impact of NASF on hours worked per professional (other health professionals)



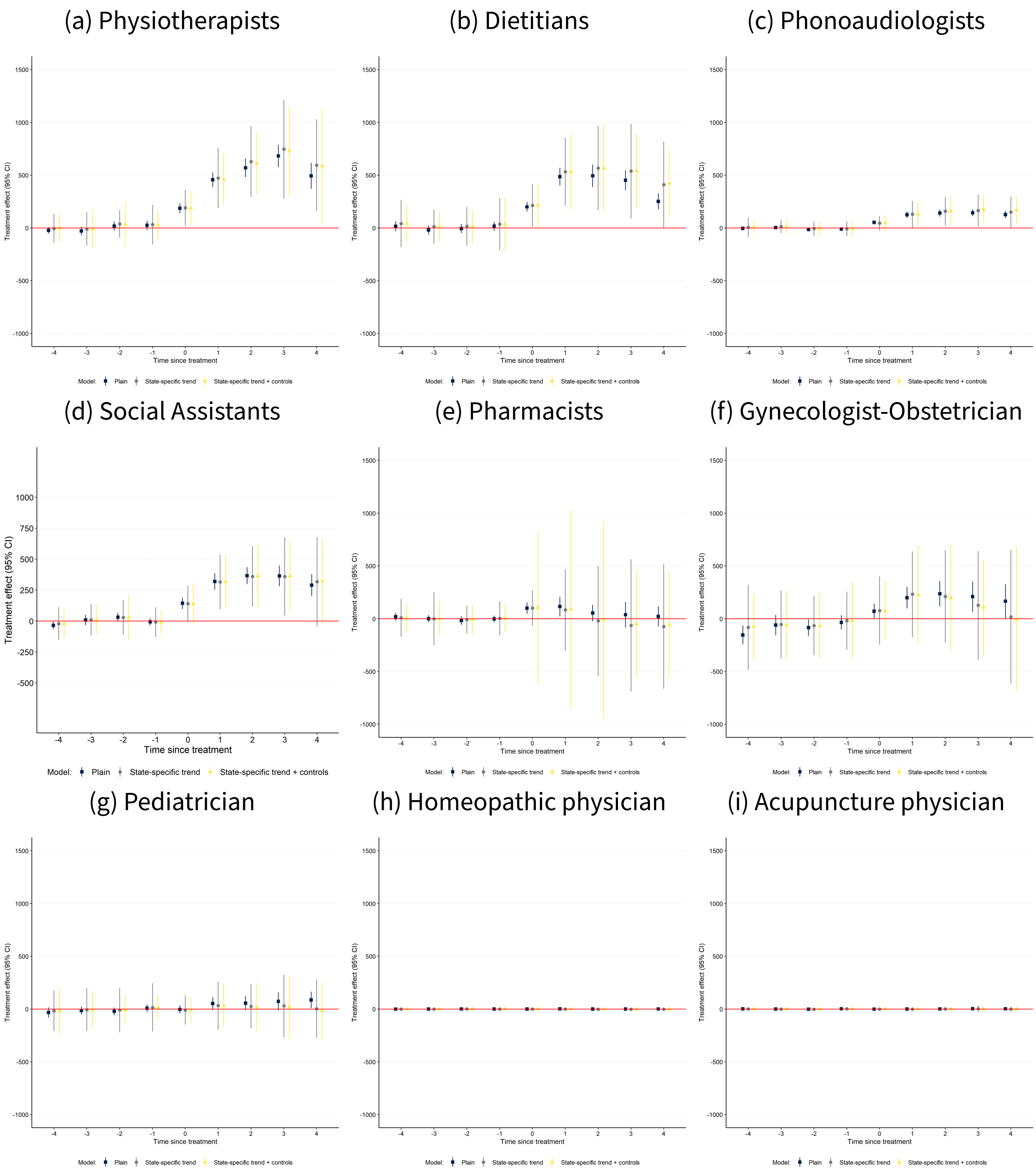
Note: The graph shows placebo and dynamic two-way fixed effects estimators proposed by Chaisemartin and D'Haultfœuille (2020) over four years before and after a NASF is introduced in a municipality for the first time on on the number of hours worked per professional in primary healthcare by other health professionals eligible for the NASF program. Vertical bars show 95% confidence intervals (CIs) around the coefficients. Results related to three different specifications are displayed. The first includes only municipality and year fixed effects. The second adds non-parametric state-specific time trends. The third adds the following controls: municipal GDP per capita (in 2010 R$), per capita expenditure with the *PBF*, share of the population in the age groups 10–19, 20–29, 30–39, 40–49, 50–59, and 60 years or older, share of the population that is female, share of the population covered by private health insurance, share of the population covered by FHTs, number of CAPS per 100,000 residents, and number of physicians hired under the More Physicians Program per 100,000 residents. Standard errors are clustered at the municipality level and estimated by a bootstrap procedure in 50 replications. In each case, the sample is composed of yearly data for all observations with at least one professional of the corresponding category occupied between 2005 and 2018. The number of municipalities with acupuncture physicians occupied in primary healthcare was too small to estimate the effects in the model with state-specific trend.

Figure A6: Impact of NASF on mental-health related services utilization



Note: The graph shows placebo and dynamic two-way fixed effects estimators proposed by Chaisemartin and D'Haultfœuille (2020) over four years before and after a NASF is introduced in a municipality for the first time on the utilization of mental health services. Utilization is measured as the number of procedures per 100,000 residents. Vertical bars show 95% confidence intervals (CIs) around the coefficients. Results related to three different specifications are displayed. The first includes only municipality and year fixed effects. The second adds non-parametric state-specific time trends. The third adds the following controls: municipal GDP per capita (in 2010 R$), per capita expenditure with the PBF, share of the population in the age groups 10–19, 20–29, 30–39, 40–49, 50–59, and 60 years or older, share of the population that is female, share of the population covered by private health insurance, share of the population covered by FHTs, number of CAPS per 100,000 residents, and number of physicians hired under the More Physicians Program per 100,000 residents. Standard errors are clustered at the municipality level and estimated by a bootstrap procedure in 50 replications. The sample is composed of yearly data for 5310 municipalities between 2008 and 2017.

