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THE REPEAL OF MEXICO'S SEGURO POPULAR AND ITS POTENTIAL IMPACT ON INFANT MORTALITY

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INTRODUCTION

Universal health coverage (UHC) aims to provide the full continuum of essential health services without financial hardship.[1] Its effectiveness can be evaluated using the World Health Organization (WHO) and World Bank framework, which defines effective coverage as a single metric encompassing need, use, and quality, representing the fraction of "total potential health gains actually delivered relative to what a health system could have theoretically delivered."[2,3] Each country's approach to achieving UHC reflects distinct priorities. In Mexico, the introduction of *Seguro Popular* was a response to the pressing issues of catastrophic health expenditures and high out-of-pocket payments, particularly among poor and informal sector workers who lacked access to comprehensive health insurance.[4,5] Furthermore, Mexico's persistent underperformance on maternal and child health indicators compared to other Organisation for Economic Co-operation and Development (OECD) countries in the decades leading up to *Seguro Popular's* inception motivated the program's focus on these areas.[4]

Seguro Popular was designed as a voluntary public health insurance program for individuals and families who lacked employer-sponsored insurance.[4] By 2018, fifty million Mexicans were enrolled in *Seguro Popular,* with important strides made in out-of-pocket expenditures as well as in actual health outcomes.[6] Notably, between 2000 and 2018, infant mortality decreased by half, largely due to government investments in quality health facilities and expanded access to obstetric care.[7–9] However, budget constraints and limited reforms since 2013 reduced its effective coverage, as enrollees faced medication shortages and rising out-of-pocket costs.[7,10,11] Despite the government's 2012 declaration of achieving UHC, these challenges highlighted gaps in health care delivery.[12] In 2020, President Andrés Manuel López Obrador replaced *Seguro Popular* with the Health Institute for Wellbeing (*INSABI*), an institution

lacking adequate guidance, investment, and infrastructure, leaving the Mexican health care system ill-prepared to face the challenges of the COVID-19 pandemic.[7]

This study examines the immediate impact of *Seguro Popular's* repeal on infant mortality. We leverage a natural experiment arising from the unexpected repeal of *Seguro Popular* in which we compare municipalities with high and low losses in public coverage[1] after the program's repeal. The loss of public insurance is calculated as the difference between (1) the average pre-repeal public insurance enrollment rate at birth during the period when the Mexican government declared UHC had been achieved (2012-2019) and (2) the average post-repeal public insurance enrollment rate at birth following the repeal of *Seguro Popular* until the end of our study period (2020-2022). Our study population is limited to uninsured infants and infants enrolled in *Seguro Popular* or its replacement, INSABI; that is, two comparable populations from the same underlying pool of potential beneficiaries. Our hypothesis posits that municipalities with greater coverage losses experienced higher infant mortality rates. A difference-in-differences model is used to estimate the differential impact, controlling for regional variations.

The analysis uses INEGI's full registry data for births and deaths (2012–2022), the most reliable source of birth and death information in Mexico due to its high accuracy and municipality-level registration. Official COVID-19 data is used to isolate the repeal's impact from pandemic-related mortality, while official Census data provide additional municipality characteristics, such as the concentration of indigenous populations.

Our findings reveal a statistically significant increase of approximately 13 infant deaths per 1,000 births in municipalities with higher public insurance losses, corresponding to a 50.35% increase in mortality from a baseline rate of 25.84. These results confirm the hypothesis that the abrupt repeal of *Seguro Popular* disproportionately affected municipalities relying heavily on its

[1] Public health insurance is defined as government-provided *Seguro Popular* or *INSABI* in the context of this paper.

coverage. The study highlights the critical importance of maintaining stability in health coverage systems during major policy transitions to avoid adverse health outcomes.

Contributions of this paper

This research contributes to the literature on *Seguro Popular* by quantifying the short-run impact of its repeal on infant mortality, isolating it from confounding factors like COVID-19. Our findings highlight the critical need for deliberate economic planning and policy design to ensure stability during health care transitions, particularly for vulnerable populations. This paper does not critique centralized health systems per se, which may well be an appropriate policy direction for Mexico. Instead, we focus on how the abrupt replacement of *Seguro Popular*, coupled with insufficient planning, impacted health outcomes.

Using accurate, official data on infant mortality, this paper examines how the repeal influenced outcomes in municipalities with larger public insurance losses compared to those with smaller losses. Our analysis rigorously tests the extent to which the abrupt repeal of *Seguro Popular* increased infant mortality rates in municipalities experiencing greater reductions in public insurance enrollment. By exploring this relationship, we aim to shed light on the broader implications of rapid, unplanned health care policy changes on infant health outcomes in Mexico and similar contexts in Latin America and elsewhere.

BACKGROUND

Mexico's introduction of *Seguro Popular* in 2003 marked a pivotal reform in addressing the country's health care challenges, particularly catastrophic health spending and excessive out-of-pocket health expenditures (OOPE).[13,14] This voluntary public health insurance program targeted uninsured populations, including the poor and informal-sector workers.[13,14] By 2005, *Seguro Popular* had been implemented across all 32 Mexican states, offering an ambitious

pathway toward UHC.[15,16] While its establishment was heralded as a significant step, challenges in implementation raised questions about its effectiveness.

