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PPP as an innovation in public health:

Decongestion of health facilities in Lima through the Guillermo Kaelin and Alberto Barton polyclinics

PERÚ Ministerio de Economía y Finanzas

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PPP AS AN INNOVATION IN PUBLIC HEALTH

Decongestion of health facilities in Lima through the Guillermo Kaelin and Alberto Barton polyclinics

Private Investment Promotion Agency - PROINVERSIÓN

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PPP as an innovation in public health: decongestion of health facilities in Lima through the Guillermo Kaelin and Alberto Barton polyclinics[1]

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PPP as an innovation in public health: decongestion of health facilities in Lima through the Guillermo Kaelin and Alberto Barton polyclinics

Abstract

This study analyzes the impact of public-private partnerships in the healthcare sector by examining the role of the Guillermo Kaelin and Alberto Barton polyclinics, each one part of the concessioned hospital complex of the same name, operated by Peru's Social Health Insurance (EsSalud). The research evaluates the contribution of these polyclinics to reducing congestion in surrounding healthcare facilities. In this way, data from 25 healthcare establishments covering the 2011–2017 period are analyzed, applying a difference-in-differences model with fixed effects, complemented by an event study analysis. The findings show that these polyclinics have significantly reduced both the number of assigned insured individuals and the volume of consultations in nearby healthcare facilities, thereby enabling a better redistribution of the healthcare burden and greater user satisfaction.

Keywords: public-private partnerships, health, differences in differences, social security, decongestion.

Resumen

Este estudio analiza el impacto de las asociaciones público-privadas en el sector salud, a partir del análisis del papel desempeñado por los policlínicos Guillermo Kaelin y Alberto Barton, cada uno perteneciente al complejo hospitalario concesionado que lleva el mismo nombre, del Seguro Social de Perú (EsSalud). La investigación evalúa la contribución de los policlínicos en la descongestión de los establecimientos de salud circundantes. Para ello, se emplean datos de 25 establecimientos de salud correspondientes al período 2011-2017, aplicando un modelo de diferencias en diferencias con efectos fijos, complementado con un análisis de eventos. Los hallazgos evidencian que estos policlínicos han generado una reducción significativa en el número de asegurados asignados y en el volumen de las consultas realizadas en los establecimientos de salud aledaños, lo que ha permitido una mejor redistribución de la carga asistencial y una mayor satisfacción de los usuarios.

Palabras clave: asociaciones público-privadas, salud, diferencias en diferencias, seguro social, descongestionamiento.

1 Introduction

Inequality in access to health care harms the most vulnerable populations as it does not allow them to access public health services efficiently and safely. These services, in addition to being fundamental for social well-being and economic development, represent the materialization of the basic human right to health, which is essential to protect safety and collective well-being.

Several authors have studied the relationship between the health and economic well-being of the population. Sandí (2006) points out that, a better state of health fosters the economic growth of a region; while this growth facilitates improvements in the delivery of health services. In addition, a person's health significantly influences their academic performance and educational level, which in turn affects various aspects of their adult life, such as marital status, fertility control, the education of children, criminal activity, and income earned in the labor market (Suhrcke & de Paz Nieves, 2011). Hence, investing in health enhances individual and collective well-being and creates a virtuous cycle that strengthens the economy and improves the quality of life in the long term.

Public health services face multiple challenges, such as rising healthcare costs and budgetary constraints (Mitchell, 2008). Added to this is the obligation to provide services that meet or exceed patients' expectations and needs (Backman, Vanderloo, & Forster, 2016). Likewise, public hospitals often have difficulty operating their facilities efficiently, offering quality services and serving the most vulnerable population that cannot afford health care (Blecher, Kollipara, Zulu, & DeJager, 2011). Faced with these problems, governments have begun to look for solutions to improve the performance of their public hospitals, one of them being public-private partnerships (PPP).

PPPs have been established as a strategy to improve the performance of health systems globally by combining the strengths of the public and private sectors, which enhances efficiency, quality and innovation (Mitchell, 2008). In an increasingly complex and dynamic world where constantly rising prices, changing disease patterns and increasing reliance on advanced technologies for diagnosis and treatment represent significant challenges, a single entity can't operate in isolation, especially in the Health sector.

In Peru, different projects have been developed in the Health sector under the PPP modality, ranging from design and construction to the management of health services. The Guillermo Kaelin and Alberto Barton hospital complexes are the first health centers to be managed under the PPP modality in Peru and Latin America. These hospital complexes are part of the Rebagliati and Sabogal health networks, respectively, of the Peruvian Social Health Insurance (EsSalud), each with the possibility of serving an average of 250 000 policyholders with modern facilities that include more than 200 beds, clinical laboratories, obstetric centers, radio diagnostic and hemodialysis services, among others.[1]

The Guillermo Kaelin and Alberto Barton hospital complexes are managed by the companies Villa María del Triunfo Salud S. A. C. and Callao Salud S. A. C., respectively; these two companies are part of the IBT Group. In March 2010, EsSalud signed a concession contract with each of these companies for a contractual term of 32 years (2 years of construction and 30 years of operation) for the incorporation of surface rights, design, construction of infrastructure, provision of equipment, operation and maintenance of each hospital complex. Each of these complexes has an approximate reference investment amount of USD 58 million (including taxes).

[1]Information extracted from the web pages of both hospital complexes. Available at: https://kaelin.pe/complejo-hospitalario-guillermo-kaelin-de-la-fuente/ and https://barton.pe/complejo-hospitalario-alberto-leonardo-barton-thompson/

These PPPs in healthcare represent the white coat model, in which it is the private company that assumes responsibility for providing healthcare services. At the end of the concession period, the operation and maintenance of the hospital complexes will be transferred to EsSalud. In addition to being a milestone in the development of the health sector in Peru, these PPPs have the potential to impact the health of citizens by offering continuous, quality services with international standards.

This new mechanism turns out to be crucial in the face of the inefficiency of health facilities at the national level. According to INEI (2014), in 2014 the average waiting time to be seen at EsSalud health facilities was 58 minutes; likewise, these patients wait, on average, 12 days to obtain an appointment. These data contrast sharply with the care offered in private clinics where patients wait, on average, 35 minutes to be seen and 8 days to get an appointment. Therefore, these concessions would alleviate pressure on EsSalud, as it would allow decongesting existing health facilities by improving access and quality of care for EsSalud patients.

High waiting rates to get an appointment at EsSalud can potentially generate: aggravation of diseases, limitations to preventive medicine, delays in returning to work activities, loss of working days, additional expenses in transport services and the presence of psychological symptoms such as sadness, disappointment and even emotional stress. Likewise, the delay in receiving care affects the institution's evaluation of the quality of health services offered.

According to the office of the Comptroller General of the Republic (CGR), in 2018, several hospitals in the La Libertad region, under EsSalud, faced deficiencies in providing essential health services due to a lack of human resources, equipment, and adequate infrastructure.[2] This situation resulted in long delays in care, non-compliance with regulations, and dissatisfaction among patients, who experienced inefficient and poor-quality service. The report states that the lack of personnel and materials in critical areas such as emergency and pharmacy services, as well as the absence of modern systems implementation, jeopardizes the health and life of users, leading to an increase in complaints and widespread discontent.

In this context, the objective of this research is to analyze and quantify the impact that PPPs in health in Peru can have on the decongestion of other health facilities in the Sabogal and Rebagliati networks. It is expected that, after the start of operations of the PPPs in 2014, the health facilities closest to the new PPPs will have been able to record a decrease in the number of policyholders assigned and consultations performed. This would allow an improvement in the quality of health services and possible reductions in waiting times to get an appointment and to be attended.

Although the expansion of the supply of health services can reduce congestion through the construction of new facilities, regardless of the type of financing, it is important to recognize the specific advantages of the PPP modality, which is presented as a more efficient and sustainable mechanism, going beyond a simple increase in capacity. Currently, hospitals built under the PPP scheme are operational, in contrast to some facilities built through traditional public works, which, although completed, face operational restrictions due to a lack of equipment and personnel.

The Guillermo Kaelin and Alberto Barton hospital complexes consist of a polyclinic, a specialized hospital and a home care unit. This study analyzes the impact of PPPs in the health sector, with special emphasis on the role played by the Guillermo Kaelin and Alberto

[2]Review: https://www.gob.pe/institucion/contraloria/noticias/496150-519-2018-cg-contraloria-alerta-riesgos-en-hospitales-de-la-libertad-por-deficiencias-en-principales-servicios-de-salud

Barton polyclinics, each belonging to the concessioned hospital complex bearing the same name, since it is believed that a large number of health facilities could have been decongested with the start-up of these polyclinics.

Likewise, specialized hospitals belong to a different health market than polyclinics. In this sense, the specialized hospital could only decongest a health facility with similar characteristics, i.e., health facilities that manage more serious and complex cases with advanced technology and a more developed infrastructure. Along these lines, this study excludes specialized hospitals, which do not have assigned policyholders for primary and preventive consultations.

To achieve this objective, the difference-in-differences method is applied using the two-way fixed-effect specification, which is commonly used in empirical research to identify causal effects. Treatment begins with the start of operations of polyclinics in 2014. In addition, a panel data event study is carried out, which incorporates a single post event indicator for all periods after the occurrence of the event in the treated units. The study of events allows us to indirectly test the assumption of parallel trends of the difference-in-differences model.

It is expected that the results of this analysis will favor a better understanding of the benefits of concessions under the PPP scheme; in particular, by analyzing the case of the Guillermo Kaelin and Alberto Barton polyclinics, on the decongestion of other health facilities and indirectly on the quality of health services. Likewise, this research is expected to be a valuable tool for those responsible for formulating public policies aimed at economic development. This research represents a contribution to the empirical literature since it is the first study in Peru that uses a causal inference method to evaluate the effects of the Guillermo Kaelin and Alberto Barton polyclinics, which are part of the first hospital complexes awarded under the PPP mechanism in the Peruvian health sector.

This study is organized into six distinct parts. The first section provides an introduction to the research. The second section offers a literature review, highlighting relevant studies, both nationally and internationally. The third section describes the empirical estimation strategy together with the assumptions applied. The fourth section addresses a discussion of the data used for estimates. The fifth section presents the results and an analysis of the estimates obtained. Finally, the sixth section includes the conclusions as well as the final recommendations.

2 Literature review

2.1 International literature

At the international level, different studies seek to analyze the relationship and impact of infrastructure and/or the provision of health services on some variable that captures a measure of the economic well-being of the population. Most studies evaluate the effect on consultations and quality of service. The main characteristics of the documents reviewed that are part of this section are listed in the Tables 1, 2, 3, 4, 5, 6. It should be noted that these tables includes the objective, the unit of analysis, the data structure, the outcome (dependent) and explanatory variables, the methodology used and the main results found.