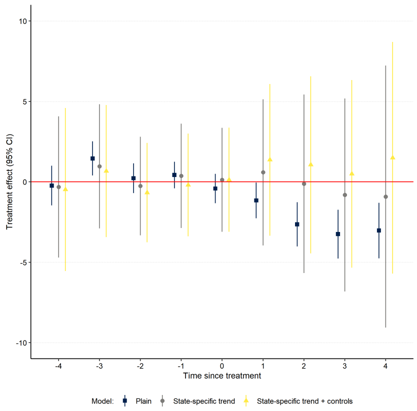
Figure A7: Impact of NASF on other health services utilization (individual consultations)



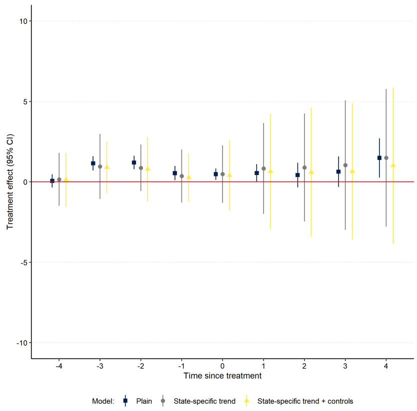
Note: The graph shows placebo and dynamic two-way fixed effects estimators proposed by Chaisemartin and D'Haultfœuille (2020) over four years before and after a NASF is introduced in a municipality for the first time on the utilization of other health services. Utilization is measured as the number of procedures per 100,000 residents. Vertical bars show 95% confidence intervals (CIs) around the coefficients. Results related to three different specifications are displayed. The first includes only municipality and year fixed effects. The second adds non-parametric state-specific time trends. The third adds the following controls: municipal GDP per capita (in 2010 R$), per capita expenditure with the PBF, share of the population in the age groups 10–19, 20–29, 30–39, 40–49, 50–59, and 60 years or older, share of the population that is female, share of the population covered by private health insurance, share of the population covered by FHTs, number of CAPS per 100,000 residents, and number of physicians hired under the More Physicians Program per 100,000 residents. Standard errors are clustered at the municipality level and estimated by a bootstrap procedure in 50 replications. The sample is composed of yearly data for 5310 municipalities between 2008 and 2017.

Figure A8: Impact of NASF on supply of health professionals not eligible for NASF program