In 2012, the Mexican government declared UHC for "catastrophic and impoverishing health expenditures" had been achieved, yet the program faced persistent barriers in delivering accessible and affordable care.[10,12] Rising out-of-pocket costs, particularly for medications, coupled with budgetary constraints disrupted the public procurement of medications, leading to medication shortages.[10,17] As a result, many enrollees turned to the private sector for essential medicines at higher out-of-pocket costs.[10,17] This shift not only placed additional financial strain on vulnerable populations but also undermined the program's objectives of reducing economic barriers to healthcare.

Despite having a lower probability of incurring OOPE compared to uninsured households (49.4% vs. 56%), *Seguro Popular* enrollees still faced significant economic strain.[18] Wirtz et al. found that spending on medications accounted for 72% of total health expenditures, which was higher than households with other types of health insurance programs in Mexico, such as Social Security (65%).[18] The program's inability to adequately fund and manage medication procurement highlighted systemic challenges in Mexico's healthcare financing and governance. These shortcomings contributed to a perception of inequity and inefficiency, as many households continued to experience financial hardship despite their enrollment in *Seguro Popular*.

Nevertheless, *Seguro Popular* achieved notable success in reducing catastrophic health expenditures and OOPE compared to the period before its inception.[14] Knaul et al. found that three characteristics were significantly associated with decreased household catastrophic health expenditures under the program: being among the lowest quintiles of household income, being a female head-of-household, and the presence of a household member receiving medical care within the past year.[19] Similarly, Sosa-Rubí et al. found that between 2005 and 2008, *Seguro*

Popular had a protective effect against catastrophic health expenditures and OOPE for outpatient and inpatient care in rural areas, as well as for out-of-pocket health payments for outpatient care in urban areas.[20] *Seguro Popular* demonstrated positive impacts on reducing financial hardship associated with medical care highlighted the program's role as a crucial, albeit imperfect, step toward equitable healthcare in Mexico.

Seguro Popular and Infant Mortality

A primary objective of *Seguro Popular* was to address high infant mortality rates and persistent underperformance on maternal and child health indicators. The program aimed to enhance access to quality obstetric care by allocating funding to upgrade health care infrastructure and services.[8] One important initiative was the establishment of accredited *Seguro Popular* health care facilities, which incentivized health care providers to elevate their standards of care in order to qualify for inclusion in the *Seguro Popular* network.[8] The deployment of mobile clinics further expanded access to obstetric services in underserved areas, particularly rural areas.[8]

Evidence underscores the program's impact on reducing infant mortality. Knaul et al. found that between 2000 and 2018, infant mortality in Mexico decreased by half.[7] Pfutze found that Mexico's infant mortality rate decreased from 38.1 per one thousand live births in 1990 to 13.4 in 2011, with its sharpest decrease in 2011.[9] Conti et al. found that the decline in the infant mortality rate due to *Seguro Popular* closed nearly the infant mortality rate gap between poor and rich municipalities, driving a statistically significant 10% reduction in infant mortality in poorer areas.[5] Pfutze attributed this sharp decline of infant mortality in 2011 to *Seguro Popular's* coverage during the prenatal period, reinforcing the program's role in addressing disparities during critical period of maternal and child health.[9] Conti et al. further found that *Seguro Popular* contributed to reductions in deaths from preventable and communicable conditions,

perinatal conditions, and congenital malformations.[5] The program's strategic investments in obstetric care infrastructure, the accreditation of health care facilities, and the deployment of mobile clinics collectively contributed to a significant reduction in infant mortality rates.

The Repeal of Seguro Popular in December 2019

The repeal of *Seguro Popular* stemmed from concerns over mismanagement, characterized by a lack of transparency and practices of "negligent expenditures, fraud, corruption, non-legitimate expenses, and price fixing."[21] Additionally, *Seguro Popular's* limited budget for public procurement of essential medications in its latter years contributed again to OOPE, creating renewed financial risk for many Mexican households.[14]

These issues motivated President Andrés Manuel López Obrador (commonly referred to as AMLO) to repeal *Seguro Popular* and replace it with the Health Institute for Wellbeing (*INSABI*) in an effort to centralize Mexico's health care system.[22] However, this centralization effort created significant disruptions in health care as there was little to no planning for how to replace *Seguro Popular*, particularly on the eve of the COVID-19 pandemic,[23] and there was inadequate investment into the new health care system that upended *Seguro Popular*.[22] Despite AMLO's assurances that *INSABI* would eliminate OOPE for public hospitals and clinics as well as cover medications, many Mexicans continued to face high costs and medication shortages.[22]

The termination of *Seguro Popular*'s centralized medication procurement system compounded financial burdens for Mexican households.[10] Under *Seguro Popular*, the bulk purchasing of medications allowed for significant cost savings, which helped shield many families from exorbitant pharmaceutical prices.[10] However, with the program's repeal, these procurement agreements were dismantled, leading to fragmented purchasing practices across states and healthcare facilities.[10] This fragmentation resulted in inefficiencies, higher costs for medications, and widespread shortages. Consequently, many families faced increased OOPE as

they were forced to pay for medications privately or forego treatment altogether, exacerbating financial strain and reducing access to essential care.[10] Overall, the repeal of *Seguro Popular* was associated with delayed medical care, increased out-of-pocket expenses, and worsened shortages in medication.[6]

Criticism of *INSABI's* rollout intensified as the lack of clear guidance became an impediment for those seeking health coverage. In response, both chambers of Mexico's Congress voted to repeal *INSABI* and reassigned the responsibility of health care delivery to the Mexican Social Security Institute (IMSS).[24] This restructuring introduced further uncertainty, contributing to a 16.8% decline in health insurance coverage in 2020.[6]

The dismantling of *Seguro Popular* raises critical questions about the continuity of funding structures for obstetric care and other essential services. As IMSS assumes greater responsibility for health care provision, the long-term implications for maternal and infant health outcomes remain unclear. Understanding how these shifts impact accessibility, quality, and financial protection for vulnerable populations will be essential for evaluating Mexico's evolving healthcare landscape.