On the unit of analysis, Babiarz, Miller, Yi, Zhang, and Rozelle (2010) analyzed primary care clinics and patients in China, while Besstremyannaya (2013), Gravelle, Santos, and Siciliani (2014) and Wang, Wang, and McLeod (2018) focused on hospitals in Japan, England and the USA. On the other hand, studies such as those by Mohanan *et al.* (2013),

Yu *et al.* (2021), Binyaruka *et al.* (2015), Cookson *et al.* (2017), Courtemanche, Marton, Ukert, Yelowitz, and Zapata (2017), Dimitrovová, Perelman, and Serrano-Alarcón (2020), Zolfaghari, Kabiri, and Saadatmanesh (2020), Hou and Zhang (2017) and Tu, Zang, Tan, Zhou, and Yu (2022) employ data at the regional and/or individual level, while research such as Gabani, Mazumdar, and Suhrcke (2023), Jakovljevic, Sugahara, Timofeyev, and Rancic (2020), Isreal Akingba, Kaliappan, and Hamzah (2018) and Wang (2015) do so at the country level.

Regarding the data structure, the tables 1, 2, 3, 4, 5, 6 include studies that use panel data for their analysis. Specifically, it is shown that Babiarz *et al.* (2010) analyzed between 156 and 160 clinics that treated between 3,257 and 8,339 patients in China in the years 2009 and 2010; Besstremyannaya (2013) and Gravelle *et al.* (2014) worked with 832 hospitals in Japan from 1999 to 2009 and with 147 hospitals in England from 2009 to 2010, respectively. In turn, Mohanan *et al.* (2013) and Binyaruka *et al.* (2015) used data from 5,597 households in India between 2005 and 2010, and from 3,000 households and 1,500 patients in Africa between January 2012 and February 2013, respectively.

Wang (2015) and Jakovljevic *et al.* (2020) examined data from 34 OECD countries from 1999 to 2009 and 9 Asian countries from 1996 to 2017; Cookson *et al.* (2017) and Courtemanche *et al.* (2017) worked with data from 32,482 neighborhoods in England during the period from 2004 to 2011 and from 18,961 neighborhoods in Ontario between 2011 and 2014, respectively. Additionally, Hou and Zhang (2017) analyzed data from 11,592 individuals in China from 2004 to 2011; Tu *et al.* (2022) used data from 259 cities in China between 2004 and 2011; Dimitrovová *et al.* (2020) employed data from 276 municipalities in Portugal between 2000 and 2015; Zolfaghari *et al.* (2020) evaluated 31 provinces in Iran from 2007 to 2016. Likewise, Yu *et al.* (2021) worked with data from 33,591 patients in South Korea for 2009 and 2014. Furthermore, Wang *et al.* (2018) evaluated 266 hospitals in the United States for 2016, and Isreal Akingba *et al.* (2018) used time-series data on the population of Singapore from 1980 to 2013.

Regarding the outcome variable, Babiarz *et al.* (2010) focused on patient flow and gross income, while Besstremyannaya (2013), Gravelle *et al.* (2014), and Wang *et al.* (2018) evaluated hospital efficiency, quality, performance, and productivity. On the other hand, Mohanan *et al.* (2013), Yu *et al.* (2021), and Binyaruka *et al.* (2015) investigated birth rates, disease treatment, and institutional coverage. Cookson *et al.* (2017) and Courtemanche *et al.* (2017) analyzed mortality and uninsured rates, while Dimitrovová *et al.* (2020), Zolfaghari *et al.* (2020), and Hou and Zhang (2017) studied hospitalizations, income inequality, and health insurance. Finally, Tu *et al.* (2022) evaluated medical staffing, and Gabani *et al.* (2023), Jakovljevic *et al.* (2020), Isreal Akingba *et al.* (2018), and Wang (2015) reviewed life expectancy, infant mortality, economic growth, and GDP per capita.

Regarding the explanatory variable, several studies used dummy variables to identify the beneficiaries of specific programs: Babiarz *et al.* (2010) for benefited clinics, Besstremyannaya (2013) for benefited hospitals, Mohanan *et al.* (2013) for households in districts with the Chiranjeevi Yojana program, and Binyaruka *et al.* (2015) for beneficiaries of the pay-for-performance (P4P) scheme. Cookson *et al.* (2017) and Courtemanche *et al.* (2017) applied dummies to identify beneficiaries of reforms in primary care and the Affordable Care Act (ACA), while Hou and Zhang (2017) used a dummy to identify areas with a high impact of the URBMI program, and Yu *et al.* (2021) to identify patients benefited by mixed public-private programs against tuberculosis. Tu *et al.* (2022) employed a dummy for the implementation of the "Broadband China" (BCCP) program. Regarding variables related to costs and expenses, Wang (2015) analyzed health expenditure relative to GDP per capita,

Table 1: Review of international literature

Author	Objective	Anlysis unit	Data structure	Outcome var.	Explanatory var.	Methodology	Conclusions
Babiarz *et al.* (2010)	Determine whether China's New Rural Cooperative Medical Plan has affected the operation and use of rural village health clinics.	Clinics and primary care patients in China.	Panel data: 156 and 160 clinics and 3257 and 8339 patients for the years 2004 and 2007.	* Weekly flow of patients attended. * Gross monthly income. * Likelihood of seeking medical attention. * Direct medical expense.	*Dummy* that takes the value of 1 if it benefits from the program and 0 otherwise.	DD	The program was associated with a 26% increase in weekly patient flow and a 29% increase in monthly gross revenue. Likewise, an increase of 5% in the use of clinics and reductions in out-of-pocket medical expenses of 19% were found.
Barlow, Roehrich, and Wright (2013)	Discuss lessons learned from public-private partnerships to finance the construction and operating costs of public hospitals and other health-care facilities and service delivery in Europe.	N. A.	N. A.	N. A.	N. A.	N. A.	Early models of these partnerships may not have met expectations for greater efficiencies at lower costs. Newer models offer greater opportunities for efficiency gains.
Besstremyannaya (2013)	Evaluate the effect of hospital financing reform establishing a prospective payment system (PPS) for hospital care on the technical and cost efficiency of local public hospitals.	Public hospitals in Japan.	Panel data: 832 hospitals from 1999-2009.	* Efficiency scores.	*Dummy* that takes the value of 1 if the hospital benefits from the program and 0 in another case.	DD	Estimates reveal that the PPS results in a limited efficiency gain, which could be related to the inadequate incentives created by the two-part PPS tariff in Japan.
Mohanan *et al.* (2013)	Evaluate the effect of the Chiranjeevi Yojana program, a public-private partnership to improve maternal and child health in Gujarat, India.	Households in India.	Panel Data: 5597 from 2005-2010.	* Institutional birth rate. * Maternal and neonatal death rate.	*Dummy* that takes the value of 1 if the household is located within the benefited district and 0 otherwise.	DD	The Chiranjeevi Yojana program does not appear to have had a significant impact on institutional delivery rates or maternal health outcomes.

Note: N.A. is not applicable, DD is difference-in-differences, GMM is generalized method of moments, DDD is differences-in-differences-in-differences, ARDL is autoregressive distributed lag, FE is fixed effects, 2SLS is two-stage least squares, PSM is *propensity score matching*, SDID is spatial difference-in-differences, SLM is spatial lag model, SEM is spatial error model and SDM is Durbin model.

Table 2: Review of international literature

Author	Objective	Analysis unit	Data structure	Outcome var.	Explanatory var.	Methodology	Conclusions
Gravelle *et al.* (2014)	Examine whether the quality of a hospital is affected by the quality provided by other hospitals in the same market.	Hospitals in England.	Panel data: 147 hospitals from 2009-2010.	* Set of quality indicators.	Distance and travel time between rival hospitals.	Spatial model	The quality of a hospital is positively associated with the quality of its rivals for 7 out of 16 quality measures. An increase in the quality of rivals by 10% increases the quality of a hospital by 1.7% to 2.9%. The finding suggests that for some quality measures a policy that improves quality in one hospital will have positive side effects on quality in other hospitals. The distance between hospitals is a variable to be taken into account in the analysis.
Binyaruka *et al.* (2015)	Evaluate the effects of a pay-for-performance (P4P) scheme in low-income countries on quality service coverage and affordability, in line with universal health coverage goals.	Households and patients in Africa.	Panel data: 3000 households and 1500 patients from January 2012 to February 2013.	* Coverage of institutional childbirths. * Provision of antimalarials during pregnancy. * Patient satisfaction.	*Dummy* that takes the value of 1 if it benefits from the P4P and 0 otherwise.	DD	An increase of 8.2% in the coverage of institutional deliveries among women in the intervention area, and an increase of 10.3% in the provision of antimalarials during pregnancy were found. The use of non-specific services was reduced in clinics by 57.5 visits per month among children under five years of age and by 90.8 visits per month for those over five years of age.
Wang (2015)	Estimate optimal healthcare spending in a growing economy. Applying the experiences of Organization for Economic Co-operation and Development (OECD) countries during the period 1990 to 2009.	OECD countries.	Panel data: 34 countries from 1999-2009.	* GDP per capita.	Health expenditure with respect to GDP.	GMM	Empirical evidence indicates that when the ratio of health spending to GDP is below the optimal level of 7.55%, increases in health spending actually lead to better economic performance. Above this level, higher spending does not equate to better care.

Note: N.A. is not applicable, DD is difference-in-differences, GMM is generalized method of moments, DDD is differences-in-differences-in-differences, ARDL is autoregressive distributed lag, FE is fixed effects, 2SLS is two-stage least squares, PSM is *propensity score matching*, SDID is spatial difference-in-differences, SLM is spatial lag model, SEM is spatial error model and SDM is Durbin model..

