

## **Brain drain in the health care sector? Impact of the Mais Médicos program in Argentina, 2010–2019**

**Fernando Antonio Ignacio  
González**

(corresponding author)

Universidad Católica del Norte,  
Escuela de Ciencias Empresariales,  
Coquimbo, Chile

E-mail:

fernando.gonzalez@fce.unam.edu.ar

**Lara Sofia Cantero**

Facultad de Ciencias  
Económicas-Universidad  
Nacional de Misiones,  
Argentina

**Pablo Ariel Szyszko**

Facultad de Ciencias  
Económicas-Universidad  
Nacional de Misiones,  
Argentina

**Joel Heman Bys**

Facultad de Ciencias  
Económicas-Universidad  
Nacional de Misiones,  
Argentina

**Keywords:**

Mais Médicos,  
physicians,  
brain drain,  
Argentina,  
difference-in-differences estimator

The *Mais Médicos* program (2013) tried to attract physicians to rural and peripheral areas of Brazil by encouraging physicians from other countries immigrate to these areas. Its creation generated widespread concern on the border areas of Argentina due to the potential brain drain (emigration of qualified professionals) in the health care sector. This study provides evidence on this topic. The identification strategy exploits the plausibly exogenous timing on the implementation of the program and the different levels of proximity of the Argentine provinces with respect to Brazil. Despite the widespread belief of a brain drain toward Brazil, the results suggest that the availability of physicians in Argentina did not show a significant reduction after the implementation of the program on the border areas of Argentina. There are also no indications of changes in the extensive (hours worked) or intensive (hourly wages) margins of the physician labor market. This evidence is robust against multiple checks and placebos. From a territorial equity perspective, there is no evidence that the creation of the program has contributed to widening regional disparities in Argentina, i.e., fewer physicians in the poorest region.

## Introduction

At the global level, there is a persistent deficit of health professionals, especially physicians and especially in developing countries, and it is estimated that by 2030, this deficit could amount to 9.9 million physicians, nurses and midwives (WHO 2016, Egri 2017, Pál et al. 2021). This is an important limitation for the functioning of health systems and becomes particularly critical during episodes of environmental shocks such as epidemics. For this reason, several countries have implemented programs to attract foreign physicians. Examples include *Mais Médicos* (More Physicians) in Brazil, Overseas Trained Doctors in Australia, and Conrad 30 in the United States (US) (Oliveira et al. 2015). The impact of these programs on the stock of physicians in other developing countries is ambiguous. On the one hand, it encourages the emigration of professionals, leading to a brain drain in the country of origin, but on the other hand, better job opportunities in the health care system can stimulate investments in health professionals' education (Grubel–Scott 1966, Abarcar–Theoharides 2021).

In this paper, we examine the impact of a program (*Mais Médicos* from Brazil) that increases the demand for foreign physicians on the stock of physicians in the country of origin. Given the extensive social and cultural links between Brazil and Argentina (Jaguaribe 1982), as well as their geographical proximity, we examine the impact of this program on Argentina. Both countries share an extensive border, dry and fluvial, of more than 1,200 km, and Argentina is the country in the region with the largest stock of physicians after Brazil and Colombia (WHO 2021). In addition, at the time of the implementation of the program, there was widespread concern about brain drain in the Argentine border areas with Brazil. Figure A2 in the Appendix collects the headlines of the main Argentine newspapers at the time. These headlines raised awareness of an apparent brain drain in small cities in the Province of Misiones, as pointed out by the then Minister of Health of that province.

The identification strategy exploits the timing, plausibly exogenous, in the implementation of the *Mais Médicos* program and the different levels of proximity of the Argentine provinces with Brazil. The provinces of Misiones and Corrientes, which belong to the Noreste region of Argentina, share borders with Brazil and are deeply economically and culturally influenced by this country. Thus, it is to be expected that in the event of brain drain, these provinces will be the most affected. It is assumed that the decision to migrate is influenced by geographical, social and cultural proximity to the host country (Munshi 2003). Additionally, the Noreste region of Argentina has persistently had the lowest salaries for health professionals (Table A1 in the Appendix) as well as the highest levels of poverty (González 2018, 2020, González–Santos 2020). Potential structural differences between Argentine provinces are considered by including socioeconomic and demographic controls together with geographical- (per province) and time- (per year) fixed effects.

Our findings show that after the implementation of the program and despite the widespread concern about brain drain in the sector, the stock of physicians in the border areas has not shown a statistically significant reduction in relation to the other provinces. This result is robust against multiple robustness checks: comparison between different sources of information (household microdata vs. administrative records of licensed physicians), disaggregation by subgroups (sex and place of residence) and inclusion of different controls. In certain specifications (Tables 2 and 3), there is even a positive effect (i.e., evidence of brain gain in the border areas of Argentina).

This research contributes to the brain drain literature in two ways. First, it is the first study to provide causal evidence on the impact of the *Mais Médicos* program in Argentina. Second, to the best of our knowledge, this is the first study to analyze brain drain in the health sector between two developing countries in the same region. Typically, the literature has focused on examining those cases where the receiving country is a developed economy and, moreover, is located in a different region from that of the sending country. This is an advantage for the estimation strategy of this work. The broad historical, cultural and economic similarities between these two countries allow us to assume that, in the event of the migration of health professionals, this phenomenon is a response to better working conditions offered by the program and not to other structural factors that may differ between countries.