THEORETICAL CONSIDERATIONS

Our hypotheses are based on economic reform theories that are debated in terms of their implementation strategy: gradualism (incremental changes) versus radicalism (rapid and comprehensive changes). These two approaches differ in their theoretical justifications, policy trade-offs, and empirical outcomes. First, there is historical evidence of the impact of radical reform. Acemoglu et al. (2011), for example, analyze the French Revolution as a case of radical reform, showing that while radical changes disrupted existing institutional structures, they also paved the way for long-term economic modernization. However, the short-term consequences included significant political and social instability, which underscores the risks of sweeping

changes. Second, there are theoretical perspectives on transition speed. Arrow (2000) explores the trade-offs between the speed and scope of reforms. Arrow emphasizes that faster reforms can eliminate inefficiencies more quickly but may overburden institutional capacities, increasing the risk of failure. Gradualism, on the other hand, can allow for adaptive learning and smoother transitions though it risks entrenching vested interests. Third, the econometric literature summarized in Babecký and Campos (2011), suggests a reform–growth nexus, revealing that the relationship is context-dependent. Their findings show that while radical reforms can yield significant growth dividends in favorable institutional environments, gradual reforms may be more effective in politically fragile contexts. More generally, Blanchard and Kremer (1997) highlight the risks of "disorganization" in radical reforms. Rapid changes can disrupt existing production networks and create coordination failures, leading to inefficiencies and output losses. This underscores the importance of maintaining some continuity during transitions. Finally, Dewatripont and Roland (1995) model the design of reform packages under uncertainty, arguing that gradual reforms reduce uncertainty and allow for mid-course corrections. They suggest that when the outcomes of reforms are highly uncertain, gradualism is preferable because it enables policymakers to build credibility and adapt to new information. In conclusion, the choice between gradualism and radicalism depends on contextual factors such as institutional capacity, political stability, and economic conditions. Hybrid approaches that combine elements of both strategies may offer an optimal path for achieving sustainable reforms.

IDENTIFICATION STRATEGY

This study exploits a natural experiment generated by the unexpected (i.e., radical) repeal of *Seguro Popular*, leveraging variation in public insurance loss across municipalities. We focus on uninsured infants and those enrolled in publicly provided health insurance (*Seguro Popular* or *INSABI*), drawing from the same underlying pool of potential beneficiaries. Formerly

publicly-insured infants serve as the intervention group, while uninsured infants represent the counterfactual—what would have occurred in the absence of government-provided health coverage and unexpected withdrawal of such coverage.

Our primary intervention of interest is the transition from *Seguro Popular* to *INSABI*, representing the loss of a structured public insurance program. We estimate the effect of this transition on infant mortality rates per 1,000 live births using a difference-in-differences (DiD) framework, contrasting municipalities with substantial public insurance loss (high-SP-loss municipalities) against those with limited prior *Seguro Popular* enrollment (low-SP-loss municipalities), thus experiencing minimal changes in coverage.

This approach mirrors the dose-response design employed by Aizer et al. (2024)[25] and draws on methodologies pioneered by Card and Krueger (1993)[26], where policy impact is evaluated by exposure intensity. The dose—measured by the magnitude of public insurance loss—captures heterogeneity in policy effects, allowing us to estimate the differential impact on infant mortality. Public insurance loss is quantified as the difference between (1) the time-weighted average pre-repeal public insurance enrollment rate at birth during the period when the Mexican government declared universal health coverage had been achieved (2012-2019), with larger weights assigned to years closer to the repeal and (2) the average post-repeal public insurance enrollment rate at birth following the repeal of *Seguro Popular* until the end of our study period (2020-2022). Municipalities in the top decile of public insurance loss constitute the treated group, representing areas experiencing the most pronounced declines in coverage. These municipalities provide a strong test of policy exposure effects. Municipalities with minimal changes in public insurance enrollment serve as the control group, under the assumption that limited *Seguro Popular* coverage prior to repeal insulated them from the full impact of the repeal and subsequent transition to *INSABI*.

This identification strategy rests on the premise that municipalities with low baseline *Seguro Popular* enrollment are less sensitive to the repeal's effects, isolating the causal impact of public insurance loss on infant mortality. By exploiting spatial variation in coverage loss, our approach captures the distributional consequences of policy reform, highlighting the differential burden borne by high-SP-loss municipalities.