Table 3: Review of international literature

Author	Objective	Analysis unit	Data structure	Outcome var.	Explanatory var.	Methodology	Conclusions
Cookson *et al.* (2017)	Analyze whether equity-oriented investment in primary care can reduce health inequity in high-income settings with pre-existing universal primary care systems.	Neighborhoods in England and Ontario.	Panel data: 32482 neighborhoods in England and 18 961 neighborhoods in Ontario from 2004-2011.	* Preventable and treatable mortality..	*Dummy* that takes 1 if favored with primary care reform and 0 otherwise.	DD	Compared to Ontario, the absolute gap in treatable mortality in England narrowed between 2004 and 2006, and between 2007 and 2011, it narrowed by 19.8 per 100 000 inhabitants, and the relative gap in treatable mortality narrowed by 10 percentage points. The greatest divergence occurred in the group of neighborhoods of the most disadvantaged decile.
Courtemanche *et al.* (2017)	Estimate the causal effects of the Affordable Care Act (ACA) on health insurance coverage using data from the American Community Survey.	Individual, locality and U.S. states.	Panel data: individuals from 2011-2014.	* Uninsured rate.	*Dummy* that takes 1 if the state participates in the ACA and 0 otherwise.	DDD	The full ACA increased the proportion of insured residents by 5.9 percentage points. Private insurance expansions from the ACA were for those who did not have a college degree, were not white, were young adults, single, and had no children in the household.
Hou and Zhang (2017)	Identify the causal effects of the expansion of public health insurance on the development of private health insurance in the case of the expansion of the Urban Residential Basic Medical Insurance (URBMI) program in China.	Population of China.	Panel data: 11592 persons from 2004-2011.	* URBMI enrollment. * Adoption of private insurance.	*Dummy* that takes the value of 1 if the individual is in a high effect area and 0 otherwise.	DD	The article concludes that private health insurance enrollment is not affected by the introduction and expansion of URBMI. Rather, private health insurance performs complementary functions.
Isreal Akingba *et al.* (2018)	Analyze the long-term impacts of health capital on Singapore's economic growth from 1980 to 2013.	Singapore	Time series from 1980-2013.	* GDP per capita.	Health infrastructure spending per capita.	ARDL	The results confirm that health capital positively and significantly affects Singapore's long-term economic growth.

Note: N.A. is not applicable, DD is difference-in-differences, GMM is generalized method of moments, DDD is differences-in-differences-in-differences, ARDL is autoregressive distributed lag, FE is fixed effects, 2SLS is two-stage least squares, PSM is *propensity score matching*, SDID is spatial difference-in-differences, SLM is spatial lag model, SEM is spatial error model and SDM is Durbin model.

Table 4: Review of international literature

Author	Objective	Analysis unit	Data structure	Outcome var.	Explanatory var.	Metodología	Conclusiones
Wang *et al.* (2018)	Examine the relationships between health information technology expenditures, intermediate business processes, hospital financial performance, and productivity.	US Hospitals.	Cross-section: 3 266 hospitals by 2016.	* Return on Assets (ROA). * Productivity	Information technology operating and capital expenditures.	FE and 2SLS Panel	Health IT expenditures, including IT operating expenses and capital expenditures, are positively associated with asset performance and hospital productivity.
Dimitrovová *et al.* (2020)	Evaluate the impact of the implementation of Family Health Units (FHU) on population health outcomes and explore the effectiveness of pay-for-performance in primary care.	Municipalities of Portugal.	Panel data: 276 municipalities from 2000-2015.	* Hospitalization Rate.	*Dummy* that takes the value of 1 if the municipality implemented the FHU and 0 otherwise.	DD	No significant impact of the implementation of FHUs on reducing the hospitalization rate was found. Furthermore, the results question the ability of this payment mechanism to achieve better health outcomes.
Jakovljevic *et al.* (2020)	Evaluate the effectiveness of health care spending among major Asian economies.	Countries 1/	Panel data: 9 countries from 1996-2017.	* Infant Mortality. * Healthy life expectancy	Per capita health expenditure.	FE Panel	The quality of governance and current health expenditure determine the performance of the health care system. Population density and urbanization are positively associated with healthy life expectancy in non-OECD Asian countries. In this group, non-potable water consumption has a statistically negative effect on healthy life expectancy.

Note: N.A. is not applicable, DD is difference-in-differences, GMM is generalized method of moments, DDD is differences-in-differences-in-differences, ARDL is autoregressive distributed lag, FE is fixed effects, 2SLS is two-stage least squares, PSM is *propensity score matching*, SDID is spatial difference-in-differences, SLM is spatial lag model, SEM is spatial error model and SDM is Durbin model.

1/ Includes member and non-member countries of the Organisation for Economic Co-operation and Development (OECD). OECD members include Japan and the Republic of Korea, while the seven non-OECD countries are China, India, Indonesia, Malaysia, Pakistan, the Philippines and Thailand.

Table 5: Review of international literature

Author	Objective	Analysis unit	Data structure	Outcome var.	Explanatory var.	Methodology	Conclusions
Moro Visconti and Morea (2020)	Review the literature, analyze some supply chain bottlenecks, address solutions related to network effects of platforms to improve public-private partnership (PPP) interactions, and investigate the cost-benefit analysis of digital health with an empirical case.	N. A.	N. A.	N. A.	N. A.	N. A.	Digital technologies are useful even for infectious disease surveillance, such as that of the coronavirus pandemic, to support mass healthcare intervention, decongest hospitals and provide timely big data.
Zolfaghari *et al.* (2020)	Evaluate the effects of economic (energy, water, ICT) and social (health, education) infrastructure expenses on income inequality in Iranian provinces.	Provinces of Iran.	Panel data: 31 provinces from 2007-2016.	* Real added value of the Industrial sector. * Real added value of the Services sector. * Real added value of the Agriculture sector.	Spending on health infrastructure.	*Pooled*	The results show that improvements in social and economic infrastructure reduce income inequality. However, the magnitude of these effects varies. Investment in education, healthcare, communication technology, energy and water infrastructure has the greatest impact on reducing income inequality.
Yu *et al.* (2021)	Evaluate public-private mix (PPM) program against tuberculosis in South Korea.	Tuberculosis patients from South Korea.	Panel data: 33591 patients for 2009 and 2014.	* Treatment success rate. * Loss of medical follow-up.	*Dummy* that takes the value of 1 if the patient with tuberculosis benefited from the program and 0 otherwise.	DD and PSM	The expansion of the PPM program was associated with improvements in tuberculosis treatment outcomes in South Korea's private sector. Centralized financial governance and regulatory mechanisms were instrumental in facilitating the integration of the South Korean private sector into the National Tuberculosis Control Program and the scale-up of the PPM intervention.

Note: N.A. is not applicable, DD is difference-in-differences, GMM is generalized method of moments, DDD is differences-in-differences-in-differences, ARDL is autoregressive distributed lag, FE is fixed effects, 2SLS is two-stage least squares, PSM is *propensity score matching*, SDID is spatial difference-in-differences, SLM is spatial lag model, SEM is spatial error model and SDM is Durbin model.

Table 6: Review of international literature

Author	Objective	Analysis Unit	Data structure	Outcome var.	Explanatory var.	Methodology	Conclusions
Tu *et al.* (2022)	Evaluate the impact of information infrastructure development on the urban healthcare environment based on a quasi-natural experiment of the ¡¡Broadband China¿¿ city pilots (BCCP).	Cities in China.	Panel data: 259 cities from 2010-2019.	* Number of doctors. * Number of hospital beds.	*Dummy* that takes the value of 1 if the city implements the BCCP program and 0 otherwise.	SDID, SLM, SEM and SDM	The implementation of the program increased by 4.1% and 2.9% in the medical workforce and medical infrastructure. In addition, there are significant spatial spillover effects of program implementation, with a 7.2% and 12.5% improvement in the medical workforce and medical infrastructure in the surrounding areas.
Gabani *et al.* (2023)	Evaluate the impact of different health financing systems on health system outcomes.	Countries	Panel data: 124 countries from 2000-2017.	* Life expectancy at birth. * Infant mortality under 5 years of age, per 1 000 live births. * Catastrophic health spending, 10% threshold.	Variable created to measure the health financing system.	FE Panel	The transition to government financing increased life expectancy (+1.3 years) and reduced under-five mortality (-8.7%) and the incidence of catastrophic health expenditures (-3.3 percentage points).

Note: N.A. is not applicable, DD is difference-in-differences, GMM is generalized method of moments, DDD is differences-in-differences-in-differences, ARDL is autoregressive distributed lag, FE is fixed effects, 2SLS is two-stage least squares, PSM is *propensity score matching*, SDID is spatial difference-in-differences, SLM is spatial lag model, SEM is spatial error model and SDM is Durbin model.

Isreal Akingba *et al.* (2018) considered per capita health infrastructure spending, and Wang *et al.* (2018) looked at IT health expenditure. Additionally, Jakovljevic *et al.* (2020) and Gabani *et al.* (2023) examined health expenditure. Dimitrovová *et al.* (2020) and Zolfaghari *et al.* (2020) used variables related to the implementation of Family Health Units (FHU) and health infrastructure spending, respectively. Finally, Gravelle *et al.* (2014) used distance and travel time between hospitals.

Regarding the methodologies used, Babiarz *et al.* (2010), Mohanan *et al.* (2013), Besstremyannaya (2013), Binyaruka *et al.* (2015), Hou and Zhang (2017), Dimitrovová *et al.* (2020), Yu *et al.* (2021), and Cookson *et al.* (2017) employed a difference-in-differences (DD) methodology. In Gravelle *et al.* (2014), a spatial regression model was used. Wang (2015) applied the generalized least squares method. Courtemanche *et al.* (2017) adopted a difference-in-differences-in-differences (DDD) approach. Isreal Akingba *et al.* (2018) used an autoregressive distributed lag (ARDL) cointegration model. Wang *et al.* (2018), Gabani *et al.* (2023), and Jakovljevic *et al.* (2020) used a fixed-effects (FE) panel model, while Zolfaghari *et al.* (2020) used a pooled model. Finally, Tu *et al.* (2022) applied a combination of spatial difference-in-differences (DDS), spatial lag model (SLM), spatial error model (SEM), and Durbin model (DM) in their analysis of information infrastructure in China.

Regarding the main results found, Babiarz *et al.* (2010) show that China's New Rural Cooperative Medical Plan increased patient flow, clinical income, and reduced out-of-pocket medical expenditure, improving access and efficiency in rural areas. Gravelle *et al.* (2014) found that the quality of hospitals in England benefited from the quality of rival hospitals, highlighting the importance of proximity in quality analysis. Binyaruka *et al.* (2015) report that a Pay-for-Performance scheme in Africa improved institutional delivery coverage and the provision of antimalarials, but reduced the use of non-specific services in clinics.

Similar to the listed studies, Besstremyannaya (2013); Hou and Zhang (2017); Isreal Akingba *et al.* (2018); Wang *et al.* (2018); Jakovljevic *et al.* (2020); Zolfaghari *et al.* (2020); Yu *et al.* (2021); Tu *et al.* (2022) and Gabani *et al.* (2023) found relevant impacts by the implementation of a program and/or expenditure on health infrastructure on hospital productivity, performance and efficiency. On the other hand, in the studies developed by Mohanan *et al.* (2013) and Dimitrovová *et al.* (2020), no statistical evidence of the significant impact of the implementation of the Chiranjeevi Yojana program and the Family Health Units, respectively, was found.