In this context, the empirical literature on brain drain has shown conflicting results. On the one hand, Abarcar-Theorides (2021) examine a visa program meant to attract nurses to the United States and its impact on the stock of these professionals in the Philippines. Despite substantial emigration to the United States, the net effect was positive. This is because more students enrolled in this career – due to better job prospects – to an extent that offset the emigration effect. Beine et al. (2008) examine cross-sectional data from 127 developing countries and report a positive effect: Doubling the emigration rate of skilled workers increases the human capital of professionals in the sending country by 5%. Other works have reported evidence of a brain gain – a positive effect on the stock of workers in the sending country (usually a developing country) (Clemens 2007, Shrestha 2017, Djajic et al. 2018, Chand-Clemens 2019, Khanna-Morales 2021).

However, Docquier et al. (2008) examine 108 developing countries and report that higher levels of emigration of qualified professionals tend to reduce human capital in sending countries, although there are heterogeneous effects. Furthermore, the authors provide evidence that education subsidies tend to reduce the emigration of qualified professionals. That is, subsidies and emigration are substitutes. Bhargava-Docquier (2008) report that the emigration of physicians from Sub-Saharan Africa tends to increase the incidence of human immunodeficiency virus (HIV) in sending countries. Doubling the rate of physician emigration is associated with a 20% increase in adult mortality from HIV. Nevertheless, physician emigration does not translate

into a reduction in life expectancy in these countries. An extensive review on the migration of skilled workers and its effects on development can be found in Docquier–Rapoport (2021).

The paper is organized as follows: brief description of the *Mais Médicos* program, sources of information and the identification strategy used, main results, and finally, conclusions of the work.

### **Brief description of the *Mais Médicos* program**

*Mais Médicos* was a program created by the federal government of Brazil in July 2013 whose main objective was to reduce the deficit in primary health care in rural and peripheral areas of that country.<sup>1</sup> To this end, the program contemplated the construction of new health care centers, new medicine schools and the opening of new positions for resident physicians. Additionally, the immigration of foreign physicians was encouraged to improve coverage in those areas where there were not enough Brazilian physicians – commonly rural municipalities that were far from large urban areas and with a high incidence of poverty (Hone et al. 2020).

In the first year of the program, approximately 15,000 physicians participated. The program attracted the attention of foreign physicians by offering competitive hiring conditions. The starting salary varied according to region and specialty but was approximately 4,500 USD per month. In addition, subsidies were offered for relocation as well as housing in the place of destination (Silva et al. 2018). Additionally, the program contemplated the relaxation of bureaucratic requirements so that foreign physicians could work in Brazil (Pereira et al. 2016). Contracts were stipulated for a period of three years and renewable for the same period.

The evidence that emerges from the evaluations of the program suggests that its implementation improved user satisfaction and quality of service and reduced hospitalizations in the municipalities included in the program (Hone et al. 2020). In particular, Mazetto (2018) observed a reduction in wait time for patients, an increase in the frequency of visits to health centers and a reduction in hospitalizations for diarrhea and gastroenteritis. Nonetheless, the program does not appear to have had a significant impact on infant mortality, birth weight, or preterm birth.

### **Data and methods**

#### **Data**

In this work, we combine two sources of information. First, we use microdata from the Annual Survey of Urban Households (EAHU in Spanish) prepared by the

<sup>1</sup> In 2019, the program was replaced by a similar one – *Médicos pelo Brasil* – (Governo Federal do Brasil 2021).

National Institute of Statistics and Censuses (INDEC). The EAHU is carried out in the third quarter of each year and covers the 2010–2019 period. However, the 2015 microdata are not available.<sup>2</sup> The sample size of each wave of the survey is approximately 46,000 households. The EAHU includes the 31 urban clusters surveyed in the Permanent Household Survey (EPH)<sup>3</sup> and, in addition, includes private households in localities with 2,000 or more inhabitants. Thus, the EAHU allows greater geographical coverage by including small towns.

The EAHU is a multipurpose survey that collects information on different socioeconomic indicators of the people surveyed. This includes labor status (employed, unemployed, inactive), income, educational level, sector of activity of the main occupation, and indicators such as age, sex and province of residence.

Although the data provided by the EAHU makes it possible to identify the sector of activity of each person's main occupation, as well as their educational level, this does not guarantee the precise identification of medical professionals within health professionals. Therefore, we complement the EAHU microdata with administrative records of licensed physicians. These data come from the Federal Network of Registration of Health Professionals (REFEPS). REFEPS records integrate updated information on the number of professionals licensed in each jurisdiction of the country (including the City of Buenos Aires). These records cover the 2012–2018 period.