Two-Way Fixed Effects Approach

To estimate the impact of the repeal of *Seguro Popular* on the infant mortality rate per 1,000 births per year, we implement a two-way fixed-effects model, leveraging panel data from 2012-2022. The following baseline equation is specified:

$$(1)\ Y_{mt} = \beta\, HighSP_{mt} + \alpha_m + \tau_t + \varepsilon_{mt}$$

where each observation corresponds to a municipality-year cell with *m* indexing municipality and *t* year. The dependent variable Y_{mt} represents the municipality-level infant mortality rate per 1000 births per year, derived from INEGI data. The variable $HighSP_{mt}$, through the coefficient β , captures the effect of the repeal of *Seguro Popular* on high SP loss municipalities. The model includes municipality fixed effects α_m to control for time-invariant characteristics specific to each municipality and year fixed effects τ_t to account for national trends that could affect all municipalities simultaneously, such as macroeconomic shocks. The error term is denoted by ε_{mt}. This identification strategy estimates the causal effect of the *Seguro Popular* repeal by comparing the differential changes in infant mortality rates between municipalities that experienced a significant loss in public insurance coverage (high-SP-loss municipalities) and those that experienced minimal loss (low-SP-loss municipalities). By including both municipality and year fixed effects, we control for both time-invariant heterogeneity across municipalities and common temporal shocks affecting all municipalities.

Our research design also accounts for the potential confounding effect of COVID-19 on infant mortality during the period 2020–2022. We find no statistically significant differences in COVID-19-related infant deaths between the treatment and control groups, suggesting that the repeal's effects on infant mortality can be distinguished from the pandemic's impact. The inclusion of municipality fixed effects ensures that any time-invariant factors, including the pandemic, are accounted for, thereby strengthening the validity of our estimates of the repeal's impact.

A key assumption in difference-in-differences (DiD) analysis is the parallel trends assumption, which posits that, in the absence of treatment, the treated and control groups would have followed parallel paths over time.[27,28] A violation of this assumption could lead to biased estimates of the policy's effect.[27,28] To test the validity of the parallel trends assumption, we conduct an event study and graphical diagnostics, examining trends in annual infant mortality rates between high-SP-loss and low-SP-loss municipalities from 2012 to 2019, before the repeal of *Seguro Popular*. Our results show that the trends in infant mortality rates were parallel in the pre-treatment period, suggesting that in the absence of the policy change, both groups would have experienced similar trends in infant mortality. This provides strong support for the validity of our DiD estimation approach.

DATA

This analysis employs three primary data sources to investigate the impact of the repeal of *Seguro Popular* on infant mortality rates: (1) INEGI Birth and Registry Data (2012-2022), (2) COVID-19 Data from Mexico's Secretary of Health (2020-2022), and (3) Official Census Data (2015).[29–31] These datasets are selected for their comprehensiveness, reliability, and relevance to understanding the demographic and health dynamics underlying our analysis.

INEGI Birth and Registry Data provides detailed municipality-level records of births and infant deaths, serving as the primary source for constructing the dependent variable, infant mortality rate. The dataset includes individual-level records aggregated by municipality and year, categorizing births and deaths by insurance status. Our analysis focuses on infants with either no insurance or public insurance. Infant mortality rates are calculated as the number of deaths among infants under one year of age per 1,000 live births. Observations missing municipality information are excluded to maintain data accuracy and integrity.

COVID-19 Data from Mexico's Secretary of Health is utilized to assess potential confounding effects of the COVID-19 pandemic on infant mortality rates during the study period. This dataset includes individual-level variables such as age, sex, municipality of residence, and indigenous status. We merge these data with INEGI records at the municipality-year level to control for pandemic-related mortality patterns and to isolate the causal effect of the *Seguro Popular* repeal.

Census Data from IPUMS International (2015) supplements the analysis by providing demographic and socio-economic characteristics at the municipality level, including indicators of indigenous population concentration, income levels, and urbanization. These control variables contextualize the socio-demographic environment in which *Seguro Popular* operated and help account for heterogeneity in municipalities' baseline characteristics and responses to policy changes.

By integrating these data sources, we construct a robust panel dataset that enables us to measure variations in infant mortality rates across municipalities over time and to explore heterogeneities in treatment effects based on demographic and socio-economic characteristics. This approach ensures that our analysis is grounded in comprehensive and high-quality data, enhancing the validity of our findings.

RESULTS

Summary Statistics

The dataset comprises 2,486 Mexican municipalities, with an average of approximately 18,000 infant deaths annually among uninsured or *Seguro Popular*-enrolled infants. *Seguro Popular*, a public insurance program targeting vulnerable populations, substantially reduced the proportion of uninsured infant deaths from 60% in its early implementation to approximately 20% during its peak coverage years. However, following its repeal in late 2019, the proportion of uninsured infant deaths surged to nearly 50% (**Figure 1**), reflecting a marked reversal of prior coverage gains.

To evaluate the impact of the repeal, we categorize municipalities into high-SP-loss (treated) and low-SP-loss (control) groups based on the magnitude of changes in public insurance coverage. The treated group consists of 242 municipalities with the highest declines in public insurance enrollment, while the control group includes 119 municipalities with minimal declines (**Table 1**).