In contrast to the studies reviewed, the present study is distinguished by its analysis of the effect of the opening of the new Guillermo Kaelin and Alberto Barton concessioned polyclinics on the decongestion of nearby health facilities. Unlike the research reviewed, this study shows the impact of PPPs in the health sector with respect to decongestion, which may be indirectly associated with their potential contribution to improving the quality of services in other health facilities by reducing pressure on their resources and facilitating better management of the demand for care. This approach brings a novel perspective, underlining the potential of PPPs to strengthen the health system as a whole, beyond the immediate effects on the infrastructures directly involved.

2.2 National Literature

In this subsection, a review is made of those documents that investigate the effects that health projects may have in Peru. In this regard, the review of those studies that evaluate the effects of PPPs has been prioritized. Table 7 presents a summary of the main characteristics of the studies found.

Table 7: Review of national literature

Author	Objective	Analysis unit	Data structure	Dependent var.	Explanatory var.	Methodology	Results
Orellana (2013)	Analyze the application of the PPP modality in the health sector in Peru, comparing the Peruvian case with international cases.	N. A.	N. A.	Qualitative	PPPs in health are opportunities that reduce the needs of the service and infrastructure.		
Zevallos, Salas, and Robles (2014)	Study the importance of PPPs for the Peruvian health system.	N. A.	N. A.	N. A.	N. A.	Qualitative	It points out that there is not yet sufficient evidence to measure the results. Therefore, it cannot be ensured that PPPs are a solution but an alternative.
Romero and Gideon (2020)	Examine the debates surrounding PPPs in the health sector for Peru and Latin America.	N. A.	N. A.	N. A.	N. A.	Qualitative	There is some controversy in the application of PPPs in the health sector, for example, that they may end up generating greater inequality. The strengthening of the debate in relation to this type of policy should be supported.
Eslava and Sáenz (2022)	Analyze the effect of SIS coverage on income, expenditures and investment in human capital in the event of an illness in rural Peruvian households.	Peruvian households.	Panel data: From 2011 - 2015.	* Household income. * Household expenditure.	Households that experienced a *shock*, which were covered by SIS.	*Propensity score matching* with difference-in-differences.	In the face of the health *shock*, SIS households experience decreases in income and short-term spending.

Note: N.A. is Not Applicable, PPP is public-private partnership, SIS is Comprehensive Health Insurance.

This table includes characteristics such as the objective, the unit of analysis, the data structure, the dependent and explanatory variables, the methodology used and the main results found. It should also be noted that the studies found are few in relation to those found at the international level, and of these, the only one that performs a quantitative analysis is the one developed by Eslava and Sáenz (2022).

Regarding the objective pursued by the research papers, those developed by Orellana (2013), Zevallos *et al.* (2014) and Romero and Gideon (2020) study the effects that PPPs have had on the health sector in Peru, while Eslava and Sáenz (2022) analyze the effect of SIS coverage on income, expenditures and investment in human capital in the event of an illness in rural households.

Most studies have information on the unit of analysis, data structure, dependent variable and explanatory variable as they are more qualitative studies. On the other hand, Eslava and Sáenz (2022) use Peruvian households as a unit of analysis, the data structure they use is panel data from 2011 to 2015, they use household income, household expenditure and the proportion of children enrolled in schools as dependent variables, they use as an explanatory variable a variable that measures whether households were covered by the SIS and they use the propensity score matching method with difference-in-differences.

Regarding the main results found, Orellana (2013) points out that PPPs in health are opportunities that make it possible to reduce service and infrastructure needs; Zevallos *et al.* (2014) indicate that there is still insufficient evidence to measure the results; Romero and Gideon (2020) spoint out that PPPs in health, for example, could end up generating greater inequality, while Eslava and Sáenz (2022) indicate that, in the face of the health shock, households that have SIS experience a decrease in their income and short-term expenditure.

This research work is positioned as a contribution to the existing literature by offering a quantification of the impact of PPPs in the health sector for the Peruvian case. Unlike previous research conducted in the country, which presents qualitative analyses, this study employs a causal measurement technique widely recognized and used in the international literature. This not only reinforces the validity of the results obtained but also allows for a rigorous and contextualized comparison with international standards, providing a solid basis for informed public policy decision-making.

3 Empirical strategy

To achieve the objectives of this research work, a difference-in-differences model is estimated under the specification of a panel of data controlled by time and observation fixed effects (individuals) known as two-way fixed effects (TWFE). As indicated in Arkhangelsky and Imbens (2024), under this specification the outcome of the control ($Y_{it}(0)$) must satisfy the following:

$$y_{i,t}(0) = \alpha_i + \beta_t + \epsilon_{i,t} \tag{1}$$

Where ϵ_{it} is independent of the treatment policy. The above equation indicates that, if the treatment is not provided, the result obtained is determined by the two-way fixed effects. Likewise, the potential outcome when treatment is received is determined by the following equation:

$$y_{i,t}(1) = y_{i,t}(0) + \tau \tag{2}$$

This equation shows that τ measures the difference between the outcome of receiving or not receiving the treatment. Joining equations 1 and 2, and considering the assignment of a treatment (T_{it}) that takes the value of 1 if the unit is treated and 0 if it is not treated, we have that the variable Y_{it} can take different values depending on whether the individual receives the treatment or not:

$$y_{i,t} \equiv T_{i,t} \cdot y_{i,t}(1) + (1 - T_{i,t}) \cdot y_{i,t}(0) \tag{3}$$

$$y_{i,t} = \alpha_i + \beta_t + \tau \cdot T_{i,t} + \epsilon_{i,t} \tag{4}$$

Equation 4 is the one to be estimated. The parameters through the ordinary least squares method are obtained through an optimization process:

$$\left(\hat{\tau}^{TWFE}, \hat{\alpha}, \hat{\beta}\right) = arg \min_{\tau,\alpha,\beta} \sum_{i=1}^{N} \sum_{t=1}^{M} \left(y_{i,t} - \alpha_i - \beta_t - \tau \cdot T_{i,t}\right) \tag{5}$$

The parameter of interest that allows us to identify the causal effect of the policy is $\hat{\tau}^{TWFE}$. One way to rewrite the treatment effect estimator is as follows:

$$\hat{\tau}^{TWFE} = \left(y^{trat,post} - y^{trat,pre}\right) - \left(y^{cont,post} - y^{cont,pre}\right) \tag{6}$$

This is quite similar to the usually known difference-in-differences method. However, according to Arkhangelsky and Imbens (2024) it is better to use the TWFE characterization of equation 4 because it applies in environments where the estimator does not have the double difference form.

Additionally, taking advantage of the panel data, the estimation of the event studies method will be carried out. Event studies occupy a prominent place in the current literature as it presents a more explicit approach to causal effects; also, event studies allow us to indirectly test the assumption of parallel trends (difference-in-differences model identification assumption) and to analyze the effect of the policy over time.

It should be noted that the parallel trend assumption states that, in the absence of the intervention, the time trends of the treatment and control groups would have followed similar trajectories over time. In other words, it is assumed that any differences observed between the groups prior to the intervention are constant and do not vary over time.

This research work seeks to measure how the polyclinics concessioned by PPP, Guillermo Kaelin and Alberto Barton, generate benefits for the population served through the decongestion of other health facilities. To identify the group of health facilities that were decongested as a result of the concession policy, the distance from each health facility to the concessioned polyclinic has been taken as a variable that measures heterogeneous exposure. Thus, it is expected that those health centers that are closer to the concessioned facility will have benefited from the decongestion compared to those that are far away.

It is important to note that it has been considered that each concessioned health facility can only generate benefits within the health network to which it belongs. Thus, the Guillermo Kaelin and Alberto Barton polyclinics can only contribute to the decongestion of the health facilities of the Rebagliati and Sabogal networks, respectively. In this context, care per consultation is restricted to the network assigned by EsSalud, which means that policyholders in a network cannot receive care in a network other than the one assigned.

4 Data

In this research work, a panel of data is used for a total of 25 health facilities (14 from the Rebagliati network and 11 from the Sabogal network) from 2011 to 2017. Considering that the start of operations of both polyclinics took place in 2014, the data allows us to identify the impact of the referred polyclinics during the following 3 years after the start of operations. The impact is measured on the number of policyholders, the number of consultations, consultations/policyholders, policyholders/doctors and consultations/doctors ratios. These data have been obtained from the EsSalud website and from various requests for access to public information (SAIP) made. Descriptive statistics for these variables are presented in Table 8.

With regard to the variable that measures the heterogeneous exposure of the health facilities in each network, the distance from each health facility to the new polyclinics has been used. The distance variable chosen is the travel time in minutes it takes a car to get from each health facility to the new polyclinic. Travel time data has been extracted from Google Maps.

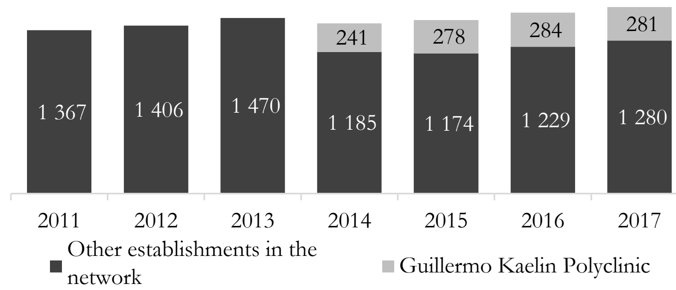
It should be noted that the analysis uses information for most of the health facilities in each network, with the exception of the III Alfredo Piazza Roberts Primary Care Center (CAP) and the III Retablo CAP in Comas, since there is no information available or they were not attending EsSalud policyholders during the analysis period. The Alberto Sabogal, Edgardo Rebagliati and Luis Negreiros hospitals are also excluded because they are national hospitals that do not have policyholders assigned for consultations; on the contrary, these hospitals attend more complex cases; therefore, they belong to a different market than the polyclinics analyzed.