## Methods

The identification strategy of this work exploits the timing, plausibly exogenous, in the implementation of the program and the difference that Argentine provinces have in their proximity to Brazil. The concern regarding physician emigration assumes that the provinces closest to Brazil experience a greater impact. Therefore, Equation 1 is estimated:

$$M_{it} = \beta_0 Treated_i * Program_t + X_{it} + \gamma_i + \delta_t + \mu_{it} \quad (1)$$

where  $M_{it}$  is the stock of physicians per inhabitant of province  $i$  in year  $t$ .  $Treated_i$  is a dummy variable that takes the value 1 for treated provinces and 0 otherwise. The

<sup>2</sup> The lack of publication of the microdata for that year occurred in the context of the INDEC statistical blackout. The details of the blackout can be consulted at INDEC (2019).

<sup>3</sup> The 31 clusters are: Posadas (Misiones), Gran Resistencia (Chaco), Corrientes (Corrientes) and Formosa (Formosa) in the Noreste region (NEA). The Noroeste region (NOA) includes Santiago del Estero-La Banda (Santiago del Estero), Jujuy-Palpalá (Jujuy), Gran Catamarca (Catamarca), Salta (Salta), La Rioja (La Rioja) and Gran Tucumán-Tafí Viejo (Tucumán). The Centro region includes Gran Córdoba (Córdoba), Río Cuarto (Córdoba), Gran Santa Fe (Santa Fe), Gran Rosario (Santa Fe), Gran Paraná (Entre Ríos), Concordia (Entre Ríos), Bahía Blanca-Cerri (Buenos Aires), Gran La Plata (Buenos Aires), Mar del Plata-Batán (Buenos Aires) and San Nicolás-Villa Constitución (Santa Fe and Buenos Aires). The southern region (Patagonia) includes Rawson-Trelew (Chubut), Neuquén-Plottier (Neuquén), Comodoro Rivadavia-Rada Tilly (Chubut), Río Gallegos (Santa Cruz), Santa Rosa-Toay (La Pampa), Ushuaia-Río Grande (Tierra del Fuego) and Viedma-Carmen de Patagones (Río Negro and Buenos Aires). Gran Buenos Aires encompasses the Ciudad Autónoma de Buenos Aires and the surrounding districts of the Province of Buenos Aires. The Cuyo region includes Gran Mendoza (Mendoza), Gran San Juan (San Juan) and Gran San Luis (San Luis).

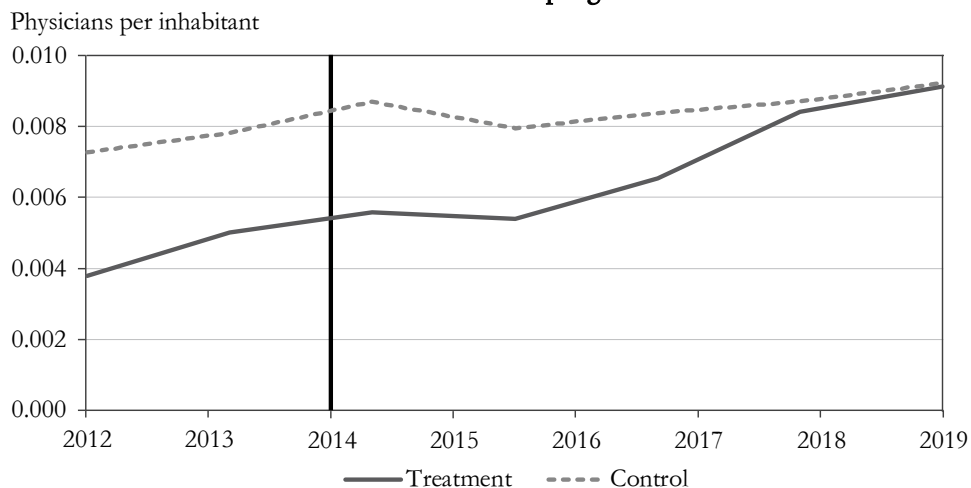
provinces of Misiones and Corrientes – those that border Brazil and where a greater concern arose with the program’s creation (see Figure A1 and A2 in the Appendix) – constituted the treatment group.  $Program_t$  is a dummy variable that takes the value 1 for the years with the program in force. Since 2014 is the first full year with the program in force, this year is considered the start of the program. Alternatively, 2013 is considered the starting year.  $X_{it}$  is a vector of control variables (male proportion, employment rate and average age).  $\gamma_i$  and  $\delta_t$  are geographic and time fixed effects, respectively.  $\mu_{it}$  is the model error term.

The coefficient of interest,  $\beta_0$ , captures the differential impact of the implementation of the program on the provinces bordering Brazil in relation to the other provinces. If a brain drain has taken place, the coefficient is expected to be negative and significant.

Equation 1 is estimated by considering multiple robustness checks. First, two different sources of information are considered to estimate the stock of physicians. On the one hand, the EAHU is used, which provides a greater time span (2010–2019) but does not allow physicians to be precisely identified. On the other hand, the administrative records of physicians licensed by province are used. This allows a precise identification of medical professionals at the cost of a shorter time period covered (2012–2018). Second, different specifications are considered by excluding control variables and fixed effects. Third, different disaggregations are implemented: analysis of the stock of physicians by sex and by place of residence. Fourth, potential adjustments are analyzed in the extensive and intensive margins (hours worked and remuneration per hour) in the medical labor market.

Figure 1

**Physicians (per inhabitant) in Argentina before and after the *Mais Médicos* program**



Note: Own elaboration based on [8].