Table 1 presents key summary statistics for the pre-repeal (2012–2019) and post-repeal (2020–2022) periods. Before the repeal, public insurance enrollment was significantly higher in high-SP-loss municipalities compared to low-SP-loss municipalities (91% vs. 62%, $p < 0.001$), reflecting *Seguro Popular's* success in expanding coverage. Following the repeal, public insurance enrollment fell sharply in both groups but was disproportionately reduced in high-SP-loss municipalities (5% vs. 17%, $p < 0.001$).

In terms of demographic characteristics, high-SP-loss municipalities were more rural and had a higher concentration of indigenous populations compared to their low-SP-loss counterparts. Before the repeal, rurality was 61% in high-SP-loss municipalities versus 54% in low-SP-loss municipalities (**$p < 0.001$**). Similarly, the concentration of indigenous populations

was higher in high-SP-loss municipalities (51% vs. 40%, **p < 0.001**). These differences persisted in the post-repeal period, underscoring the socio-demographic disparities between treated and control groups.

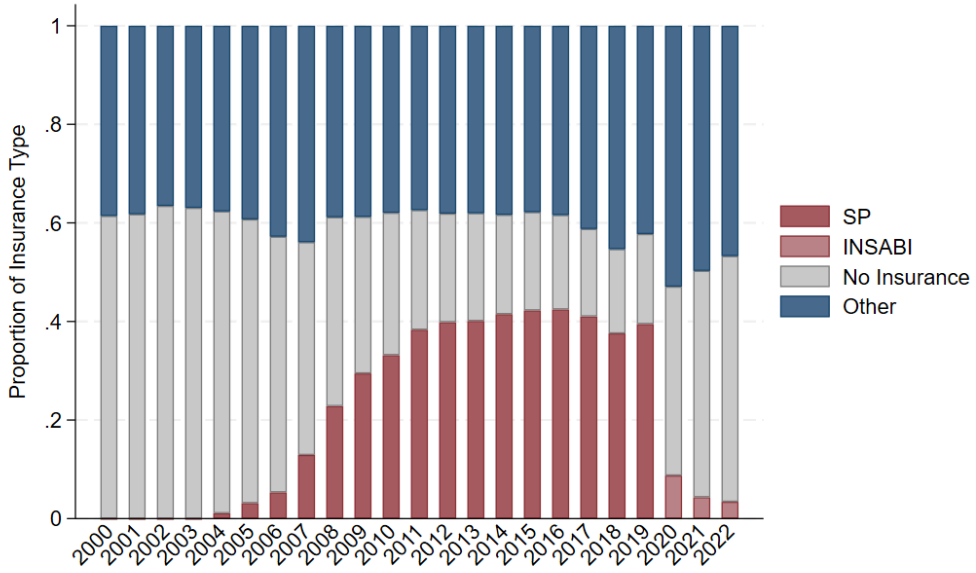
To ensure that the observed effects are attributable to the repeal of *Seguro Popular* and not confounded by the COVID-19 pandemic, we examine COVID-19-related infant mortality rates per 1,000 births during 2020–2022. The analysis reveals no statistically significant differences between high-SP-loss and low-SP-loss municipalities (0.23 vs. 0.27, p = 0.759). This suggests that the pandemic's impact on infant mortality was comparable across both groups, supporting the validity of our identification strategy.

Table 1: Summary Statistics

	Pre-Repeal 2012-2019			**Post-Repeal 2020-2022**		
	Low SP Loss	High SP Loss	Test	Low SP Loss	High SP Loss	Test
Number of Municipalities	119	242		119	242	
Public Insurance Enrollment (%)	0.62 (0.23)	0.91 (0.12)	<0.001	0.17 (0.19)	0.05 (0.07)	<0.001
Rurality (%)	0.54 (0.42)	0.61 (0.39)	<0.001	0.49 (0.44)	0.60 (0.41)	<0.001
Indigenous Population (%)	0.40 (0.34)	0.51 (0.35)	<0.001	0.39 (0.34)	0.49 (0.35)	0.003
COVID-19 Infant Deaths Per 1000 Births	—	—	—	0.27 (1.21)	0.23 (1.68)	0.759

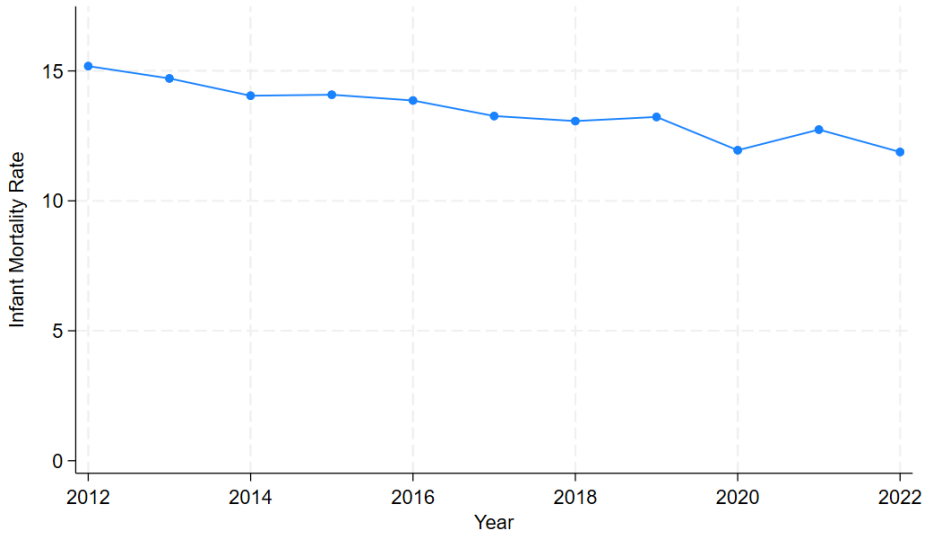
Notes: Mean (standard deviation) values are presented. High-SP-loss municipalities experienced the most significant reductions in public insurance coverage following the repeal of *Seguro Popular*, while low-SP-loss municipalities experienced minimal changes. Data are drawn from INEGI mortality registry records, COVID-19 data from Mexico's Secretary of Health, and Official Census data.