Table 8: Descriptive statistics of variables

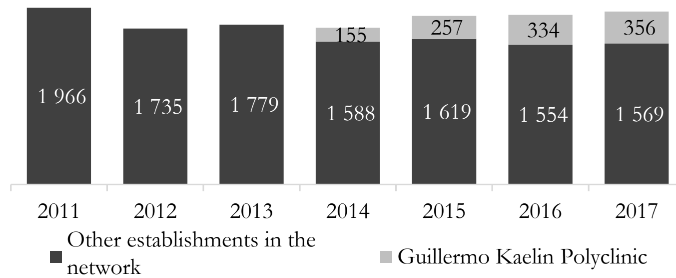
Variables	Obs.	Average	Std. Dev.	Mín.	Max.
Rebagliati Network					
Number of policyholders	98	92 961	62 837	0	260 947
Number of consultations	98	120 520	84 958	0	344 662
Consultations/policyholders	98	1,3	0,9	0	5,7
Consultations/doctors	91	4 255	2 178	1 130	12 236
Number of doctors	95	46	57	0	227
Sabogal Network					
Number of policyholders	77	111 887	55 325	33 038	245 196
Number of consultations	77	136 982	72 168	31 576	326 096
Consultations/policyholders	77	1,3	0,7	0,6	4
Consultations/doctors	77	5 261	2 635	1 818	13 108
Number of doctors	77	39	35	4	122

5 Results

This section presents the results found after applying the empirical strategy detailed above. The objective of this research is to analyze and quantify the impact that PPPs can have on the decongestion of other health facilities in Peru, based on the analysis of the role played

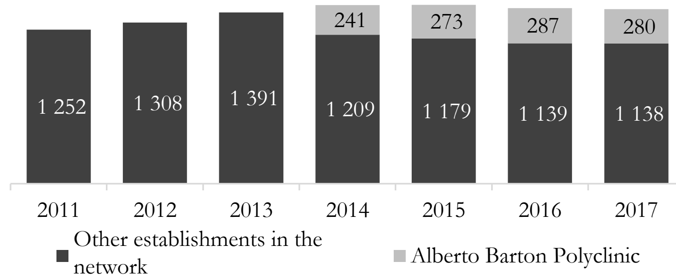


(a) Number of policyholders (in thousands)

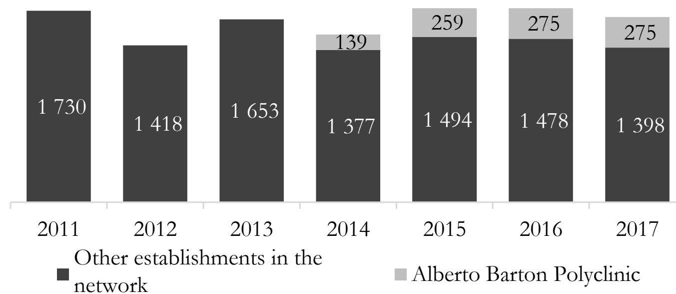


(b) Number of consultations (in thousands)

Figure 1: Number of policyholders and consultations in the Rebagliati network



(a) Number of policyholders (in thousands)



(b) Number of consultations (in thousands)

Figure 2: Number of policyholders and consultations in the Sabogal network

The figures include the number of patients and policyholders treated in Metropolitan Lima. In addition, the Alberto Sabogal, Edgardo Rebagliati and Luis Negreiros hospitals have been excluded because they are national hospitals that do not have policyholders assigned for consultations; on the contrary, these hospitals attend more complex cases.

by the Guillermo Kaelin and Alberto Barton polyclinics, each belonging to the concessioned hospital complex of the same name. It is expected that, following the start of operations of the polyclinics in 2014, the health facilities closest to the new polyclinics may have registered decreases in the number of consultations and in the number of policyholders. This would allow for better quality of health services and possible reductions in waiting times for appointments and for being seen.

Although the concessioned hospital complexes include, in addition to the polyclinic, the specialized hospital and the home care unit, this research focuses on measuring the effect only of the polyclinics, given the information available; however, it is to be expected that the specialized hospital and the home care unit have also had an impact on the benefit of the insured population; therefore, it can be affirmed that the total impact of these concessions on health is greater than those estimated in this document.

For the purposes of applying the difference-in-differences method, the date on which the polyclinics began operations has been considered as the date on which treatment began, since it is only after this date that effects on the congestion of other health facilities may have been generated. The period of analysis is between 2011 and 2017, which makes it possible to have 3 years before and 3 years after the start of operations of the concessioned health facilities.

Likewise, the analysis considers that the new polyclinics only generate decongestion effects in health facilities that are within their respective networks. This assumption is based on the fact that the policyholders themselves cannot decide in which hospital network to be treated; on the contrary, it is EsSalud that assigns the number of policyholders for each health facility and for each network, considering the proximity of the policyholder to the health facility. Therefore, it is expected that health facilities close to the new polyclinics will benefit positively in terms of reducing the number of policyholders compared to health facilities that are farther away.

It is important to note that, as shown in Figures 1 and 2, the start of operations of the new polyclinics has not led to an increase in the number of policyholders, as this depends on other factors. Similarly, there has been no increase in the number of consultations. However, there has been a decrease in the number of policyholders and patients treated in existing health facilities. In this sense, it is evident that the new health facilities have contributed to the decongestion of each health network and, therefore, to a possible improvement in health services.

Since distance to polyclinics is a determining variable in identifying the effects of concessions on health facility congestion, the measure of distance used was the travel time by car required to travel from each health facility to the new polyclinic. Travel time was preferred as a measure of distance because, unlike other distance measures such as kilometers traveled and Euclidean distance, this one takes into account traffic congestion in the area, the number of curves on the roads, and even the condition of the highways. In short, this makes this a more accurate measure of distance compared to others.

Tables 9 and 10 present the health facilities closest to the new polyclinics in order of travel time. It should be noted that in the case of the Rebagliati network, for every additional 5 minutes of travel time, at least one health facility is added; however, this does not occur in the Sabogal network, which has the same number of health facilities for less than 25, 30 and 35 minutes of travel time, and only after 40 minutes are health facilities added.

Table 9: Travel time by car from health facilities in the Rebagliati network to the Guillermo Kaelin polyclinic

Travel time to Guillermo Kaelin Polyclinic by car	Health facilities in the Rebagliati network
Less than 10 min	- Pol. Villa María
Less than 15 min	- Pol. Villa María - H. I Uldarico Rocca Fernández
Less than 20 min	- Pol. Villa María - H. I Uldarico Rocca Fernández - CAP III Los Próceres de San Juan de Miraflores
Less thane 25 min	- Pol. Villa María - H. I Uldarico Rocca Fernández - CAP III Los Próceres de San Juan de Miraflores - Pol. Los Próceres
Less than 30 min	- Pol. Villa María - H. I Uldarico Rocca Fernández - CAP III Los Próceres de San Juan de Miraflores - Pol. Los Próceres - Pol. Juan José Rodríguez Lazo
Menos de 35 min	- Pol. Villa María - H. I Uldarico Rocca Fernández - CAP III Los Próceres de San Juan de Miraflores - Pol. Los Próceres - Pol. Juan José Rodríguez Lazo - CAP III Barranco
Menos de 40 min	- Pol. Villa María - H. I Uldarico Rocca Fernández - CAP III Los Próceres de San Juan de Miraflores - Pol. Los Próceres - Pol. Juan José Rodríguez Lazo - CAP III Barranco - H. I Carlos Alcántara Butterfield - CAP II Lurín

Note: Data collected on January 18, 2025.
Own elaboration.
Source: Google Maps

Table 10: Travel time by car from Sabogal network health facilities to the Alberto Barton Polyclinic

Travel time by car to the Alberto Barton Polyclinic	**Health facilities in the Sabogal network**
Less than 10 min	- N. A.
Less than 15 min	- CAP III Bellavista - CAP III Metropolitano Callao
Less than 20 min	- CAP III Bellavista - CAP III Metropolitano Callao - H. I Octavio Mongrut Muñoz
Less than 25 min	- CAP III Bellavista - CAP III Metropolitano Callao - H. I Octavio Mongrut Muñoz - CAP III Luis Negreiros Vega
Less than 30 min	- CAP III Bellavista - CAP III Metropolitano Callao - H. I Octavio Mongrut Muñoz - CAP III Luis Negreiros Vega
Less than 35 min	- CAP III Bellavista - CAP III Metropolitano Callao - H. I Octavio Mongrut Muñoz - CAP III Luis Negreiros Vega
Less than 40 min	- CAP III Bellavista - CAP III Metropolitano Callao - H. I Octavio Mongrut Muñoz - CAP III Luis Negreiros Vega - CAP III Hermana María Donrose - Fiori Polyclinic

Note: Data collected on January 18, 2025. N.A. indicates that no healthcare facilities have been identified within the Sabogal network in the specified distance range.

Own elaboration.

Source: Google Maps.

In order to quantify the magnitude and length of the shock wave of the impact generated by the operation of the Guillermo Kaelin and Alberto Barton polyclinics on the decongestion of other health facilities, estimates have been made considering different treatment and control groups according to their proximity to the new polyclinics. Hereafter, a separate analysis is performed for each new polyclinic; however, the same empirical strategy is employed for both cases.

5.1 Impact of the Guillermo Kaelin polyclinic on the congestion of health facilities in the Rebagliati network

Tables 11 and 12 spresent estimates of the decongestion effect generated by the Guillermo Kaelin polyclinic in the Rebagliati network. Table 11 presents the results of the effects on policyholders, consultations and the consultations per policyholder ratio, and Table 7 presents the results of the effects on the policyholders per doctors ratio and the consultations per doctors ratio.

The results in Table 11 indicate statistically significant effects on the growth rate of insured and consultations; however, no effects on the ratio of consultations per policyholders are identified. All estimations have fixed effects of time and observations, as well as a control variable of number of doctors; likewise, all estimations included cluster to avoid bias problems.

In particular, column (1) shows that the Guillermo Kaelin polyclinic generated a statistically significant reduction of 46.3 % in the number of policyholders in the health facilities of the Rebagliati network that are less than 15 minutes of distance from the polyclinic. Within this radius is the Villa María polyclinic, which stopped treating policyholders after the start of operations of the hospital complex concession. Column (2) shows that the Guillermo Kaelin polyclinic generated a statistically significant reduction of 42.1 % in the number of policyholders in the Rebagliati network of health facilities located less than 20 minutes of distance. Likewise, column (3) shows that there is no statistically significant effect of the new polyclinic on decongestion after 25 minutes of distance.

In column (4), it is estimated that the Guillermo Kaelin polyclinic generated a statistically significant reduction of 54.5 % in the number of consultations in the health facilities of the Rebagliati network that are less than 15 minutes of distance from the polyclinic. Column (5) shows the statistically significant impact of the Guillermo Kaelin polyclinic helping to reduce by 48.1 % the number of consultations in network polyclinics less than 20 minutes of distance. Likewise, column (6) shows that there is no statistically significant effect of the new polyclinic on decongestion after 25 minutes of distance.

On the other hand, in columns (7), (8) and (9) the ratio of consultations per policyholders is quantified considering the health facilities that are less than 15, 20 and 25 minutes of distance from the Guillermo Kaelin polyclinic. In the estimates presented in these columns, it is observed that the aforementioned polyclinic has not had a statistically significant effect on the ratio. This is because the impacts generated on the number of policyholders and on the number of consultations are statistically equal.

The results in Table 12 indicate significant effects on the ratios of policyholders per doctors and consultations per doctors. All the estimates presented in this table have fixed effects of time and observations; likewise, the cluster was included in all the estimates to avoid bias in them.