Figure 1 below shows the evolution of the number of physicians per inhabitant in the treated and control provinces. The number of physicians in the control provinces was always higher than that in the treatment provinces in the years prior to the program (until 2014). The difference between both magnitudes remained constant in that period. However, from the start of the program, the number of physicians in the treatment provinces increases considerably.

## Results

We begin this section by presenting basic descriptive statistics of the indicators of interest. Table 1 summarizes the main indicators used from EAHU. From here, we can observe a wide variability in the stock of physicians between Argentine provinces (the maximum of the series is 20 times greater than the minimum).

Table 1

### Descriptive statistics of selected indicators

Variable	Mean	Standard deviation	Minimum	Maximum
Physicians per inhabitant	0.0078	0.0048	0.0016	0.0329
Average age	45.68	10.46	22	75
Employment rate	0.3973	0.0394	0.2867	0.5242
Male proportion	0.4878	0.0114	0.4483	0.5102

*Note:* Physicians are identified as those professionals with at least five years of completed university studies and whose main occupation is “Human health care activities”.

*Source:* Own elaboration based on [2], [3].

Table 2

### *Mais Médicos* program and availability of physicians in Argentine provinces, 2010–2019

Regressor	1	2	3	4
Treatment* <i>Mais Médicos</i>	0.0029458*** (0.0002443)	0.0008013 (0.0008786)	0.0018686*** (0.0003891)	0.00014217 (0.00067)
Average age		0.0003745** (0.0001757)		0.0003614 (0.0003042)
Male proportion		-0.0478551** (0.0196847)		-0.0352446 (0.0298385)
Employment rate		0.0381634*** (0.0137788)		0.0225179*** (0.0084309)
Fixed effects	No	No	Yes	Yes
N	215	215	215	215
R <sup>2</sup>	0.0536	0.1986	0.1843	0.2428

*Note:* Robust and clustered standard errors at the province level are in parentheses. The treatment group includes the provinces of Misiones and Corrientes and considers 2014 as the first year of the program in force. \* significant at 10%, \*\* significant at 5%, \*\*\* significant at 1%.

*Source:* Own elaboration based on [2].

Table 2 presents the results that arise from estimating Equation 1. From the preferred specification (Column 4, which includes fixed effects and controls), it appears that there are no significant reductions in the number of physicians per inhabitant. That is, the availability of physicians in the provinces of Misiones and Corrientes, after the implementation of the *Mais Médicos* program, does not show significant changes in relation to the other provinces. In the less complete specifications (Columns 1 and 3, which do not include fixed effects or controls), significant differences emerge consistent with the idea of a brain gain in the border areas.

Additionally, a battery of robustness checks is considered. First, Table 3 shows that the number of physicians in the border areas away from the provincial capitals (Misiones and Corrientes) increased after the implementation of the program in relation to the other provinces. No significant differences were observed when comparing between sexes. The previous result is especially relevant since it suggests that the program could have contributed to reducing territorial inequities not only between Argentine provinces but also within them: Typically, small urban agglomerations and rural areas have a lower stock of physicians than provincial capitals.

Table 3

***Mais Médicos* program and availability of physicians  
in Argentine provinces in subgroups, 2010–2019**

Regressor	Men	Women	Provincial	
			interiors	capitals
Treatment* <i>Mais Médicos</i>	0.000022 (0.0005075)	0.0013722 (0.0010403)	0.0020432** (0.0009192)	-0.0006215 (0.0004944)
Average age	0.0003103* (0.0001823)	0.0000987 (0.0001832)	0.0001072 (0.0001847)	0.0002541 (0.0002812)
			-0.0178236 (0.015718)	-0.0174211 (0.0246702)
Male proportion				
Employment rate	0.0097109* (0.0058304)	0.0095644 (0.0074811)	0.0078292 (0.0078411)	0.0146887** (0.0068507)
Fixed effects	Yes	Yes	Yes	Yes
N	215	215	215	215
R <sup>2</sup>	0.2015	0.1196	0.1961	0.0903

*Note:* Robust and clustered standard errors at the province level are in parentheses. The treatment group includes the provinces of Misiones and Corrientes and considers 2014 as the first year of the program in force. \* significant at 10%, \*\* significant at 5%, \*\*\* significant at 1%.

*Source:* Own elaboration based on [2].

Second, the adjustments in the extensive (hours worked) and intensive (remuneration per hour) margins are analyzed as potential coping mechanisms to retain physicians. Table 4 shows that there were no significant changes in the number of hours worked or in remuneration per hour worked. Thus, there is no evidence of improvements in the working conditions of physicians who continued working in the Argentine health system after the *Mais Médicos* program came into force.



Table 4

**Adjustments in extensive and intensive margins  
after the *Mais Médicos* program, 2010–2019**

Regressor	Extensive	Intensive
	margin	
Treatment* <i>Mais Médicos</i>	-1.554524 (2.411086)	-28.55371 (49.89481)
Average age	0.5415231 (0.5714632)	-8.972751 (18.63946)
Male proportion	1.20338* (0.6305041)	-58.78387** (26.01116)
Employment rate	-10.73969 (33.22536)	-16.08255 (11.11146)
Fixed effects	Yes	Yes
N	215	215
R <sup>2</sup>	0.0560	0.7809

*Note:* Robust and clustered standard errors at the province level are in parentheses. The treatment group includes the provinces of Misiones and Corrientes and considers 2014 as the first year of the program in force. \* significant at 10%, \*\* significant at 5%, \*\*\* significant at 1%.