Figure 1: Proportion of Total Infant Deaths, by Insurance Type



Notes: *Seguro Popular* (2003–2019) and *INSABI* (2020–2023) represent the primary public health insurance programs examined in this study. During *Seguro Popular's* tenure, the proportion of uninsured infant deaths decreased by approximately 40 percentage points, reflecting the program's significant impact on expanding coverage among vulnerable populations. However, as *Seguro Popular* operated on a voluntary enrollment basis, uninsurance persisted throughout its implementation, as evidenced by the proportions of uninsured births and deaths recorded in the data. Data are drawn from INEGI mortality registry records, and Official Census data.

Figure 2: Trends in Infant Mortality Rates (Per 1000 Live Births) in Mexico (2012–2022)



Notes: The infant mortality rate per 1,000 live births in Mexico steadily declined during the tenure of *Seguro Popular*, reflecting improvements in healthcare access and outcomes. This downward trend persisted across all insurance types, highlighting broader health system advancements. Data are drawn from INEGI mortality registry records, and Official Census data.

Parallel Pre-Trends

A critical assumption for the validity of our difference-in-differences (DiD) framework is that, in the absence of the repeal of *Seguro Popular*, high-SP-loss and low-SP-loss municipalities would have exhibited parallel trends in infant mortality rates per 1,000 births. To assess this assumption, we first visually examine the trends in infant mortality rates during the pre-repeal period (2012–2019) for both groups (**Figure 3**). The plotted trends indicate a high degree of similarity across the two groups prior to the policy change, suggesting no substantial divergence in outcomes that might undermine the validity of the DiD approach.

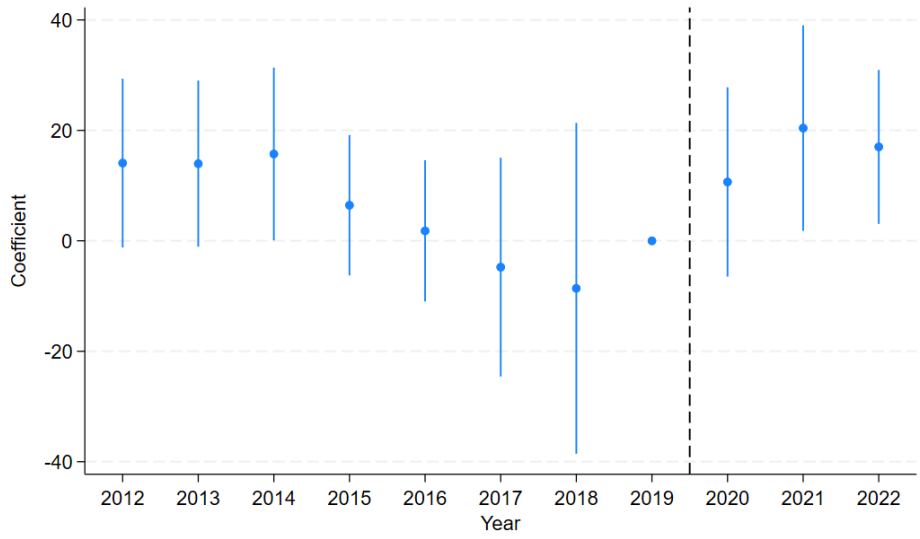
To formally test the parallel trends assumption, we estimate the following event study regression model for the pre-repeal period:

$$(2) \qquad Y_{mt} = \alpha + \sum_{t \neq 2019} \beta_t Treat_m \cdot Year_t + \mu_m + \lambda_t + \epsilon_{mt}$$

where Y_{mt} represents the infant mortality rate per 1,000 births for municipality m in year t. The terms μ_m and λ_t denote municipality and year fixed effects, respectively, and $Treat_m \cdot Year_t$ captures the interaction of treatment group status with pre-repeal year indicators. Under the parallel trends assumption, the coefficients in vector β_t for all pre-repeal years should not be statistically significant, reflecting no differential trends between high-SP-loss and low-SP-loss municipalities before the repeal.

The results of this formal test confirm the absence of statistically significant differences in trends between high-SP-loss and low-SP-loss municipalities during the pre-repeal period. These findings validate the parallel trends assumption and provide confidence in the robustness of our difference-in-differences identification strategy.

Figure 3: Parallel Trends Analysis of Infant Mortality Rates



Notes: The treated group comprises Mexican municipalities experiencing greater public insurance coverage loss at birth after the repeal of *Seguro Popular*, while the control group includes municipalities with smaller coverage losses. The trends in the beta coefficients from estimating Eq. (2) demonstrate pre-repeal similarities in infant mortality rates between the two groups, supporting the validity of the parallel trends assumption.