In particular, column (1) shows that the Guillermo Kaelin polyclinic generated a statistically significant reduction of 28.4 % in the ratio of policyholders per doctors in the

Table 11: Estimates of the decongestion effect generated by the Guillermo Kaelin polyclinic on the Rebagliati network – Part 1

	Log(policyholders)			Log(consultations)			Log(consultations/policyholders)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Treated (15 min distance to the GK pol.)*post	-0,463***			-0,545*			0,125		
	(0,057)			(0,255)			(0,076)		
Treated (20 min distance to the GK pol.)*post		-0,421***			-0,481***			0,05	
		(0,081)			(0,153)			(0,106)	
Treated (25 min distance to the GK pol.)*post			-0,179			-0,161			0,111
			(0,213)			(0,240)			(0,103)
Constant	10,511***	10,523***	10,508***	10,759***	10,752***	10,706***	0,346**	0,344**	0,350**
	(0,092)	(0,088)	(0,096)	(0,188)	(0,196)	(0,236)	(0,119)	(0,117)	(0,123)
Number of doctors	-0,005	-0,007	-0,005	0,006	0,005	0,009	0,004	0,005	0,005
	(0,006)	(0,006)	(0,006)	(0,009)	(0,010)	(0,011)	(0,005)	(0,005)	(0,005)
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observation fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster by observations	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0,949	0,953	0,944	0,948	0,95	0,939	0,814	0,813	0,815
Observations	91	91	91	92	92	92	91	91	91

Note: GK is Guillermo Kaelin, post is a dummy variable that takes the value of 1 for all years from the start of operations of the new polyclinic. Treated is a dummy variable that identifies the treated group, which can be found 15, 20 and 25 minutes of distance from the Guillermo Kaelin polyclinic.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Table 12: Estimates of the decongestion effect generated by the Guillermo Kaelin polyclinic on the Rebagliati network – Part 2

	Log(policyholder/doctors)			Log(consultations/doctors)		
	(1)	(2)	(3)	(4)	(5)	(6)
Treated (15 min distance to the GK pol.)*post	-0,284***			-0,168**		
	(0,080)			(0,065)		
Treated (20 min distance to the GK pol.)*post		-0,228**			-0,193**	
		(0,104)			(0,068)	
Treated (25 min distance to the GK pol.)*post			-0,096			0,005
			(0,152)			(0,170)
Constant	7,547***	7,539***	7,547***	7,968***	7,958***	7,977***
	(0,086)	(0,087)	(0,085)	(0,110)	(0,108)	(0,095)
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observation fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Cluster by observations	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0,946	0,946	0,945	0,893	0,895	0,891
Observations	91	91	91	91	91	91

Note: GK is Guillermo Kaelin, post is a dummy variable that takes the value of 1 for all years from the start of operations of the new polyclinic. Treated is a dummy variable that identifies the treated group, which can be found 15, 20 and 25 minutes of distance from the Guillermo Kaelin polyclinic.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

health facilities of the Rebagliati network that are less than 15 minutes of distance from the polyclinic. Column (2) shows that the Guillermo Kaelin polyclinic generated a statistically significant reduction of 22.8 % in the ratio of policyholders per doctors in the health facilities of the Rebagliati network that are less than 20 minutes of distance from the polyclinic. Likewise, column (3) shows that there is no statistically significant effect of the new polyclinic on decongestion after 25 minutes of distance.

Therefore, it can be affirmed that, after the Guillermo Kaelin polyclinic began operations, the health facilities of the Rebagliati network located less than 20 minutes of distance from the polyclinic have a lower number of policyholders per doctor. This is indicative of the impact that the Guillermo Kaelin polyclinic has had on the capacity of nearby health facilities, allowing each doctor to treat a smaller number of policyholders.

In column (4), it is estimated that the Guillermo Kaelin polyclinic generated a statistically significant reduction of 16.8 % in the ratio of consultations per doctor in the health facilities of the Rebagliati network that are less than 15 minutes of distance from the polyclinic. Column (5) shows that there is a statistically significant impact of the Guillermo Kaelin polyclinic helping to reduce by 19.3 % the ratio of consultations per doctor in the network's polyclinics less than 20 minutes of distance. Likewise, column (6) shows that there is no statistically significant effect of the new polyclinic on decongestion after 25 minutes of distance.

Therefore, it can be affirmed that, after the Guillermo Kaelin polyclinic began operating, the health facilities in the Rebagliati network that are less than 20 minutes' drive from the polyclinic have reduced the number of consultations per doctor. This is indicative of the impact the polyclinic has had on the capacity of nearby health facilities, allowing each doctor to see fewer patients.

In conclusion, the effect on the decongestion generated by the Guillermo Kaelin polyclinic on the number of policyholders and consultations of other facilities of the Rebagliati network has a ripple effect of up to 20 minutes of distance. Considering that a vehicle in the city of Lima travels at an average speed of 17 km/hour[3] during rush hour, the expansive effect of the concession would cover approximately 5.6 km around the Guillermo Kaelin polyclinic. Therefore, the decongestion effect generated by this polyclinic mainly benefits the Villa María polyclinic, the I Uldarico Rocca Fernández hospital and the III Los Próceres de San Juan de Miraflores CAP.

5.2 Impact of the Alberto Barton polyclinic on the congestion of health facilities in the Sabogal network

Tables 13 and 14 show the estimates of the decongestion effect generated by the Alberto Barton polyclinic in the Sabogal network. Table 13 presents the results of the effects on the number of policyholders, consultations and consultations per policyholders ratio, and Table 14 presents the results of the effects on the policyholders per doctors ratio and the consultations per doctors ratio.

The results in Table 13 indicate statistically significant effects on the growth rate of policyholders and consultations; however, no effects on the ratio of consultations per policyholders are identified. All estimations have fixed effects of time and observations, as well as a control variable of number of doctors; likewise, all estimations included cluster to avoid bias

[3]Information extracted from the Tomtom Traffic Index on January 20, 2025, available at: https://www.tomtom.com/traffic-index/ranking/

problems.

In particular, column (1) shows that the Alberto Barton polyclinic generated a statistically significant reduction of 42.3 % in the number of policyholders in the health facilities of the Sabogal network that are less than 15 minutes of distance from the polyclinic. Column (2) shows that this polyclinic generated a statistically significant reduction of 37.4 % in the number of policyholders in the Sabogal network of health facilities located less than 20 minutes of distance. Similarly, column (3) shows that there is a statistically significant reduction of 30.6 % in the number of policyholders in the Sabogal network of health facilities that are less than 25 minutes of distance. Likewise, column (4) shows that there is no statistically significant effect of the new polyclinic on decongestion after 40 minutes of distance.

In column (5), it is estimated that the Alberto Barton polyclinic generated a statistically significant reduction of 34.4 % in the number of consultations in the health facilities of the Sabogal network that are less than 15 minutes of distance from the concessioned polyclinic. Column (6) shows the statistically significant impact of this polyclinic, as it helps to reduce by 34.7 % the number of consultations to network polyclinics less than 20 minutes of distance. Likewise, columns (7) and (8) show that there is no statistically significant effect of the Alberto Barton polyclinic on decongestion after 25 minutes of distance.

On the other hand, columns (9), (10), (11) and (12) quantify the impact on the ratio of consultations per policyholders considering health facilities located less than 15, 20, 25 and 40 minutes of distance from the Alberto Barton polyclinic. The estimates presented in these columns show that the new polyclinic has not had a statistically significant effect on the ratio. This is due to the fact that the impacts on the number of policyholders and the number of consultations are statistically equivalent.

The results in Table 14 indicate significant effects on the ratios of policyholders per doctors and consultations per doctors. All estimates presented in this table have time and observation fixed effects, and all estimates include cluster to avoid bias.

In particular, column (1) shows that the Alberto Barton polyclinic generated a statistically significant reduction of 23.0 % in the ratio of policyholders per doctors in the health facilities of the Sabogal network that are less than 15 minutes of distance from the polyclinic. Column (2) shows that this polyclinic generated a statistically significant reduction of 33.3 % in the ratio of policyholders per doctors in the Sabogal network of health facilities located less than 20 minutes of distance. Similarly, column (3) shows that there is a statistically significant reduction of 28,4 % in the ratio of policyholders per doctors over the Sabogal network health facilities that are less than 25 minutes of distance. On the other hand, column (4) shows that there is no statistically significant effect of the Alberto Barton polyclinic on decongestion at a distance of 40 minutes.

Therefore, it can be affirmed that, after the start of operations of the Alberto Barton polyclinic, the health facilities of the Sabogal network located less than 25 minutes of distance from this polyclinic have a lower number of policyholders per doctor. This is indicative of the impact that the Alberto Barton polyclinic has had on the capacity of nearby health facilities, allowing each doctor to treat a smaller number of policyholders.

Table 13: Estimates of the decongestion effect generated by the Alberto Barton polyclinic on the Sabogal network – Part 1

	Log(policyholders)				Log(consultations)				Log(policyholders/consultations)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Treated (15 min distance to the AB pol.)*post	-0.423***				-0.344*				0.079			
	(0.090)				(0.163)				(0.179)			
Treated (20 min distance to the AB pol.)*post		-0.374***				-0.347***				0.026		
		(0.107)				(0.112)				(0.136)		
Treated (25 min distance to the AB pol.)*post			-0.306**				-0.202				0.104	
			(0.136)				(0.157)				(0.123)	
Treated (40a/ min distance to AB pol.)*post				-0.259				-0.125				0.134
				(0.150)				(0.130)				(0.108)
Constant	11.210***	11.192***	11.187***	11.171***	11.095***	11.074***	11.086***	11.090***	-0.115	-0.118	-0.101	-0.081
	(0.056)	(0.059)	(0.065)	(0.067)	(0.043)	(0.039)	(0.036)	(0.043)	(0.065)	(0.068)	(0.065)	(0.057)
Number of doctors	-0.005	-0.002	-0.002	-0.003	0	0.003	0.002	0.002	0.005	0.004	0.005	0.005
	(0.003)	(0.003)	(0.002)	(0.002)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observation fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster by observations	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.932	0.934	0.928	0.923	0.959	0.964	0.953	0.949	0.910	0.909	0.911	0.913
Observations	77	77	77	77	77	77	77	77	77	77	77	77

Note: AB is Alberto Barton, post is a dummy variable that takes the value of 1 for all years from the start of operations of the new polyclinic. Treated is a dummy variable that identifies the treated group, which can be found 15, 20 and 25 minutes of distance from the Alberto Barton polyclinic.

a/ 40 minutes was considered because no health facilities in the Sabogal network were identified that were between 25 and 35 minutes of distance from the concessioned polyclinic.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Table 14: Estimates of the decongestion effect generated by the Alberto Barton polyclinic on the Sabogal network – Part 2