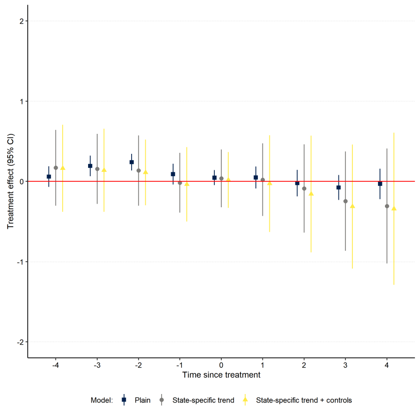
(a) CHWs



(b) Nurses

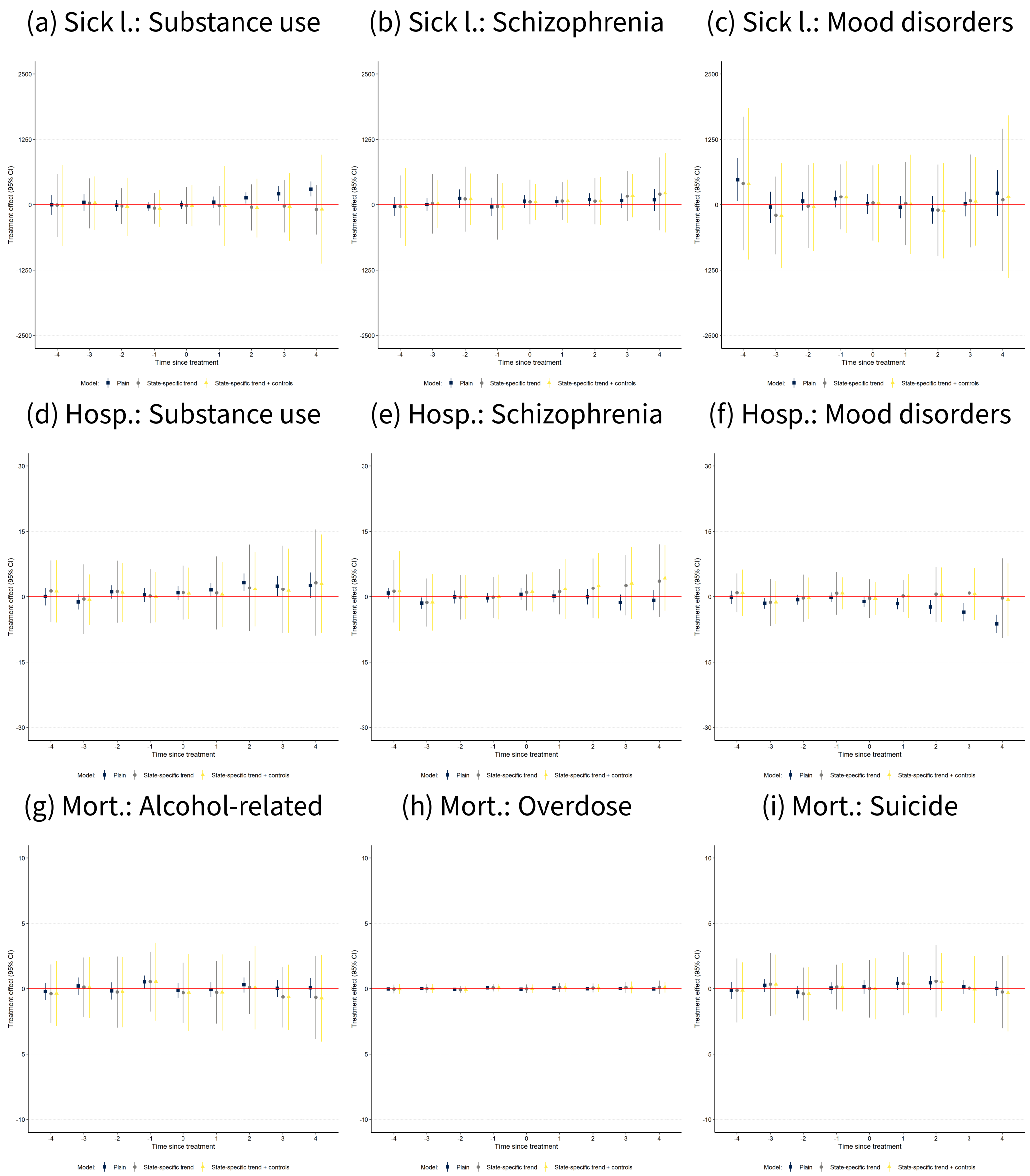


(c) Surgeons



Note: The graph shows placebo and dynamic two-way fixed effects estimators proposed by Chaisemartin and D'Haultfœuille (2020) over four years before and after a NASF is introduced in a municipality for the first time on the total supply of health professionals not eligible for the NASF program. Supply is measured as the number of professionals per 100,000 residents. Vertical bars show 95% confidence intervals (CIs) around the coefficients. Results related to three different specifications are displayed. The first includes only municipality and year fixed effects. The second adds non-parametric state-specific time trends. The third adds the following controls: municipal GDP per capita (in 2010 R$), per capita expenditure with the PBF, share of the population in the age groups 10–19, 20–29, 30–39, 40–49, 50–59, and 60 years or older, share of the population that is female, share of the population covered by private health insurance, share of the population covered by FHTs, number of CAPS per 100,000 residents, and number of physicians hired under the More Physicians Program per 100,000 residents. Standard errors are clustered at the municipality level and estimated by a bootstrap procedure in 50 replications. The sample is composed of yearly data for 5564 municipalities between 2005 and 2018.

Figure A9: Impact of NASF on mental-health related days on sick leave, hospitalizations and mortality (detailed)



Note: The graph shows placebo and dynamic two-way fixed effects estimators proposed by Chaisemartin and D'Haultfœuille (2020) over four years before and after a NASF is introduced in a municipality for the first time on the hospitalization and mortality rates (per 100,000 residents) for mental-health-related conditions. Hospitalizations: substance-use (ICD10 F10-F19), schizophrenia (ICD10 F20-F29), and mood diorders (ICD10 F30-F39). Mortality: alcohol related (ICD10 K70, K73-74), suicide (ICD X60-84, Y87.0), and overdose (ICD X40-45, Y10-15, Y45, 47, 49). Vertical bars show 95% confidence intervals (CIs) around the coefficients. Results related to three different specifications are displayed. The first includes only municipality and year fixed effects. The second adds non-parametric state-specific time trends. The third adds the following controls: municipal GDP per capita (in 2010 R$), per capita expenditure with the PBF, share of the population in the age groups 10–19, 20–29, 30–39, 40–49, 50–59, and 60 years or older, share of the population that is female, share of the population covered by private health insurance, share of the population covered by FHTs, number of CAPS per 100,000 residents, and number of physicians hired under the More Physicians Program per 100,000 residents. Standard errors are clustered at the municipality level and estimated by a bootstrap procedure in 50 replications. The sample is composed of yearly data for 5564 municipalities between 2005 and 2018 for hospitalizations and mortality and for 4688 municipalities between 2010 and 2017 for paid sick leave.

B Supplementary Tables

Table B1: Impact of NASF on supply of health professionals added in 2011

	Occupational physicians (1)	Geriatricians (2)	Veterinarians (3)	Internists / General practitioners (4)
Average Treatment Effect	0.039	0.011	0.387	0.615
	(0.057)	(0.037)	(0.244)	(1.502)
Average Placebo Effect	0.002	0.002	0.013	0.212
	(0.026)	(0.013)	(0.089)	(0.39)
Municipality & Year FE	Yes	Yes	Yes	Yes
State-specific trend	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Mean at baseline	0.143	0.052	1.659	16.24

Note: The table shows the simple average of the placebo and the dynamic two-way fixed effects estimators proposed by Chaisemartin and D'Haultfœuille (2020) over four years before and after a NASF is introduced in a municipality for the first time on the total supply of health professionals made eligible for the NASF program in 2011. State-specific trends are state-specific year fixed-effects. Controls included are: municipal GDP per capita (in 2010 R$), per capita expenditure with the PBF, share of the population in the age groups 10–19, 20–29, 30–39, 40–49, 50–59, and 60 years or older, share of the population that is female, share of the population covered by private health insurance, share of the population covered by FHTs, number of CAPS per 100,000 residents, and number of physicians hired under the More Physicians Program per 100,000 residents. Standard errors are clustered at the municipality level and estimated by a bootstrap procedure in 50 replications. The sample is composed of yearly data for 5564 municipalities between 2005 and 2018. Mean at baseline refers to 2005–2007, the period before the introduction of NASFs, and is measured as a rate per 100,000 residents. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table B2: Impact of NASF-1 on supply of health professionals according lo level of care

	Mental health			Other health professionals					Other Physicians			
	Psychologists	Occupational Therapists	Psychiatrists	Physioterapists	Dietitians	Phonoaudiologists	Social Assistants	Pharmacists	Gynecologist-Obstetricians	Pediatricians	Homeopathic physicians	Acupuncture physicians
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Primary Healthcare												
Average Treatment Effect	2.387	0.563	0.143	3.119	1.862	1.143	2.34	0.266	0.228	0.192	0.012	0.002
	(0.403)***	(0.155)***	(0.162)	(0.545)***	(0.415)***	(0.29)***	(0.406)***	(0.491)	(0.371)	(0.292)	(0.016)	(0.037)
Average Placebo Effect	-0.017	0.016	0.011	-0.187	-0.091	-0.02	0.085	-0.314	-0.02	-0.05	-0.003	-0.001
	(0.108)	(0.036)	(0.047)	(0.149)	(0.098)	(0.07)	(0.113)	(0.14)**	(0.127)	(0.098)	(0.009)	(0.012)
Mean at baseline	4.852	0.144	0.695	3.959	1.218	1.432	3.048	2.996	4.881	4.412	0.02	0.018
Outside Primary Healthcare												
Average Treatment Effect	0.839	0.159	0.113	0.578	0.05	0.198	0.325	0.403	0.083	0.382	0.004	0.011
	(0.487)*	(0.165)	(0.185)	(0.564)	(0.309)	(0.198)	(0.318)	(0.503)	(0.343)	(0.468)	(0.023)	(0.024)
Average Placebo Effect	0.359	0.078	0.023	0.392	0.146	0.142	0.141	0.331	-0.014	0.094	0.002	0.004
	(0.185)*	(0.049)	(0.064)	(0.229)*	(0.101)	(0.093)	(0.114)	(0.143)**	(0.108)	(0.15)	(0.009)	(0.01)
Mean at baseline	3.57	0.778	1.007	5.548	1.307	1.603	2.453	3.807	4.668	4.445	0.067	0.047
Municipality & Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State-specific trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: The table shows the simple average of the placebo and the dynamic two-way fixed effects estimators proposed by Chaisemartin and D'Haultfœuille (2020) over four years before and after a NASF-1 is introduced in a municipality for the first time on the supply of mental health professionals eligible for the NASF program in primary healthcare facilities/outside of primary healthcare facilities. State-specific trends are state-specific year fixed-effects. Controls included are: municipal GDP per capita (in 2010 R$), per capita expenditure with the PBF, share of the population in the age groups 10–19, 20–29, 30–39, 40–49, 50–59, and 60 years or older, share of the population that is female, share of the population covered by private health insurance, share of the population covered by FHT's, number of CAPS per 100,000 residents, and number of physicians hired under the More Physicians Program per 100,000 residents. Standard errors are clustered at the municipality level and estimated by a bootstrap procedure in 50 replications. Municipalities that eventually received a NASF-2 or a NASF-3 were excluded from the sample, which is composed of yearly data for 2990 municipalities between 2005 and 2018. Mean at baseline refers to 2005–2007, the period before the introduction of NASFs, and is measured as a rate per 100,000 residents. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table B3: Impact of NASF-2 on supply of health professionals according lo level of care