Difference-in-Differences Results

Our difference-in-differences analysis evaluates the impact of the *Seguro Popular* repeal on infant mortality rates per 1,000 births, comparing high-SP-loss and low-SP-loss municipalities. As hypothesized, the results (of coefficient β in eq. 1) indicate a statistically significant increase in infant mortality rates of approximately 13 additional deaths per 1,000 births in high-SP-loss municipalities compared to low-SP-loss municipalities following the repeal (p=0.027) (**Table 2**).

This effect represents a 50.35% increase in mortality relative to the pre-repeal mean of 25.84 deaths per 1,000 births in high SP loss municipalities (**Table 2**). These findings underscore a sharp reversal in the declining trend of infant mortality rates, highlighting the substantial negative impact of *Seguro Popular's* repeal on infant health outcomes.

Table 2: Difference-in-Differences Model

	Infant Mortality Rate Per 1000 Births
Mean in high SP municipalities, pre-repeal	25.84
Seguro Popular Repeal Effect	13.01** (5.851)
Observations (Municipalities/Year)	361
% increase relative to mean in high SP municipalities	50.35%

Notes: Robust standard errors clustered at the municipality level are reported in parentheses.
*** p<0.01, ** p<0.05, * p<0.1
DiD regression [from eq. (1)] controls for municipality and year fixed effects.

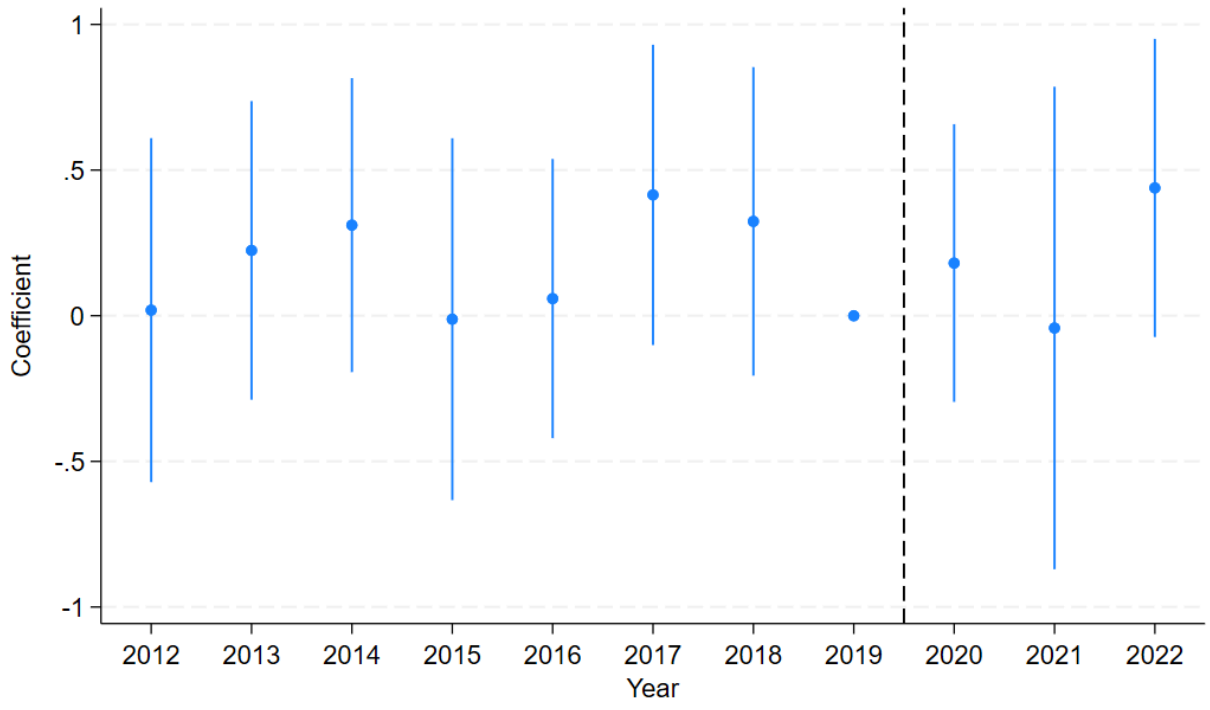
Sensitivity Analyses

To ensure the robustness of our findings, we conduct a placebo sensitivity analysis using infant mortality rates due to car accidents, a cause of death that is plausibly unrelated to the repeal of *Seguro Popular*. This approach helps to rule out spurious correlations driving the observed effects on overall infant mortality rates.

Figure 4 displays the results of the event study for this placebo outcome using the same specification as in Eq. (2), but substituting car-accident infant mortality instead of general infant mortality as the independent variable. Consistent with our expectations, we find no statistically significant differences in car accident-related infant mortality rates between high-SP-loss and low-SP-loss municipalities during the pre- or post-repeal periods. The coefficients remain small in magnitude and statistically indistinguishable from zero across all years.

These findings bolster the validity of our main results by demonstrating that the observed increase in infant mortality is unlikely to be driven by unrelated trends or unobserved confounders. Instead, the evidence strongly supports a causal relationship between the repeal of Seguro Popular and the deterioration in infant health outcomes.