	Log(policyholder/doctors)				Log(consultations/doctors)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treated (15 min distance to the AB pol.)*post	-0.230***				-0.242*			
	(0.098)				(0.213)			
Treated (20 min distance to the AB pol.)*post		-0.333***				-0.305***		
		(0.090)				(0.143)		
Treated (25 min distance to the AB pol.)*post			-0.284**				-0.181	
			(0.116)				(0.154)	
Treated (40a/ min distance to AB pol.)*post				-0.247				-0.118
				(0.138)				(0.117)
Constant	7.670***	7.649***	6.970***	7.740***	8.037***	8.014***	8.103***	8.260***
	(0.040)	(0.039)	(0.042)	(0.056)	(0.055)	(0.051)	(0.049)	(0.083)
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observation fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster by observations	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.958	0.961	0.960	0.959	0.902	0.911	0.901	0.897
Observations	77	77	77	77	77	77	77	77

Note: AB is Alberto Barton, post is a dummy variable that takes the value of 1 for all years from the start of operations of the new polyclinic. Treated is a dummy variable that identifies the treated group, which can be found 15, 20 and 25 minutes of distance from the Alberto Barton polyclinic.

a/ 40 minutes was considered because no health facilities in the Sabogal network were identified that were between 25 and 35 minutes of distance from the concessioned polyclinic.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

In column (5), it is estimated that the Alberto Barton polyclinic generated a statistically significant reduction of 24.2 % in the ratio of consultations per doctor in the health facilities of the Sabogal network that are less than 15 minutes of distance from this polyclinic. Column (6) shows that there is a statistically significant impact of the polyclinic helping to reduce by 30.5 % the ratio of consultations per doctor in network polyclinics less than 20 minutes of distance. Likewise, columns (7) and (8) show that there is no statistically significant effect of the Alberto Barton polyclinic on decongestion after 25 minutes of distance.

Therefore, it can be affirmed that, after the start of operations of the Alberto Barton polyclinic, the health facilities of the Sabogal network that are less than 20 minutes of distance from this polyclinic have reduced the number of consultations per doctor. This is indicative of the impact that the Alberto Barton polyclinic has had on the capacity of nearby health facilities, allowing each doctor to see fewer patients.

In conclusion, the effect on the decongestion generated by the Alberto Barton polyclinic with respect to the number of policyholders and consultations of other facilities of the Rebagliati network has a ripple effect of up to 25 minutes of distance. Considering that a vehicle in the city of Lima travels at an average speed of 17 km/hour[4] during rush hour, the expansive effect of the concession would cover approximately 7.1 km around the Barton polyclinic. Therefore, the decongestion effect generated by this polyclinic mainly benefits III Bellavista CAP, III Metropolitano Callao CAP, I Octavio Mongrut Muñoz Hospital and III Luis Negreiros Vega CAP.

5.3 Event study

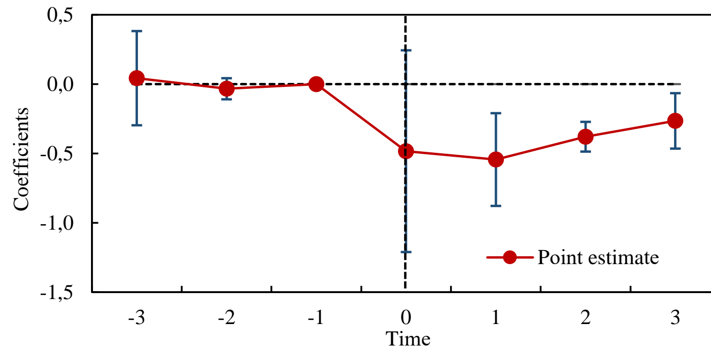
To ensure that the models meet the assumption of parallel trends in the estimates presented in Tables 11, 12, 13 and 14, an event study analysis was performed for each polyclinic, as shown in Figures 3 and 4. These figures show that in the estimates for both the Guillermo Kaelin polyclinic and the Alberto Barton polyclinic, the assumption of parallel trends is fulfilled, since the estimated coefficients for the years prior to treatment are statistically equal to zero.

Indeed, in graphs (a), (b), (c) and (d) of both figures, it can be seen that, in most cases, the coefficient estimates for the periods prior to the event (for years -3, -2 and -1) are statistically equal to zero (considering a 95 % significance level), which suggests that there are no significant differences in the trends of the variables analyzed prior to the start of operations of the concessioned polyclinics.

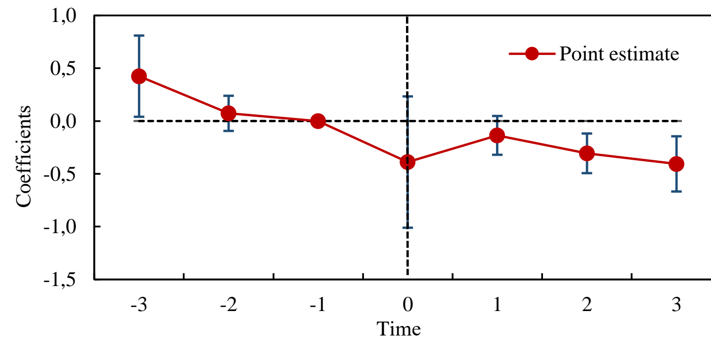
In the case of the Guillermo Kaelin polyclinic, Figure 3 shows more significant impacts on the variables of the number of policyholders and the number of consultations, as shown in graphs 3a and 3b, where the coefficients after the concession show statistically significant changes. On the other hand, graphs 3c and 3d, corresponding to the policyholders/doctors and consultations/doctors ratios, show less statistical significance. In particular, in graph 3c, the impact would be visible only until the second post-treatment period. On the other hand, in graph 3d, it is observed that the estimated coefficients after treatment are statistically equal to zero, but with a tendency to decrease. The results in graph 3d may be due to the lack of statistical power due to the small amount of data, which makes the confidence intervals large.

In the case of the Alberto Barton polyclinic, Figure 4a, 4b, 4c and 4d show clearer impacts. Although the post-treatment coefficients show a decrease, implying a decongestion

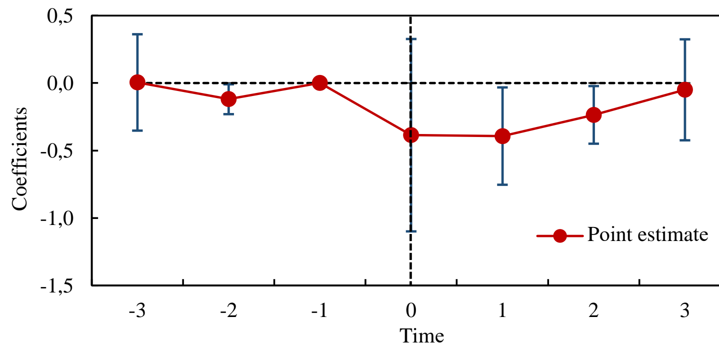
[4]Information extracted from the Tomtom Traffic Index on January 20, 2025, available at: https://www.tomtom.com/traffic-index/ranking/



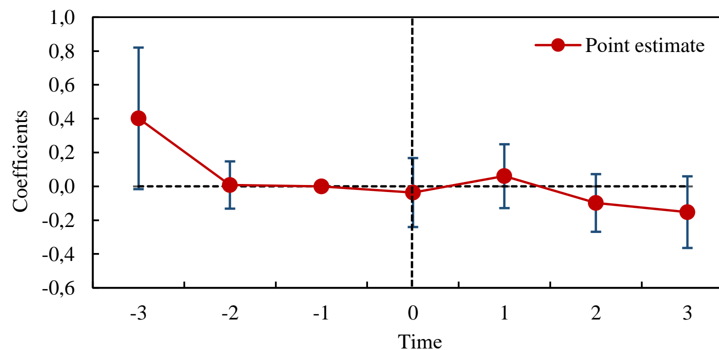
(a) Logarithm of the number of policyholders



(b) Logarithm of the number of consultations



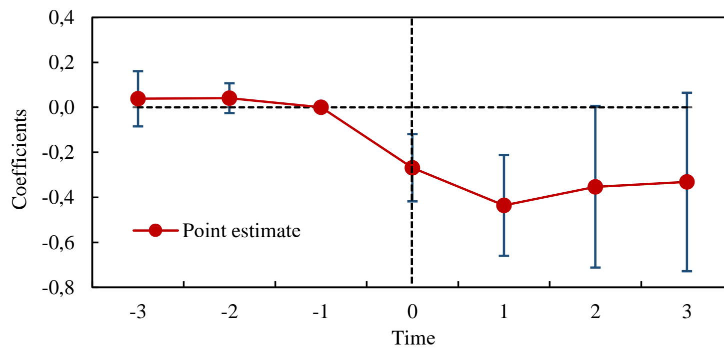
(c) Logarithm of policyholders/doctors



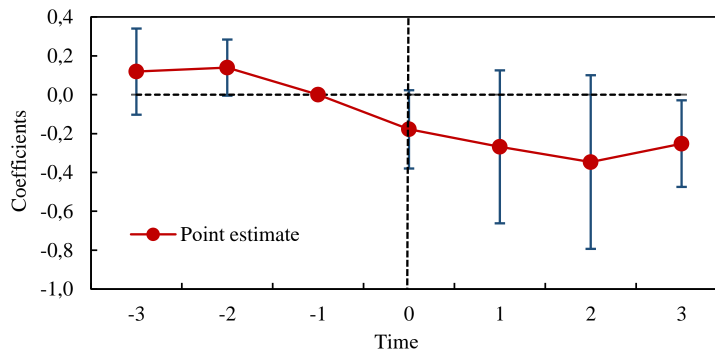
(d) Logarithm of consultations/doctors

Figure 3: Event study for the Guillermo Kaelin polyclinic estimations

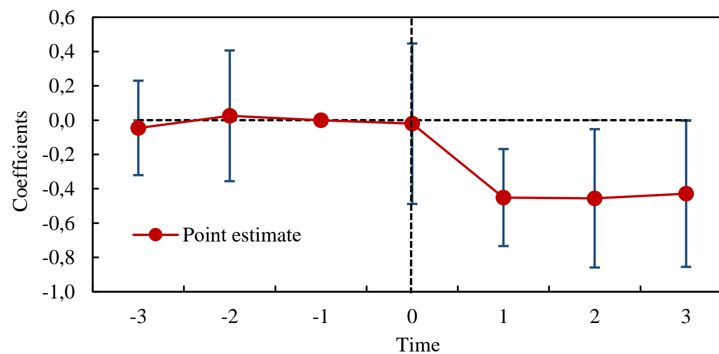
Note: Intervals are estimated at a 95 % significance level.



