Mortality Impact of Chile’s Explicit Health Guarantees (GES) Insurance Reform

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Introduction

This research project analyzes the mortality effects of Chile’s 2005-2019 Explicit Health Guarantees (GES) insurance reform. GES added coverage for specific priority diagnoses that often require special care not previously insured for under the government’s universal health care policies. The initial expansion in 2005 covered 25 priority conditions, including high prevalence diagnoses amenable to mortality-averting health care treatment such as heart attacks, hypertension, and diabetes. Subsequent developments in 2006, 2007, 2010, 2013, and 2019 brought the total to 85 newly covered conditions of varying prevalence and amenability to care. In this project, I estimate the effect of GES on increased care utilization and potentially reduced cause-specific mortality plausibly related to the newly covered conditions. I also investigate the extent to which GES narrowed or exacerbated socioeconomic and geographic inequalities in these outcomes.

This research agenda is crucial to understanding how much Chile's innovative approach to expanding specialty care access could provide a model for other middle-income countries, as the international community prioritizes cost-effective reforms towards achieving universal health coverage (UHC). In 2015, United Nations member states agreed to work towards worldwide UHC by 2030 following the World Health Organization and others' argument that UHC progress leads to improvements in overall population health. UHC means that all individuals and communities receive the health services they need without suffering financial hardship; this requires implementing specific policies that emphasize care for women, adolescents, and other vulnerable populations (The Lancet. 2019). Countries have followed different paths to achieve this goal depending on their economic and historical contexts (Reich, M. R. et al., 2016). While there is evidence to suggest that UHC has a positive effect on health status, particularly for poor people, methodological constraints and lack of data have limited the availability of rigorous research on the impact of specific alternative reform ideas (Moreno-Serra, R., & Smith, P. C. 2012). Furthermore, analyses have generally focused on the extensive margin of expanding coverage to uninsured populations. However, less is known about the population-level health benefits as insurance generosity expands to include a broader array of more expensive specialty care.

Chile's health system presents a unique opportunity to study evidence related to the UHC initiative and its effects on health outcomes. Chile meets universal coverage criteria, but it is limited and different depending on the health care provision. The GES reform starting in 2005 is a novel effort to expand guaranteed access substantially, opportunity, quality, and financial coverage for additional enumerated health-related problems with high mortality and morbidity.

This research can provide evidence for other middle-income countries already covering most of the population but wanting to move towards more effective health care. This Chilean GES health insurance reform builds on a universal health plan which provides explicit healthcare guarantees to health-related problems with high mortality. Thus, it is not a health reform affecting the percent of the population insured but instead targets improved diagnosing and treating high mortality diseases.

My research will update and expand the current evidence on health outcomes and the impact of UHC progress in reducing health disparities. First, by evaluating high mortality diseases in this reform rather than focusing on just one and its impact on inequalities. Second, by contributing with causal evidence rather than associations to measure and improve health status resulting from this reform.

Research questions and hypotheses

This research aims to answer the following questions: (1) Does the provision of targeted health care reforms that guarantee access and coverage for specific conditions reduce mortality? (2) Does target health care reduce mortality disparities across the socioeconomic spectrum? (3) Does guarantee access: increase utilization, improve efficiency, and reduce socioeconomic disparities in treatment to care?

The hypotheses I plan to test are the following: (1) the reform will have a negative effect on mortality; the effect will be: (2A) strongest for lower and middle-income geographic areas, and (2B) with lower baseline access to care. In addition, there will be a: (3A) reduction in the time of in-hospital treatment or procedures; (3B) an increase in the surgery rate for health-related problems covered by the GES reform in the lower and middle-income geographic areas, and (3C) also for those insured in the public system.

Data

Death and Hospital Discharges administrative records

The primary mortality dataset I will use for this research is the individual-level deaths registry from the death certificates provided by The Department of Health Statistics and Information for 1997 - 2017. This dataset includes each individual’s cause of death, year of birth, sex, educational attainment, residence, and place of death (home or health care facility). Moreover, it includes health care facility location, urban/rural, and medical attention (yes or no) of each death in the country.

The secondary data contains patient-level records updated daily from 2001 to April 2020 for the entire health system. It includes the patient's treatment health facility (and its characteristics) and demographics such as year of birth, sex, nationality, race, place of residence. It also contains information on insurance coverage (public/private), health care facility identifier, health care facility location, and clinical data, such as derivation, duration in the hospital, admission, diagnosis, surgeries, procedures performed, and the condition's description at the moment of discharge.

Survey data: CASEN and EPS

Using the administrative sources above, I plan to use two of Chile’s most essential household surveys to analyze health-related outcomes that we cannot study. In addition, this dataset will allow me to study the mechanisms and behaviors connected to the GES reform.