	Mental health			**Other health professionals**					**Other Physicians**			
	Psychologists	Occupational Therapists	Psychiatrists	Physioterapists	Dietitians	Phonoaudiologists	Social Assistants	Pharmacists	Gynecologist-Obstetricians	Pediatrician	Homeopathic physicians	Acupuncture physicians
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
						Primary Healthcare						
Average Treatment Effect	6.09	0.524	0.444	6.652	4.675	1.916	3.762	0.591	-0.017	0.014	0.005	0.006
	(0.848)***	(0.304)*	(0.335)	(1.063)***	(1.082)***	(0.564)***	(0.869)***	(1.039)	(0.64)	(0.584)	(0.008)	(0.028)
Average Placebo Effect	0.015	-0.006	-0.01	-0.172	-0.04	0.071	0.166	-0.321	0.057	-0.008	-0.001	0.004
	(0.274)	(0.045)	(0.086)	(0.305)	(0.196)	(0.106)	(0.148)	(0.213)	(0.197)	(0.183)	(0.023)	(0.009)
Mean at baseline	6.155	0.148	0.685	5.286	1.361	1.848	3.807	4.159	5.579	4.77	0.009	0.011
						Outside Primary Healthcare						
Average Treatment Effect	0.113	0.22	0.096	-0.213	-0.195	0.025	0.054	-0.443	-0.26	-0.234	-0.016	-0.005
	(0.679)	(0.297)	(0.213)	(1.479)	(0.521)	(0.347)	(0.511)	(1.012)	(0.518)	(0.381)	(0.019)	(0.022)
Average Placebo Effect	0.03	-0.032	0.013	0.03	0.022	-0.001	0.026	-0.03	0.091	0.059	0.001	-0.004
	(0.208)	(0.1)	(0.056)	(0.352)	(0.142)	(0.123)	(0.119)	(0.27)	(0.177)	(0.171)	(0.013)	(0.007)
Mean at baseline	2.893	0.586	0.657	4.924	0.855	1.385	1.889	3.757	3.117	2.886	0.029	0.03
Municipality & Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State-specific trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: The table shows the simple average of the placebo and the dynamic two-way fixed effects estimators proposed by Chaisemartin and D'Haultfœuille (2020) over four years before and after a NASF-2 is introduced in a municipality for the first time on the supply of mental health professionals eligible for the NASF program in primary healthcare facilities/outside of primary healthcare facilities. State-specific trends are state-specific year fixed-effects. Controls included are: municipal GDP per capita (in 2010 R$), per capita expenditure with the PBF, share of the population in the age groups 10–19, 20–29, 30–39, 40–49, 50–59, and 60 years or older, share of the population that is female, share of the population covered by FHT's, number of CAPS per 100,000 residents, and number of physicians hired under the More Physicians Program per 100,000 residents. Standard errors are clustered at the municipality level and estimated by a bootstrap procedure in 50 replications. Municipalities that eventually received a NASF-1 or a NASF-3 were excluded from the sample, which is composed of yearly data for 2311 municipalities between 2005 and 2018. Mean at baseline refers to 2005–2007, the period before the introduction of NASFs, and is measured as a rate per 100,000 residents. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table B4: Impact of NASF-3 on supply of health professionals according lo level of care

	Mental health			Other health professionals					Other Physicians			
	Psychologists	Occupational Therapists	Psychiatrists	Physioterapists	Dietitians	Phonoaudiologists	Social Assistants	Pharmacists	Gynecologist-Obstetricians	Pediatrician	Homeopathic physicians	Acupuncture physicians
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Primary Healthcare												
Average Treatment Effect	10.571	0.844	0.459	10.306	9.582	2.658	6.403	2.004	0.923	0.223	0.006	-0.017
	(1.813)***	(0.614)	(0.482)	(2.426)***	(1.822)***	(1.257)**	(1.828)***	(1.348)	(1.193)	(1.02)	(0.009)	(0.11)
Average Placebo Effect	0.554	0.053	-0.006	0.493	0.298	0.23	0.153	0.375	-0.167	0.052	0.001	0.01
	(0.42)	(0.097)	(0.169)	(0.528)	(0.41)	(0.343)	(0.345)	(0.426)	(0.422)	(0.319)	(0.004)	(0.039)
Mean at baseline	8.247	0.151	0.724	7.029	1.719	2.339	5.491	5.451	6.671	5.369	0.017	0.03
Outside Primary Healthcare												
Average Treatment Effect	-0.139	0.023	0.177	0.14	-0.121	-0.315	-0.344	-0.433	-0.305	-0.064	-0.003	-0.001
	(0.989)	(0.22)	(0.505)	(1.321)	(1.019)	(0.539)	(0.778)	(1.178)	(0.336)	(0.494)	(0.003)	(0.015)
Average Placebo Effect	-0.119	-0.02	-0.003	0.068	0.147	-0.013	-0.012	0.086	0.026	0.042	-0.004	-0.002
	(0.183)	(0.104)	(0.04)	(0.42)	(0.18)	(0.136)	(0.227)	(0.39)	(0.16)	(0.167)	(0.006)	(0.007)
Mean at baseline	2.488	0.481	0.506	4.285	0.761	1.217	1.588	3.455	2.344	2.219	0.028	0.017
Municipality & Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State-specific trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: The table shows the simple average of the placebo and the dynamic two-way fixed effects estimators proposed by Chaisemartin and D'Haultfœuille (2020) over three years before and after a NASF-3 is introduced in a municipality for the first time on the supply of mental health professionals eligible for the NASF program in primary healthcare facilities/outside of primary healthcare facilities. State-specific trends are state-specific year fixed-effects. Controls included are: municipal GDP per capita (in 2010 R$), per capita expenditure with the PBF, share of the population in the age groups 10–19, 20–29, 30–39, 40–49, 50–59, and 60 years or older, share of the population that is female, share of the population covered by private health insurance, share of the population covered by FHT's, number of CAPS per 100,000 residents, and number of physicians hired under the More Physicians Program per 100,000 residents. Standard errors are clustered at the municipality level and estimated by a bootstrap procedure in 50 replications. Municipalities that eventually received a NASF-1 or a NASF-2 were excluded from the sample, which is composed of yearly data for 2585 municipalities between 2005 and 2018. Mean at baseline refers to 2005–2007, the period before the introduction of NASFs, and is measured as a rate per 100,000 residents. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table B5: Impact of NASF on supply of health professionals before and after the 2012 reform