*Source:* Own elaboration based on [2].

Third, Equation 1 is re-estimated when considering administrative records of licensed physicians by each province. Although the point estimate is positive, it is not significantly different from zero. The foregoing indicates that when considering the administrative records of licensed physicians and a shorter time period (2012–2018), there is no significant effect of the *Mais Médicos* program. In any case, this confirms the absence of a brain drain in the health sector.

Table 5

***Mais Médicos* program and physicians licensed in Argentine provinces, 2012–2018**

Regressor	Coefficient
Treatment* <i>Mais Médicos</i>	0.603866 (1.072187)
Average age	0.0724524 (0.158549)
Male proportion	-6.859105 (20.371)
Employment rate	-7.412956 (8.869606)
Fixed effects	Yes
N	215
R <sup>2</sup>	0.1641

*Note:* Robust and clustered standard errors at the province level are in parentheses. The treatment group includes the provinces of Misiones and Corrientes and considers 2014 as the first year of the program in force. \* significant at 10%, \*\* significant at 5%, \*\*\* significant at 1%.

*Source:* Own elaboration based on [6].

Additionally, time placebos in which the implementation of the program is fictionally advanced are implemented (Table A2 in the Appendix). No significant differences arise from here, which suggests that our identification strategy is credible. Table A3 in the Appendix considers the potential existence of heterogeneous effects among provinces and over time. It also implements the estimator proposed in de Chaisemartin–D’Haultfœuille (2020).

The results reported here are not consistent with the hypothesis of brain drain in the health sector in Argentina after the implementation of the *Mais Médicos* program. Depending on the specification, null results or a positive effect (i.e., brain gain) are observed. These findings are similar to those reported in Abarcar–Theoharides (2021). These authors show that the expansion of a US visa program for nurses did not reduce the stock of these workers in the Philippines, which was the most frequent country of origin among nurses who migrated to the US. In addition, the enrollment of Filipino students in this career pathway increased. However, in the findings of our work, the nondecrease in the stock of physicians does not seem feasible to have been caused by compensation between those who emigrate and an increase in the number of graduates. Even if there had been an increase in medical school enrollment, the period considered after the implementation of the program (2014–2019) would not seem long enough to ensure that new students certainly entered the labor market.

## Conclusions

In this paper, we have examined the impact of the *Mais Médicos* program on the stock of physicians in the Argentine areas bordering Brazil. Based on a differences-in-differences estimation, we combined administrative records of licensed physicians and household microdata from a survey with broad territorial coverage (Annual Survey of Urban Households).

During the first months of the program, the most important newspapers in Argentina showed widespread concern about the potential brain drain from health sector professionals to Brazil (Figure A2 in the Appendix). In addition, the program indicated worrying distributional implications: It could have contributed to widening the deep territorial disparities in Argentina. Before the implementation of the program, the provinces of the NEA region had the lowest number of physicians per inhabitant and the highest incidence of poverty.

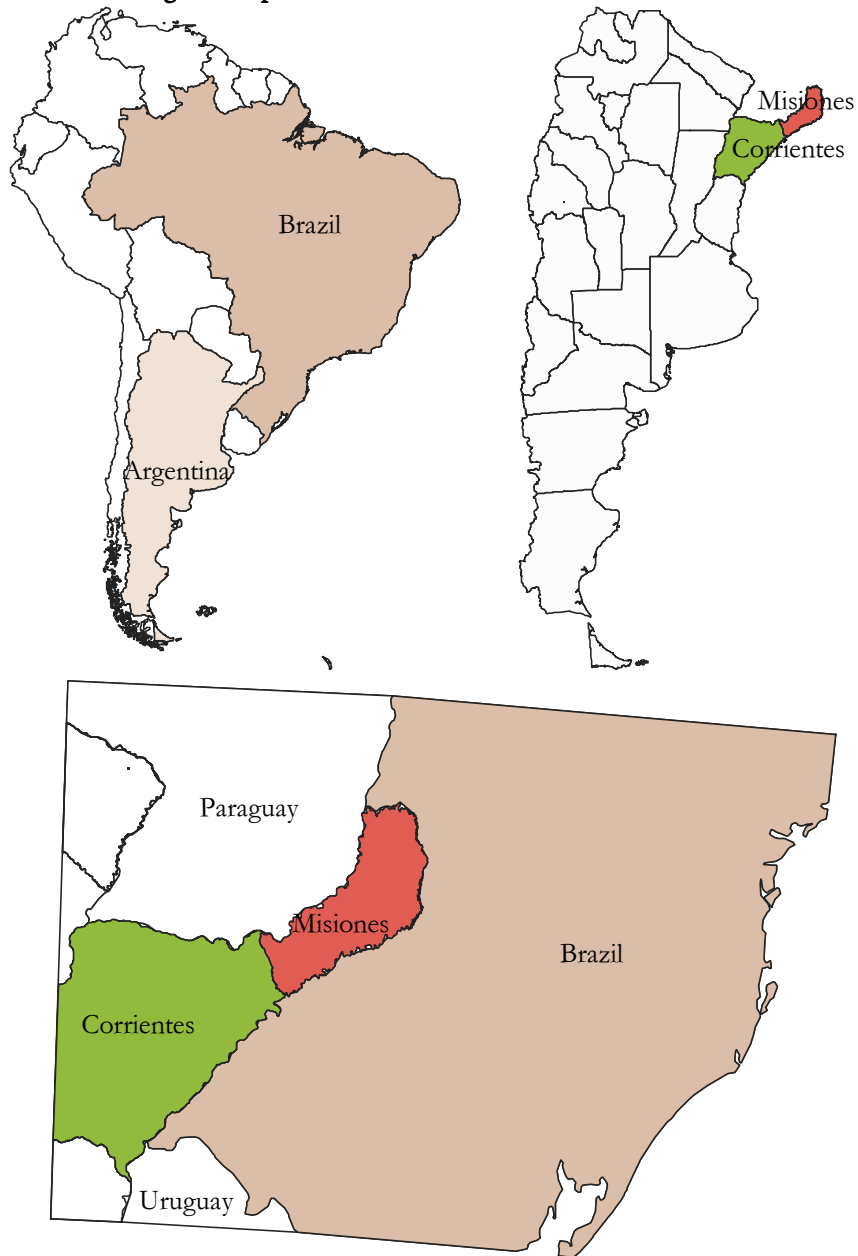
Despite the abovementioned concerns, the findings of this work show that a brain drain of medical professionals did not take place in the border areas of Argentina. The results are robust when considering different sources of information (household microdata vs. administrative records of licensed physicians) and against multiple disaggregations (by sex and place of residence). In all the cases considered, the results show that there was no statistically significant negative differential impact in the border areas after the implementation of the program. Furthermore, in some specifications, a positive effect appears (i.e., brain gain).