ICD10 codes and amenable deaths

The GES plan established clinical guidelines with detailed procedures for detection, diagnosis, treatment, and follow-up for the health conditions covered by the plan. Therefore, we can classify each disease using the ICD 10 codes to evaluate the impact of the reform on those potentially preventable deaths given effective and timely health care. I will use the classification of amenable death by Tobias and Yeh (2008) and Nolte and Mcknee (2009). They identify 582 ICD10 codes at the chapter level, where 37% are found in the 3,582 different ICD10 codes in the death data. Amenable deaths represent 31% of the deaths in the period, and 31% of the ICD10 amenable codes are found under the GES classification.

Research design and methods

The implementation of the reform allows for a natural experiment or quasi-experimental research design by exploiting the variation in time of the inclusion of a group of diseases covered by the reform using a difference-in-differences model that compares mortality before and after the GES reform. Therefore, the study analyzes a change in policy that results in variation in health insurance coverage that is unrelated to unobservable characteristics that also determine health so that the causal effect of insurance on health can be isolated. The primary identification assumption is that in the absence of the reform, the trend in my outcome of interest (mortality or surgery rate) of these two groups of diseases (covered and not covered) would have evolved similarly, meaning that differences would have been constant between them. Thus, the implicit identifying assumptions there are: (1) fixed characteristics within diseases (not change over time) (2) time trends for deaths are the same for covered and not covered disease. These are usually understood as the common or parallel trends that allow us to recover the true parameter identifying the reform effect.

In 2x2 DiD, the first difference compares deaths before and after GES reform, while the second difference contrasts diseases covered at a given point in time with those that did not. In our setting, we want to exploit variation across conditions covered at different points in time by the GES reform. Therefore, the coefficient that comes from the two-way fixed effects (TWFE) estimator when there are more than two units and periods is not an easily interpretable parameter in the same manner. Furthermore, recent literature has now documented that this coefficient is, in fact, a weighted average of many different treatment effects and that these weights are often negative and non-intuitive.

The general specification we would like to estimate is the following differences in differences regression:

$$y_{dt} = \alpha_d + \gamma_t + \beta GES_{dt} + \epsilon_{dt}$$

Where y_{dt} is one of our outcomes of interest, associated with an ICD10 code d at time t. GES_{dt} is an indicator that equals one from the first time a disease is included in GES and onwards (note that in this setting, the control group consists of yet-to-be included and never-included diagnostics); α_d represent diseases fixed effects that control for unobservables specific to the diseases and γ_t are time-fixed effects to account for unobservable shocks specific to a period.

Turning to examine the dynamic effects of GES. We will estimate the following semi-parametric dynamic differences in differences model:

$$y_{dt} = \alpha_d + \gamma_t + x_{dt}'\theta + \sum_{k=\underline{C}}^{-2} \beta_k D_{dt}^k + \sum_{k=0}^{\overline{C}} \beta_k D_{dt}^k + \epsilon_{dt}$$

where $D_{dt}^k = 1\left[t = GES_d + k\right]$, and GES_d is the timing of inclusion of diagnostic d. D_{dt}^k is a dummy variable indicating that diagnostic d was included in GES, k periods ago (or will be included k periods ahead for negative values of k). Therefore, the β_k coefficients can be interpreted as the effect of GES on y_{dt} for each k period, relative to the date before the inclusion of d in GES. We normalize the coefficients such that $\beta_{k=-1} = 0$.

Poisson Estimation

Some of our outcomes are bounded on non-negative values, such as deaths, surgeries, diagnosis, and treatments. Therefore, dependent variables have restricted support, and least squares regression will predict negative nonsense values and non-integer values. As a result, we need to fit a model for counting data as a function of covariates x_{dt} such as, sex (% of females in the cell or mode of the variable) and age (mean age of the cell). The benchmark model is the Poisson model.

$$log(y_{dt}) = \alpha_d + \gamma_t + x_{dt}'\theta + \sum_{k=\underline{C}}^{\overline{C}} \beta_k D_{dt}^k + \epsilon_{dt}$$

Here our parameter of interest will be the weighted average of log risk or log rate ratio comparing the log risk or log rate when diseases were covered by GES and when they were not.

The natural extension of this model will be to estimate by disease:

$$log(y_t^d) = x_t^d{}'\theta + \sum_{k=\underline{C}}^{\overline{C}} \beta_k^d D_t^k + \epsilon_t^d$$

In this case, our parameter of interest will be capturing the effect of the GES reform by diseases covered. We do this is because we would not necessarily expect similar effects for each outcome. We can also run this model separately for sex and age groups instead of having them as control variables and the place of death (hospital or home).

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