	Mental health			Other health professionals				
	Psychologists	Occupational Therapists	Psychiatrists	Physioterapists	Dietitians	Phonoaudiologists	Social Assistants	Pharmacists
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
2005-2011								
Average Treatment Effect	1.981	0.69	0.153	2.949	1.487	0.891	1.707	0.782
	(0.452)***	(0.308)**	(0.154)	(0.578)***	(0.321)***	(0.293)***	(0.311)***	(0.68)
Average Placebo Effect	0.19	0.075	0.066	0.221	0.12	0.106	0.124	0.281
	(0.352)	(0.111)	(0.14)	(0.431)	(0.259)	(0.23)	(0.396)	(0.756)
Mean at baseline	7.112	0.662	0.844	7.853	1.883	2.495	5.004	6.472
2012-2018								
Average Treatment Effect	5.523	0.573	0.211	5.051	5.047	1.437	3.643	1.054
	(0.624)***	(0.235)**	(0.154)	(0.862)***	(0.654)***	(0.458)***	(0.584)***	(0.584)*
Average Placebo Effect	0.547	0.008	0.145	0.03	0.281	0.047	0.259	0.209
	(0.709)	(0.172)	(0.15)	(0.883)	(0.568)	(0.475)	(0.658)	(0.761)
Mean at baseline	14.129	1.404	1.213	20.323	7.054	5.327	7.864	20.482
Municipality & Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State-specific trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

	Other Physicians			
	Gynecologist-Obstetrician	Pediatrician	Homeopathic physician	Acupuncture physician
	(9)	(10)	(11)	(12)
2005-2011				
Average Treatment Effect	0.188	0.362	0.011	0.016
	(0.343)	(0.277)	(0.02)	(0.032)
Average Placebo Effect	-0.102	0.093	0.002	0.001
	(0.384)	(0.301)	(0.02)	(0.022)
Mean at baseline	4.837	4.327	0.042	0.023
2012-2018				
Average Treatment Effect	0.12	0.058	0.003	0.003
	(0.259)	(0.347)	(0.007)	(0.012)
Average Placebo Effect	0.17	0.011	0.004	0.002
	(0.357)	(0.379)	(0.008)	(0.016)
Mean at baseline	4.45	5.582	0.029	0.056
Municipality & Year FE	Yes	Yes	Yes	Yes
State-specific trend	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes

Note: The table shows the simple average of the placebo and the dynamic two-way fixed effects estimators proposed by Chaisemartin and D'Haultfœuille (2020) over one year before and after a NASF is introduced in a municipality for the first time on the supply of health professionals eligible for the NASF program. The effect is estimated separately for two periods: before the 2012 reform (2005-2011) and after the reform (2012-2018). State-specific trends are state-specific year fixed-effects. Controls included are: municipal GDP per capita (in 2010 R$), per capita expenditure with the PBF, share of the population in the age groups 10–19, 20–29, 30–39, 40–49, 50–59, and 60 years or older, share of the population that is female, share of the population covered by private health insurance, share of the population covered by FHT's, number of CAPS per 100,000 residents, and number of physicians hired under the More Physicians Program per 100,000 residents. Standard errors are clustered at the municipality level and estimated by a bootstrap procedure in 50 replications. All municipalities were included in the analysis between 2005 and 2011. Municipalities that were treated before 2012 were excluded in the analysis between 2012 and 2018. Mean at baseline refers either to 2005–2007 (for the analysis before 2012) or to 2012 (for the analysis after 2012) and is measured as a rate per 100,000 residents. *** p<0.01, ** p<0.05, * p<0.1.

Table B6: Impact of NASF on hours worked by mental health professional by level of care

	Psychologists (1)	Occupational Therapists (2)	Psychiatrists (3)
	Primary Healthcare		
Average Treatment Effect	3.198	0.107	0.072
	(1.4)**	(2.918)	(2.506)
Average Placebo Effect	0.189	-0.544	0.181
	(0.376)	(1.301)	(1.278)
Mean at baseline	29.134	29.163	34.128
	Outside Primary Healthcare		
Average Treatment Effect	-1.214	-0.614	-0.052
	(0.98)	(1.98)	(3.224)
Average Placebo Effect	-0.025	-0.538	0.462
	(0.551)	(1.034)	(0.916)
Mean at baseline	30.715	34.81	22.668
Municipality & Year FE	Yes	Yes	Yes
State-specific trend	Yes	Yes	Yes
Controls	Yes	Yes	Yes

Note: The table shows the simple average of the placebo and the dynamic two-way fixed effects estimators proposed by (Chaisemartin and D'Haultfœuille 2020) over four years before and after a NASF is introduced in a municipality for the first time on the number of hours worked per professional eligible for the NASF program according to the level of care. State-specific trends are state-specific year fixed-effects. Controls included are: municipal GDP per capita (in 2010 R$), per capita expenditure with the PBF, share of the population in the age groups 10–19, 20–29, 30–39, 40–49, 50–59, and 60 years or older, share of the population that is female, share of the population covered by private health insurance, share of the population covered by FHTs, number of CAPS per 100,000 residents, and number of physicians hired under the More Physicians Program per 100,000 residents. Standard errors are clustered at the municipality level and estimated by a bootstrap procedure in 50 replications. In each case, the sample is composed of yearly data for all observations with at least one professional of the corresponding category occupied between 2005 and 2018. Mean at baseline refers to 2005–2007, the period before the introduction of NASFs, and is measured as the mean number of hours worked per occupied professional. ***p<0.01, ** p<0.05, * p<0.1.