Figure 4: Sensitivity Analysis: Event Study of Infant Mortality Due to Car Accidents as a Placebo Outcome



Notes: Event study estimates of infant mortality due to car accidents, used as a placebo outcome to test the robustness of the main results. The coefficients represent the differences in car accident-related infant mortality rates between high-SP-loss and low-SP-loss municipalities relative to the repeal of *Seguro Popular*. All beta coefficients [from Eq. (2) using car-accident infant mortality as the dependent variable] are statistically indistinguishable from zero, indicating no significant pre- or post-repeal differences. This finding supports the validity of the main results by

ruling out unrelated trends or unobserved confounders as drivers of the observed effects on overall infant mortality rates.

DISCUSSION

Previous studies have shown that *Seguro Popular* played a critical role in improving access to obstetric care and reducing infant mortality in Mexico. We build on this literature by providing evidence on the immediate effects of its repeal. Our findings demonstrate that the abrupt removal of *Seguro Popular* led to a differential increase in infant mortality rates in municipalities that experienced a substantial loss in public insurance enrollment. This underscores the crucial role that stable public health insurance programs play in protecting infant health, particularly in vulnerable populations.

Our difference-in-differences analysis reveals that municipalities with high losses of public insurance coverage saw approximately 13 additional infant deaths per 1,000 births compared to municipalities with lower losses, representing a 50.35% increase in infant mortality from a pre-repeal base rate of 25.84 deaths per 1,000 births. These results reflect a sharp reversal of the progress made under *Seguro Popular*, indicating that its repeal had dire consequences for infant health outcomes. The magnitude of this effect highlights the importance of consistent access to health care services, as disruptions can have immediate and devastating impacts on vulnerable populations.

The policy implications of these findings are clear: abrupt and poorly planned health policy transitions can lead to significant health crises. The transition from *Seguro Popular* to *INSABI* was marked by a lack of forethought and preparedness, exacerbating issues such as out-of-pocket costs, medication shortages, and broader health system disorganization. This uncoordinated centralization effort left gaps in the public health infrastructure, undermining efforts to protect infant health. Policymakers must ensure that future health system reforms build upon existing infrastructure rather than dismantling it without adequate transitional planning.

Incorporating the logistical frameworks of *Seguro Popular* into future reforms could help mitigate the adverse health impacts observed in this study.

Our findings contribute to a growing body of evidence on the adverse health effects of policy uncertainty and poorly implemented transitions. They emphasize the need for gradual, well-communicated policy changes that prioritize the continuity of care for vulnerable populations. As seen in other contexts, such as the abrupt closure of rural hospitals in the United States, sudden disruptions in health services can lead to reduced access to care and worsened health outcomes. The case of *Seguro Popular's* repeal serves as a cautionary tale, highlighting the risks of policy reversals without adequate preparation and safeguards.

Notably, our analysis focused on the immediate period following the policy change, potentially limiting a comprehensive understanding of the long-term impact of the repeal of *Seguro Popular*. A more extended observation period may yield additional insights into the ongoing health outcomes stemming from this policy shift. Future research could explore whether municipalities that experienced higher infant mortality rates post-repeal have been able to recover as *INSABI's* repeal stabilized or if the negative trends have persisted.

Additionally, the repeal of *INSABI* in 2023 and its replacement with a new health system may introduce further instability into Mexico's public health infrastructure. This continuous policy churn highlights the importance of institutional memory and robust transitional mechanisms to avoid exacerbating health disparities. Future studies should investigate the compounded effects of these successive policy changes on maternal and infant health, particularly during periods of global and national crises such as the COVID-19 pandemic.

The findings of this study also raise important questions about equity. Municipalities with higher losses of public insurance coverage are likely to have had more limited health care access and resources even prior to the repeal, exacerbating pre-existing inequalities. Our results suggest

that the repeal disproportionately affected regions with fewer safety nets, amplifying disparities in infant health outcomes. Targeted policies aimed at supporting these vulnerable regions could play a critical role in mitigating the adverse effects of future health system changes.

In conclusion, this study highlights the critical role of stable public health insurance programs in protecting infant health and underscores the dangers of abrupt health policy transitions. The repeal of *Seguro Popular* serves as a stark reminder of the human costs of policy decisions, particularly for the most vulnerable populations. Future reforms should prioritize continuity, equity, and resilience to ensure that health systems can adapt to challenges without sacrificing progress in public health outcomes.

Future Research

Further research should evaluate the long-term impacts of *Seguro Popular's* repeal and subsequent health system transitions, including the dissolution of *INSABI* in 2023. Specifically, studies could assess whether municipalities with higher infant mortality rates post-repeal have shown signs of recovery under the new health system, or if disparities persist.

Investigating the role of Mexico's *Instituto Mexicano del Seguro Social (IMSS)* in stabilizing public health insurance is another key area for exploration. Research should examine whether *IMSS* has effectively addressed gaps in service delivery, particularly in rural and high-SP-loss municipalities. Understanding how obstetric care infrastructure has transitioned across reforms will also provide valuable insights into the broader impacts on maternal and infant health.

Additionally, maternal mortality rates, a sensitive indicator of health system performance, should be explored in the context of medication shortages, clinical care gaps, and equity concerns. These studies could contribute to a comprehensive understanding of how abrupt policy

changes affect vulnerable populations and provide lessons for designing resilient health systems globally.

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