In the future, it is relevant to investigate possible indirect effects. This includes, first, examining the number of students enrolled in medical schools. It seems to be expected, considering the previous literature, that more people entered this career due to the better job opportunities. Second, it is pertinent to investigate the mechanisms that may have prevented brain drain in the health sector with greater depth and precision. This refers to the working conditions of physicians, such as pay and hours worked. It would also be interesting to disaggregate the number of physicians according to the type of institution in which they work (e.g., primary health centers vs. hospitals). From the current administrative records, however, it is not possible to obtain this information. Therefore, the need for updated and detailed records of the functioning of the sector and its professionals is highlighted.

**Appendix**

Figure A1

**Argentine provinces and their borders with Brazil**



*Source:* Own elaboration based on [7].

Figure A2

## Concern in Argentine newspapers about the emigration of physicians to Brazil

### UN FENÓMENO QUE INQUIETA

#### Médicos de Argentina se van a Brasil por el doble de sueldo

a)

Es por un plan del Dilma Rousseff, que les ofrece 4.200 dólares por mes y 40 horas de trabajo por semana. En localidades fronterizas hay preocupación porque emigran los pocos médicos que tienen.

LA NACION - Sociedad

#### Médicos de Misiones se van a Brasil porque ganan más plata

b)

El ministro de Salud Pública de la provincia, Oscar Herrera Ahuad, admitió que en los últimos meses se registra un éxodo

13 de enero de 2014 - 13:01

#### Misiones sufre el éxodo de médicos que se van a Brasil a ganar el doble

c)

Los directivos del hospital público Samic de Puerto Iguazú, en el norte de Misiones, convocaron ayer a profesionales en distintas especialidades a raíz del éxodo de casi la mitad de sus...

20 de febrero 2014 - 01:00hs

*Note:* The titles from Panels a, b and c state: “Physicians from Argentina go to Brazil for twice the salary”; “Physicians from Misiones go to Brazil because they earn more money”; “Misiones suffers the exodus of physicians who go to Brazil to earn double”. The articles from Panels a), b) and c) can be found in [1], [5] and [4], respectively.

*Source:* Own elaboration based on [1], [5] and [4].

Table A1

### Monetary income of physicians in Argentine regions, 2019

Region	Average income
NEA	36,178.82
NOA	44,812.96
Cuyo	43,531.34
Centro	48,422.17
Patagonia	48,361.05

*Note:* Values are for Argentine pesos in 2019.

*Source:* Own elaboration based on [2].

Table A2

**Placebos and *Mais Médicos* program, 2010–2019**

Regressor	1	2
Treatment* <i>Mais Médicos</i>	0.0004455 (0.0005579)	0.0005298 (0.000437)
Average age	0.0003613 (0.0003037)	0.0003609 (0.0003037)
Male proportion	-0.034309 (0.0294871)	-0.0344958 (0.0296353)
Employment rate	0.02411*** (0.0087491)	0.0242333*** (0.0087811)
Fixed effects	Yes	Yes
N	215	215
R <sup>2</sup>	0.2335	0.2336

*Note:* The treatment group includes the provinces of Misiones and Corrientes, where the first full year of the program in force is fictitiously advanced by one (Column 1) and two years (Column 2). Since it is a placebo, no significant effects should appear. \* significant at 10%, \*\* significant at 5%, \*\*\* significant at 1%.