Table B7: Impact of NASF on hours worked by other health professionals by level of care

	Other health professionals					Other Physicians		
	Physioterapists	Dietitians	Phonoaudiologists	Social Assistants	Pharmacists	Gynecologist-Obstetrician	Pediatrician	Homeopathic physician
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Primary Healthcare							
Average Treatment Effect	1.012	3.732	3.468	2.603	2.236	1.211	2.001	-2.043
	(1.109)	(1.226)***	(1.589)**	(1.059)**	(0.917)**	(1.576)	(1.54)	(5.594)
Average Placebo Effect	0.023	0.164	0.034	-0.032	-0.084	-0.401	0.106	1.24
	(0.48)	(0.564)	(0.519)	(0.475)	(0.376)	(0.529)	(0.683)	(2.289)
Mean at baseline	29.473	29.299	26.873	33.859	28.939	26.986	27.26	22.192
	Outside Primary Healthcare							
Average Treatment Effect	-1	-1.774	-0.48	-0.663	-0.363	1.45	-0.173	4.825
	(0.997)	(1.328)	(1.219)	(0.819)	(0.779)	(2.369)	(2.124)	(6.465)
Average Placebo Effect	-0.072	-0.263	-0.108	-0.186	-0.133	-0.052	-0.169	-0.474
	(0.471)	(0.55)	(0.816)	(0.569)	(0.469)	(1.286)	(0.803)	(2.93)
Mean at baseline	33.453	32.661	29.198	34.478	30.03	36.33	30.623	21.051
Municipality & Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State-specific trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: The table shows the simple average of the placebo and the dynamic two-way fixed effects estimators proposed by (Chaisemartin and D'Haultfœuille 2020) over four years before and after a NASF is introduced in a municipality for the first time on the number of hours worked per professional by other health professionals eligible for the NASF program according to the level of care. State-specific trends are state-specific year fixed-effects. Controls included are: municipal GDP per capita (in 2010 R$), per capita expenditure with the PBF, share of the population in the age groups 10–19, 20–29, 30–39, 40–49, 50–59, and 60 years or older, share of the population that is female, share of the population covered by private health insurance, share of the population covered by FHTs, number of CAPS per 100,000 residents, and number of physicians hired under the More Physicians Program per 100,000 residents. Standard errors are clustered at the municipality level and estimated by a bootstrap procedure in 50 replications. In each case, the sample is composed of yearly data for all observations with at least one professional of the corresponding category occupied between 2005 and 2018. Mean at baseline refers to 2005–2007, the period before the introduction of NASFs, and is measured as the mean number of hours worked per occupied professional. The number of municipalities with acupuncture physicians occupied in primary healthcare was too small to estimate the effects in the model with state-specific trend. ***$p<0.01$, ** $p<0.05$, * $p<0.1$.

Table B8: Impact of NASF on days on sick leave, hospitalizations and mortality by type of NASF

	Days on sick leave				**Hospitalizations**				**Mortality**			
	Mental	Substance use	Schizophrenia	Mood disorders	Mental	Substance use	Schizophrenia	Mood disorders	Deaths of despair	Alcohol-related	Overdose	Suicide
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
						NASF-1						
Average Treatment Effect	-278.444	-81.082	-24.894	-174.317	4.858	2.405	2.396	-0.513	-0.679	-0.268	-0.082	-0.329
	(604.219)	(194.25)	(175.545)	(591.29)	(8.611)	(3.34)	(3.061)	(2.001)	(0.818)	(0.6)	(0.115)	(0.562)
Average Placebo Effect	-49.765	-18.997	9.79	-32.489	-0.297	0.051	-0.016	-0.317	-0.044	-0.125	0.007	0.073
	(319.857)	(114.145)	(105.744)	(204.697)	(3.249)	(1.297)	(1.174)	(0.639)	(0.341)	(0.288)	(0.038)	(0.211)
Mean at baseline	7837.363	1509.109	1051.683	4140.276	140.294	48.015	55	19.279	15.185	9.12	0.15	5.914
						NASF-2						
Average Treatment Effect	-278.444	-81.082	-24.894	-174.317	-1.027	-0.308	0.485	-1.201	-0.459	-0.24	0.074	-0.292
	(805.683)	(184.854)	(154.126)	(574.578)	(11.562)	(8.251)	(5.198)	(3.401)	(1.92)	(1.283)	(0.293)	(1.472)
Average Placebo Effect	-49.765	-18.997	9.79	-32.489	0.929	0.523	0.309	0.014	-0.034	-0.142	-0.01	0.119
	(350.922)	(102.524)	(93.77)	(215.07)	(2.967)	(1.712)	(1.772)	(1.266)	(0.627)	(0.442)	(0.091)	(0.463)
Mean at baseline	7576.76	1393.802	1063.406	4054.543	155.703	55.524	56.867	21.687	16.455	9.427	0.151	6.877
						NASF-3						
Average Treatment Effect	258.741	-28.895	187.629	28.269	5.053	1.552	1.45	2.694	0.12	-0.902	0.226	0.797
	(823.035)	(370.202)	(294.76)	(507.582)	(14.2)	(6.294)	(5.223)	(5.543)	(2.904)	(1.879)	(0.279)	(2.072)
Average Placebo Effect	163.178	-58.329	0.256	157.044	-1.786	-0.212	-0.857	-0.725	0.364	0.413	-0.03	-0.019
	(281.422)	(112.295)	(81.993)	(157.664)	(3.973)	(2.198)	(1.286)	(1.958)	(0.851)	(0.801)	(0.12)	(0.525)
Mean at baseline	7875.221	1356.47	1136.65	4349.199	167.513	60.495	58.464	25.123	16.85	9.181	0.149	7.521
Municipality & Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State-specific trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: The table shows the simple average of the placebo and the dynamic two-way fixed effects estimators proposed by Chaisemartin and D'Haultfœuille (2020) over four years before and after a NASF-1 or a NASF-2 are introduced in a municipality for the first time on the hospitalization and mortality rates (per 100,000 residents) and over three years before and after a NASF-1 or a NASF-2 are introduced on the number of paid sick leave (per 100,000 residents) for mental-health related conditions. For NASF-3, time windows are three years before and after introduction for hospitalizations and mortality, and two years before and after for days on sick leave. State-specific trends are state-specific year fixed-effects. Controls included are: municipal GDP per capita (in 2010 R$), per capita expenditure with the PBF, share of the population in the age groups 10–19, 20–29, 30–39, 40–49, 50–59, and 60 years or older, share of the population that is female, share of the population covered by private health insurance, share of the population covered by FHTs, number of CAPS per 100,000 residents, and number of physicians hired under the More Physicians Program per 100,000 residents. Standard errors are clustered at the municipality level and estimated by a bootstrap procedure in 50 replications. For each type of NASF, the sample is composed of yearly data for municipalities that were either never treated or eventually treated exclusively with that type of NASF. Mean at baseline refers to 2005–2007 (hospitalizations and mortality) or 2010 (days on sick leave), and is measured as a rate per 100,000 residents. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table B9: Impact of NASF on mental-health related hospitalizations and mortality before and after the 2012 reform