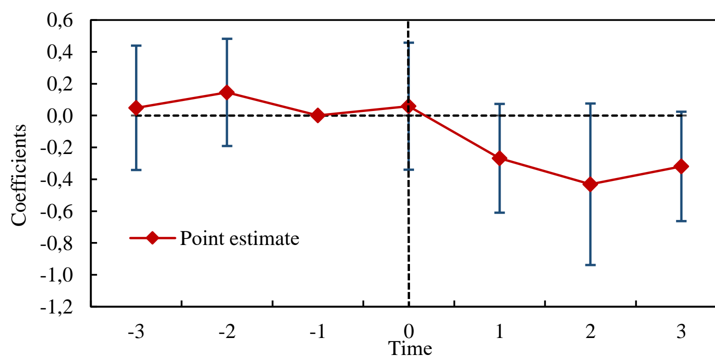
(a) Logarithm of the number of policyholders



(b) Logarithm of the number of consultations



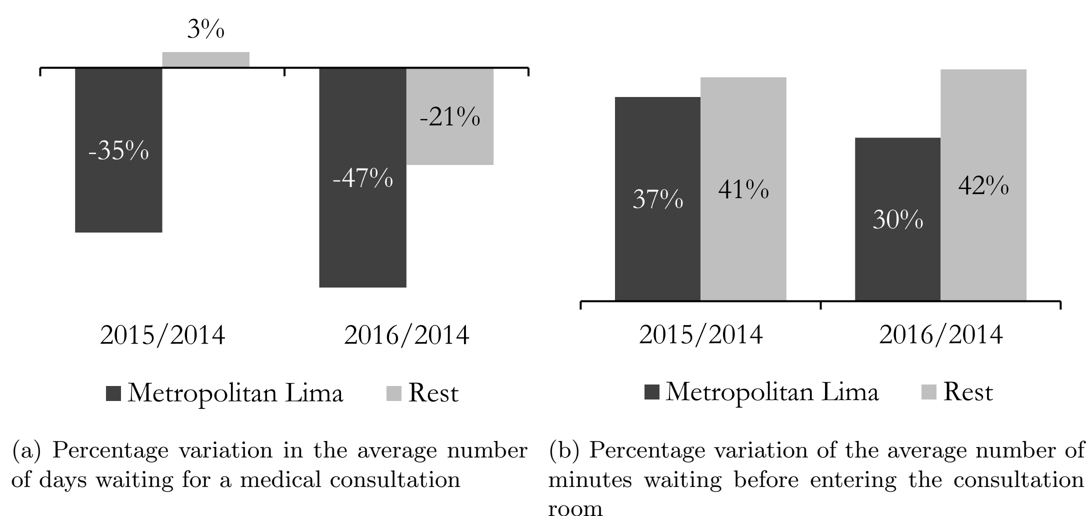
(c) Logarithm of policyholders/doctors



(d) Logarithm of consultations/doctors

Figure 4: Event study for the Alberto Barton polyclinic estimations

Note: Intervals are estimated at a 95 % significance level.



(a) Percentage variation in the average number of days waiting for a medical consultation

(b) Percentage variation of the average number of minutes waiting before entering the consultation room

Figure 5: Waiting time indicators in EsSalud's health facilities

Source: National Survey on User Satisfaction of Health Services.

of nearby health facilities, the confidence intervals are wide, indicating a lower accuracy in the estimates. This is because, compared to the Guillermo Kaelin polyclinic, the estimates made for the Sabogal network include a smaller number of health facilities, which does not allow an accurate identification of the impact.

5.4 Analysis of satisfaction of users of health services

To strengthen the results obtained, the waiting time in EsSalud health facilities in Metropolitan Lima and the rest of the country was analyzed. Waiting time variables are used as indicators of satisfaction with the effects of the decongestion of these health facilities. The waiting times have been obtained from the National Survey on User Satisfaction of Health Services, prepared by the INEI, corresponding to the years 2014, 2015 and 2016. The objective of this survey is to evaluate and monitor the functioning and performance of the health system in the country.

Figure 5 shows two key indicators of waiting times in EsSalud health facilities. Figure 5a shows the percentage variation in the average number of days waiting for a medical consultation in Metropolitan Lima compared to the rest of the country. The data reflect that facilities in Metropolitan Lima significantly reduced waiting days, reaching a decrease of up to 47 % in 2016 compared to 2014. Although a 21 % reduction was also observed in EsSalud establishments in the rest of the country in the same period, it was not as pronounced as in Metropolitan Lima. Thus, patients who go to the health networks of Metropolitan Lima, such as the Rebagliati and Sabogal networks, experience shorter waiting times to access an external medical consultation in the years after the start of the service provision of the concessioned polyclinics.

Similarly, Figure 5b shows the percentage variation in the average number of minutes a patient must wait from the time he/she arrives at the health facility until being seen by a doctor. It is observed that in Metropolitan Lima facilities there were increases in waiting times of 37 % in 2015 and 30 % in 2016 compared to 2014. However, these increases were smaller compared to those recorded in health facilities in the rest of the country.

In general, Figures 5a and 5b show a reduction in waiting times in EsSalud health facilities in Metropolitan Lima compared to those in the rest of the country, which could be due to the effects of the start of operations of the concessioned hospital complexes on the congestion of the other health facilities in the Sabogal and Rebagliati networks. These results suggest improvements in patient well-being as a result of the decongestion of health facilities.

6 Conclusions and recommendations

The objective of this research is to analyze and quantify the impact that PPPs in health in Peru can have on the decongestion of other health facilities, based on the analysis of the role played by the Guillermo Kaelin and Alberto Barton polyclinics, each belonging to the concessioned hospital complex of the same name. It is expected that, after the start of operations of both polyclinics in 2014, the health facilities closest to them will have been able to register decreases in the number of policyholders assigned and consultations performed. This would make possible an improvement in the efficiency and quality of health services, as well as possible reductions in waiting times to get an appointment and be seen in a timely manner.

To verify this objective, the difference-in-differences method was applied using the two-way fixed-effect specification, followed by an event study to analyze the impact of the concession over time. The treatment begins with the start of operations of the Guillermo Kaelin and Alberto Barton polyclinics in 2014, and the comparison is made with the rest of the health facilities that are part of the Rebagliati and Sabogal networks, respectively.

The results indicate that the implementation of the Guillermo Kaelin polyclinic has had a significant impact on the decongestion of health facilities in the Rebagliati network, particularly in the areas closest to the concession. With distance as a heterogeneous exposure variable, a statistically significant reduction of 42.1 % was identified in the number of policyholders in the other health facilities of the network, located less than 20 minutes of distance from the polyclinic; however, no significant effect was observed after 25 minutes of distance.

Regarding the number of consultations, the results also show a significant reduction of 48.1 % in establishments located less than 20 minutes of distance. Similarly, no significant effect was found from 25 minutes of distance. The ratio of policyholders per doctor also decreased significantly, with a reduction of 22.8 % to less than 20 minutes. Regarding the ratio of consultations per doctor, there was a reduction of 19.3 % to less than 20 minutes of distance.

These results suggest that the Guillermo Kaelin polyclinic has made it possible to redistribute the workload of doctors in the Rebagliati network, especially in the nearest areas, which has improved the care capacity in the surrounding health facilities. The influence of this polyclinic extends to a radius of approximately 5.6 km, particularly benefiting other health facilities such as the Villa María polyclinic, the H. I Uldarico Rocca Fernández and the CAP III Los Próceres de San Juan de Miraflores.

For its part, the event study showed that the most notable impacts are observed in the number of policyholders assigned and consultations carried out, with statistically significant changes after the start of operations. However, policyholders/doctors ratios and consultations/doctors show less statistical significance. Specifically, the impact on the policyholders/doctors ratio is only visible from the second post-treatment period.

The Alberto Barton polyclinic has also had a significant impact on the decongestion of the Sabogal network's policyholders. The data reveal a significant decrease of 30.6 % in those establishments in the network located less than 25 minutes of distance, with no significant effect on those located more than 40 minutes of distance.

Regarding the decongestion of the consultations carried out, the Alberto Barton polyclinic has led to a 34.7 % reduction in the number of consultations in the establishments to less than 20 minutes. No significant changes were found in the areas located after 25 minutes. The ratio of policyholders per doctor also showed significant decreases, showing a 28.4 % reduction in polyclinics to less than 25 minutes of distance. The ratio of consultations per doctor was also reduced by 30.5 % at less than 20 minutes of distance.

In summary, the results reflect that the Alberto Barton polyclinic has been effective in improving the capacity of care in the health facilities of the Sabogal network, promoting, especially in nearby areas, a more equitable redistribution of the doctors' workload. The influence of this polyclinic covers a radius of approximately 7.1 km, benefiting facilities such as CAP III Bellavista, CAP III Metropolitano Callao, H. I Octavio Mongrut Muñoz and CAP III Luis Negreiros Vega.

In the study of events, it was found that the most significant impacts were observed in the number of policyholders and consultations. It is important to note that this event study presents wider confidence intervals in the estimated points compared to the event study carried out for the Guillermo Kaelin polyclinic, which is due to the smaller number of health facilities considered in the Sabogal network.

This research constitutes a significant contribution to the empirical literature, since it allows us to quantify, using the difference-in-differences method, the impact of the Guillermo Kaelin and Alberto Barton polyclinics as part of the hospital complexes of the same name concessioned through the PPP mechanism, on the decongestion of public health services in other existing health facilities. In addition, it is the first study in Peru that uses a causal inference approach to evaluate the effects of public-private partnerships in the health sector. It also discusses how, as a result of the decongestion generated by PPPs in health, improvements in the satisfaction of EsSalud policyholders can be generated.

The findings of this study open the possibility of continuing research in the Health sector. For example, one could analyze how beneficial the use of a PPP is in this area, compared to traditional public works or other mechanisms, such as the Government-to-Government model. It would also be useful to have information on the direct beneficiaries of the project, mainly associated with the perception of the quality of services; therefore, it is recommended that the competent authorities collect statistical information, from the project design stage, that can serve as a baseline to assess the impact on the level of user satisfaction when using the health PPP.

The results of this research have shown a positive impact after the implementation of the concessions, which has significantly contributed to the decongestion of the other health facilities belonging to the Sabogal and Rebagliati networks. These concessions proved effective in relieving pressure on EsSalud by decongesting existing health facilities, thereby improving access, efficiency and quality of services for policyholders. Therefore, in order to continue closing the gaps in health coverage and quality, it is recommended that the State, through ProInversión, continue to promote projects with the participation of private investment through concessions within the framework of PPPs, since, by combining the strengths of the public and private sectors, they allow to increase the efficiency of health services.

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