*Source:* Own elaboration based on [2].

Table A3

**Heterogeneous effects and *Mais Médicos* program, 2010–2019**

Regressor	Treatment effect
Estimator	0.0029253 (0.0007341)
Lower bound 95%	0.0014866
Upper bound 95%	0.0043641
Groups	24
Switchers	2

*Note:* Robust and clustered standard errors at the province level are in parentheses. The treatment group includes the provinces of Misiones and Corrientes and considers 2014 as the first year of the program in force. \* significant at 10%, \*\* significant at 5%, \*\*\* significant at 1%.

*Source:* Own elaboration based on [2].

## REFERENCES

- ABARCAR, P.–THEOHARIDES, C. (2021): Medical worker migration and origin-country human capital: Evidence from U.S. visa policy *The Review of Economics and Statistics* 1–46. [https://doi.org/10.1162/rest\\_a\\_01131](https://doi.org/10.1162/rest_a_01131)
- BEINE, M.–DOCQUIER, F.–RAPOPORT, H. (2008): Brain drain and human capital formation in developing countries: Winners and losers *The Economic Journal* 118 (528): 631–652. <https://doi.org/10.1111/j.1468-0297.2008.02135.x>
- BHARGAVA, A.–DOCQUIER, F. (2008): HIV pandemic, medical brain drain, and economic development in Sub-Saharan Africa *The World Bank Economic Review* 22 (2): 345–366. <https://doi.org/10.1093/wber/lhn005>
- DE CHAISEMARTIN, C.–D'HAULTFCEUILLE, X. (2020): Two-way fixed effects estimators with heterogeneous treatment effects *American Economic Review* 110 (9): 2964–2996. <https://doi.org/10.1257/aer.20181169>
- DOCQUIER, F.–FAYE, O.–PESTIEAU, P. (2008): Is migration a good substitute for education subsidies? *Journal of Development Economics* 86 (2): 263–176. <https://doi.org/10.1016/j.jdeveco.2007.12.007>
- DOCQUIER, F.–RAPOPORT, H. (2021): Globalization, brain drain, and development *Journal of Economic Literature* 50 (3): 681–730. <https://doi.org/10.1257/jel.50.3.681>
- EGRI, Z. (2017): Regional health inequalities in the European macroregion from the East Central European perspective *Regional Statistics* 7 (1): 197–224. <https://doi.org/10.15196/RS0711>
- GONZÁLEZ, F. (2018): Las múltiples dimensiones de la pobreza: Posadas en el contexto de la Argentina urbana *Visión de Futuro* 22 (2): 117–136.
- GONZÁLEZ, F. (2020): Regional price dynamics in Argentina (2016–2019) *Regional Statistics* 10 (2): 83–94. <https://doi.org/10.15196/RS100205>
- GONZÁLEZ, F.–SANTOS, M. (2020): Pobreza multidimensional urbana en Argentina: ¿Reducción de las disparidades entre el Norte Grande Argentino y Centro-Cuyo-Sur? (2003–2016) *Cuadernos de Economía* 39 (81): 795–822. <https://doi.org/10.15446/cuad.econ.v39n81.76486>
- GRUBEL, H.–SCOTT, A. D. (1966): The international flow of human capital *American Economic Review* 56 (1/2): 268–274.
- HONE, T.–POWELL-JACKSON, T.–SANTOS, L.–SOARES, R.–DE OLIVEIRA, F. P.–SANCHEZ, M. N.–HARRIS, M.–DE SOUZA SANTOS, F.–MILLET, C. (2020): Impact of the Programa Mais médicos (more doctors Programme) on primary care doctor supply and amenable mortality: quasi-experimental study of 5565 Brazilian municipalities *BMC Health Medical Research* 20: 873. <https://doi.org/10.1186/s12913-020-05716-2>
- JAGUARIBE, H. (1982): Brasil-Argentina: Breve análisis de las relaciones de conflicto y cooperación *Instituto de Estudios Internacionales Universidad de Chile* 15 (57): 9–27. <https://doi.org/10.5354/0719-3769.1982.16058>
- MUNSHI, K. (2003): Networks in the Modern Economy: Mexican Migrants in the U. S. Labor Market *Quarterly Journal of Economics* 118 (2): 549–599. <https://doi.org/10.1162/003355303321675455>

- OLIVEIRA, F.–VANNI, T.–PINTO, H. A.–DOS SANTOS, J. T. R.–DE FIGUEIREDO, A. M.–DE ARAÚJO, S. Q.–MATOS, M. F. M.–CYRINO, E. G. (2015): “Mais Médicos”: A Brazilian program in an international perspective *Comunicação Saúde Educação* 19 (54): 623–634. <https://doi.org/10.1590/1807-57622014.1142>
- PÁL, V.–LADOS, G.–MAKRA, Z.–BOROS, L.–UZZOLI, A.–FABULA, S. (2021): Concentration and inequality in the geographic distribution of physicians in the European Union, 2006–2018 *Regional Statistics* 11 (3): 3–28. <https://doi.org/10.15196/RS110308>
- PEREIRA, L.–SANTOS, L.–SANTOS, W.–OLIVEIRA, A.–RATTNER, D. (2016): Mais Médicos program: provision of medical doctors in rural, remote and socially vulnerable areas of Brazil, 2013–2014. *Rural and Remote Health* 16: 3616. <https://doi.org/10.22605/RRH3616>
- SHRESTHA, S. (2017): No man left behind: Effects of emigration prospects on educational and labour outcomes of non-migrants *The Economic Journal* 127 (600): 495–521. <https://doi.org/10.1111/econj.12306>
- SILVA, E.–RAMOS, M.–SANTOS, W.–RASELLA, D.–OLIVEIRA, A.–SANTOS, L. (2018): Cost of providing doctors in remote and vulnerable areas: Programa Mais Médicos in Brazil *Revista Panamericana de Salud Pública* 42: e11. <https://doi.org/10.26633/RPSP.2018.11>