	Hospitalizations				Mortality			
	Mental (1)	Substance use (2)	Schizophrenia (3)	Mood disorders (4)	Deaths of despair (5)	Alcohol-related (6)	Overdose (7)	Suicide (8)
				2005-2011				
Average Treatment Effect	0.417	0.03	1.297	-1	-0.297	-0.027	-0.038	-0.232
	(4.474)	(2.488)	(2.715)	(1.582)	(1.154)	(0.925)	(0.126)	(0.801)
Average Placebo Effect	0.182	0.608	-0.304	-0.844	-0.018	-0.311	0.03	0.263
	(8.18)	(3.542)	(3.651)	(1.87)	(1.47)	(1.352)	(0.195)	(1.127)
Mean at baseline	140.624	47.504	54.628	20.268	15.155	8.786	0.14	6.23
				2012-2018				
Average Treatment Effect	2.925	1.151	1.463	0.371	-0.005	-0.438	0.092	0.341
	(5.219)	(3.326)	(2.354)	(2.355)	(1.786)	(1.28)	(0.164)	(1.106)
Average Placebo Effect	3.753	0.336	0.664	1.953	1.429	0.914	0.093	0.421
	(7.498)	(7.028)	(4.438)	(3.772)	(2.503)	(1.825)	(0.296)	(1.587)
Mean at baseline	142.741	60.822	41.905	27.16	17.715	10.423	0.235	7.058
Municipality & Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State-specific trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: The table shows the simple average of the placebo and the dynamic two-way fixed effects estimators proposed by Chaisemartin and D'Haultfœuille (2020) over one year before and after a NASF is introduced in a municipality for the first time on on the hospitalization and mortality rates (per 100,000 residents) from conditions related to mental health. The effect is estimated separately for two periods: before the 2012 reform (2005-2011) and after the reform (2012-2018). State-specific trends are state-specific year fixed-effects. Controls included are: municipal GDP per capita (in 2010 R$), per capita expenditure with the PBF, share of the population in the age groups 10–19, 20–29, 30–39, 40–49, 50–59, and 60 years or older, share of the population that is female, share of the population covered by private health insurance, share of the population covered by FHT's, number of CAPS per 100,000 residents, and number of physicians hired under the More Physicians Program per 100,000 residents. Standard errors are clustered at the municipality level and estimated by a bootstrap procedure in 50 replications. All municipalities were included in the analysis between 2005 and 2011. Municipalities that were treated before 2012 were excluded in the analysis between 2012 and 2018. Mean at baseline refers either to 2005–2007 (for the analysis before 2012) or to 2012 (for the analysis after 2012) and is measured as a rate per 100,000 residents. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table B10: Impact of NASF on mental-health related hospitalizations and mortality according to the presence of CAPS in the municipality

	Hospitalizations				Mortality			
	Mental (1)	Substance use (2)	Schizophrenia (3)	Mood disorders (4)	Deaths of despair (5)	Alcohol-related (6)	Overdose (7)	Suicide (8)
	Municipalities with CAPS in 2008							
Average Treatment Effect	9.598	6.128	2.519	-0.417	-0.289	-0.08	-0.049	-0.16
	(12.615)	(4.425)	(6.372)	(2.92)	(1.029)	(0.862)	(0.09)	(0.743)
Average Placebo Effect	0.193	0.299	-0.296	0.104	-0.108	-0.092	0.002	-0.018
	(4.906)	(2.249)	(2.039)	(1.189)	(0.406)	(0.384)	(0.049)	(0.364)
Mean at baseline	145.35	51.258	55.137	21.332	14.887	9.473	0.147	5.267
	Municipalities without CAPS in 2008							
Average Treatment Effect	3.721	1.07	2.408	0.515	-0.066	-0.38	0.097	0.217
	(5.898)	(3.184)	(3.175)	(2.802)	(1.319)	(1.159)	(0.204)	(0.765)
Average Placebo Effect	0.63	0.449	0.084	0.117	0.035	0.053	0	-0.017
	(2.014)	(1.13)	(0.948)	(0.672)	(0.522)	(0.41)	(0.064)	(0.297)
Mean at baseline	139.66	47.832	53.769	20.514	15.435	8.801	0.14	6.494
Municipality & Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State-specific trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: The table shows the simple average of the placebo and the dynamic two-way fixed effects estimators proposed by Chaisemartin and D'Haultfœuille (2020) over four years before and after a NASF is introduced in a municipality for the first time on the hospitalization and mortality rates (per 100,000 residents) from conditions related to mental health. The sample of municipalities was divided according to the presence of a CAPS in 2008, the first year of the NASF program. CAPS are health centers that provide specialized outpatient services for severe cases if mental and substance-use disorders. State-specific trends are state-specific year fixed-effects. Controls included are: municipal GDP per capita (in 2010 R$), per capita expenditure with the PBF, share of the population in the age groups 10–19, 20–29, 30–39, 40–49, 50–59, and 60 years or older, share of the population that is female, share of the population covered by private health insurance, share of the population covered by FHTs, number of CAPS per 100,000 residents, and number of physicians hired under the More Physicians Program per 100,000 residents. Standard errors are clustered at the municipality level and estimated by a bootstrap procedure in 50 replications. The samples are composed separately of yearly data between 2005 and 2018 for 1021 municipalities that had a CAPS in 2008 and 4543 municipalities that had not a CAPS in 2008. Mean at baseline refers to 2005-2007 and is measured as a rate per 100,000 residents. ***$p<0.01$, ** $p<0.05$, * $p<0.1$.

Table B11: Impact of NASF on mortality from assaults and transport accidents and on violent episodes reported

	Mortality		**Violent episodes reported**		
	Assault (1)	Transport accidents (2)	Total (3)	Against women (4)	Self-inflicted (5)
Average Treatment Effect	1.165	0.113	3.085	2.214	1.592
	(1.123)	(1.45)	(6.664)	(5.218)	(2.3)
Average Placebo Effect	0.077	0.095	0.899	0.778	0.04
	(0.386)	(0.539)	(3.164)	(2.076)	(0.696)
Municipality & Year FE	Yes	Yes	Yes	Yes	Yes
State-specific trend	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
Mean at baseline	14.441	21.206	10.122	6.491	1.393

Note: The table shows the simple average of the placebo and the dynamic two-way fixed effects estimators proposed by Chaisemartin and D'Haultfœuille (2020) over four years before and after a NASF is introduced in a municipality for the first time on the mortality rate from assaults and transport accidents and the number of violent episodes reported (per 100,000 residents). Mortality: assault (ICD10 X85-Y09), transport-accidents (X85-Y09). State-specific trends are state-specific year fixed-effects. Controls included are: municipal GDP per capita (in 2010 R$), per capita expenditure with the PBF, share of the population in the age groups 10–19, 20–29, 30–39, 40–49, 50–59, and 60 years or older, share of the population that is female, share of the population covered by private health insurance, share of the population covered by FHTs, number of CAPS per 100,000 residents, and number of physicians hired under the More Physicians Program per 100,000 residents. Standard errors are clustered at the municipality level and estimated by a bootstrap procedure in 50 replications. In regressions with mortality as outcome, the sample is composed of yearly data for 5564 municipalities between 2005 and 2018. In regressions with violent episodes reported as outcome, the sample is composed of yearly data for 4922 municipalities between 2009 and 2018, Mean at baseline refers to 2005–2007 (mortality) or 2009 (violent episodes reported), and is measured as a rate per 100,000 residents. ***$p<0.01$, ** $p<0.05$, * $p<0.1$.

Table B12: Impact of NASF on days on sick leave, hospitalizations and mortality not related to mental health

	Days on sick leave		**Hospitalizations**		**Mortality**	
	Amenable to PHC (1)	Other causes (2)	Amenable to PHC (3)	Other causes (4)	Amenable to PHC (5)	Other causes (6)
Average Treatment Effect	176.365	1196.087	21.494	43.501	-1.071	0.059
	(395.462)	(2216.358)	(54.129)	(55.992)	(3.98)	(5.995)
Average Placebo Effect	-60.269	3.685	3.748	10.854	0.575	0.258
	(174.225)	(724.266)	(15.391)	(20.192)	(1.572)	(2.11)
Municipality & Year FE	Yes	Yes	Yes	Yes	Yes	Yes
State-specific trend	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Mean at baseline	4938.161	74580.151	1974.445	4412.678	155.363	366.203

Note: The table shows the simple average of the placebo and the dynamic two-way fixed effects estimators proposed by Chaisemartin and D'Haultfœuille (2020) over four years before and after a NASF is introduced in a municipality for the first time on the hospitalization and mortality rates (per 100,000 residents) and over three years before and after a NASF is introduced on the number of paid sick leave (per 100,000 residents) for mental-health-related conditions. Amenable to PHC: conditions deemed amenable to PHC by the Brazilian Ministry of Health (Alfradique et al. 2009). Other: conditions not amenable to PHC and not considered in table 11, State-specific trends are state-specific year fixed-effects. Controls included are: municipal GDP per capita (in 2010 R$), per capita expenditure with the PBF, share of the population in the age groups 10–19, 20–29, 30–39, 40–49, 50–59, and 60 years or older, share of the population that is female, share of the population covered by private health insurance, share of the population covered by FHTs, number of CAPS per 100,000 residents, and number of physicians hired under the More Physicians Program per 100,000 residents. Standard errors are clustered at the municipality level and estimated by a bootstrap procedure in 50 replications. The sample is composed of yearly data for 5564 municipalities between 2005 and 2018 for hospitalizations and mortality and for 4688 municipalities between 2010 and 2017 for days on sick leave. Mean at baseline refers to 2005-2007 (hospitalizations and mortality) or 2010 (days on sick leave), and is measured as a rate per 100,000 residents. ***$p<0.01$, ** $p<0.05$, * $p<0.1$.

Table B13: Impact of NASF on supply of health professionals not eligible for NASF program

	Nurses (1)	CHW (2)	Surgeons (3)
Average Treatment Effect	0.661	0.91	-0.164
	(1.516)	(2.065)	(0.278)
Average Placebo Effect	0.522	-0.168	0.094
	(0.359)	(0.882)	(0.103)
Municipality & Year FE	Yes	Yes	Yes
State-specific trend	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Mean at baseline	14.158	164.694	2.268

Note: The table shows the simple average of the placebo and the dynamic two-way fixed effects estimators proposed by Chaisemartin and D'Haultfœuille (2020) over four years before and after a NASF is introduced in a municipality for the first time on the total supply of health professionals not eligible for the NASF program. CHW: Community Health Workers. State-specific trends are state-specific year fixed-effects. Controls included are: municipal GDP per capita (in 2010 R$), per capita expenditure with the PBF, share of the population in the age groups 10–19, 20–29, 30–39, 40–49, 50–59, and 60 years or older, share of the population that is female, share of the population covered by private health insurance, share of the population covered by FHTs, number of CAPS per 100,000 residents, and number of physicians hired under the More Physicians Program per 100,000 residents. Standard errors are clustered at the municipality level and estimated by a bootstrap procedure in 50 replications. The sample is composed of yearly data for 5564 municipalities between 2005 and 2018. Mean at baseline refers to 2005–2007, the period before the introduction of NASFs, and is measured as a rate per 100,000 residents. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.