#### INTERNET SOURCES

- CHAND, S.–CLEMENS, M. (2019): *Human capital investment under exit options: Evidence from a natural quasi-experiment* Working paper 12173, IZA, Bonn, Germany. <https://docs.iza.org/dp12173.pdf> (downloaded: November 2022)
- CLEMENS, M. (2007): *Do visas kill? Health effects of African health professional emigration* Working paper 114, Center for Global Development, Washington, DC. [https://www.cgdev.org/sites/default/files/13123\\_file\\_Clemens\\_Do\\_visas\\_kill\\_3.pdf](https://www.cgdev.org/sites/default/files/13123_file_Clemens_Do_visas_kill_3.pdf) (downloaded: November 2022)
- DJAJIC, S.–DOCQUIER, F.–MICHAEL, M. (2018): *Optimal education policy and human capital – Accumulation in the context of brain drain* Working paper 224. <https://hal.archives-ouvertes.fr/hal-01743814/> (downloaded: November 2022)
- INSTITUTO NACIONAL DE ESTADÍSTICA Y CENSOS (INDEC) (2019): *El INDEC 2015–2019. Síntesis de gestión y bases para el desarrollo futuro del sistema de estadísticas oficiales de la Argentina.* [https://www.indec.gob.ar/ftp/documentos/sintesis\\_gestion\\_indec\\_2015\\_2019.pdf](https://www.indec.gob.ar/ftp/documentos/sintesis_gestion_indec_2015_2019.pdf) (downloaded: November 2022)
- KHANNA, G.–MORALES, N. (2021): *The IT boom and other unintended consequences of chasing the American dream* Working paper. <http://www-personal.umich.edu/~moralesn/Khanna%20Morales.pdf> (downloaded: November 2022)
- GOVERNO FEDERAL DO BRASIL (2021): *Médicos pelo Brasil x Mais Médicos: o que muda?* Programa Mais Médicos Governo Federal. <http://maismedicos.gov.br/noticias/342-medicos-pelo-brasil-x-mais-medicos-o-que-muda> (downloaded: November 2022)



- MAZETTO, D. (2018): Assessing the impact of the Mais Medicos program on basic health care indicators. Master in Economics thesis, FGV.  
<https://bibliotecadigital.fgv.br/dspace/bitstream/handle/10438/20284/2018%2002%2027%20Disserta%C3%A7%C3%A3o%20-%20D%C3%A9bora%20Mazetto.pdf?sequence=3&isAllowed=y>  
(downloaded: November 2022)
- WORLD HEALTH ORGANIZATION (WHO) (2016): *Global strategy on human resources for health: workforce 2030* WHO, Washington.  
<https://apps.who.int/iris/handle/10665/250368> (downloaded: November 2022)
- WORLD HEALTH ORGANIZATION (WHO) (2021): The global health observatory. Medical doctors (number). [https://www.who.int/data/gho/data/indicators/indicator-details/GHO/medical-doctors-\(number\)](https://www.who.int/data/gho/data/indicators/indicator-details/GHO/medical-doctors-(number)) (downloaded: November 2022)

### WEBSITES/DATABASES

- [1] CLARÍN: Médicos de Argentina se van a Brasil por el doble de sueldo.  
[www.clarin.com](http://www.clarin.com) (downloaded: October 2022)
- [2] EAHU: <https://www.indec.gob.ar/indec/web/Institucional-Indec-BasesDeDatos>  
(downloaded: October 2022)
- [3] INDEC: <https://www.indec.gob.ar/> (downloaded: October 2022)
- [4] LA CAPITAL: Misiones sufre el éxodo de médicos que se van a Brasil a ganar el doble.  
[lacapital.com.ar](http://lacapital.com.ar) (downloaded: October 2022)
- [5] LA NACIÓN: Médicos de Misiones se van a Brasil porque ganan más plata.  
<https://www.lanacion.com.ar/> (downloaded: October 2022)
- [6] MINISTRY OF HEALTH: <https://www.argentina.gob.ar/salud>  
(downloaded: September 2022)
- [7] NATIONAL GEOGRAPHIC INSTITUTE: <https://www.ign.gob.ar/>  
(downloaded: September 2022)
- [8] REFEPs: [https://sisa.ms.gov.ar/sisadoc/docs/050102/refeps\\_home.jsp](https://sisa.ms.gov.ar/sisadoc/docs/050102/refeps_home.jsp)  
(downloaded: September 2022)