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Green Card Health Insurance and Out-of-Pocket Health Expenditures in Türkiye: Evidence from Entropy Balancing

Türkiye'de Yeşil Kart Sağlık Sigortası ve Cepten Yapılan Sağlık Harcamaları: Entropi Dengeleme Yönteminden Bulgular

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ABSTRACT

Over the past two decades, Türkiye has significantly advanced health system reforms towards universal health coverage, notably expanding non-contributory, government-funded health insurance benefits (Green Card) for low-income households to mitigate inequities in financing, access, and outcomes. This research investigates the association between the Green Card and low-income households' out-of-pocket healthcare expenditures, focusing on physician and hospital costs. Using the Entropy Balancing technique on TurkStat Household Budget Survey data (2005-2018) to balance observed characteristics between Green Card holders and non-holders, the study finds an inverse relationship between Green Card and healthcare costs, especially in regions with enhanced infrastructure. These results are consistent with non-contributory insurance being an important tool for addressing financing inequities for the disadvantaged, and the association between the program and out-of-pocket expenditures varies with the region's health infrastructure.

JEL Codes: I13, I18, H51, I32, C14, C21

Keywords: Green Card Health Insurance, Government-Funded Health Insurance, Healthcare Expenditures, Low-Income Households, Entropy Balancing Method

ÖZ

Son yirmi yılda Türkiye, genel sağlık sigortası kapsamına ulaşmak amacıyla sağlık sistemi reformlarında önemli ilerlemeler kaydetmiştir. Bu süreçte, finansman, sağlık hizmetlerine erişim ve sağlık sonuçlarındaki eşitsizlikleri azaltmak için düşük gelirli hanehalklarına yönelik katkı payı gerektirmeyen, devlet destekli sağlık sigortası (Yeşil Kart) faydaları belirgin şekilde genişletilmiştir. Bu araştırma, Yeşil Kart ile düşük gelirli hanehalklarının cepten yaptıkları sağlık harcamaları arasındaki ilişkiyi, özellikle hekim ve hastane harcamalarına odaklanarak incelemektedir. Yeşil Kart sahipleri ile diğer bireyler arasındaki gözlenen özellik farklılıklarını dengelemek amacıyla 2005-2018 dönemi Türkiye İstatistik Kurumu (TÜİK) Hanehalkı Bütçe Anketleri verileri üzerinde Entropy Balancing tekniği kullanılan çalışmada, özellikle sağlık altyapısı gelişmiş bölgelerde Yeşil Kart ile sağlık harcamaları arasında ters yönlü bir ilişki olduğu ortaya çıkmaktadır. Bu sonuçlar, katkı payı gerektirmeyen sağlık sigortasının en dezavantajlı kesimler için finansman eşitsizliklerini gidermede önemli bir araç olabileceği görüşüyle uyumludur ve program ile sağlık harcamaları arasındaki ilişkinin bölgelerin sağlık altyapısına göre farklılaştığını göstermektedir.

JEL Kodları: I13, I18, H51, I32, C14, C21

Anahtar Kelimeler: Yeşil Kart Sağlık Sigortası, Devlet Destekli Sağlık Sigortası, Sağlık Harcamaları, Düşük Gelirli Hanehalkları, Entropy Balancing Yöntemi

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Introduction

Exposure to out-of-pocket healthcare expenditures has been demonstrated to correlate with detrimental effects on the attainment of equitable healthcare financing, access to healthcare, and health outcomes. This issue is particularly pronounced in developing countries (Lara & Ruiz Gómez, 2011; Njagi et al., 2018; Pal, 2012; Su et al., 2006; Van Minh et al., 2013). A substantial body of research has established that out-of-pocket healthcare expenditures can also adversely affect relatively wealthier nations (Baird, 2016; Kronenberg & Barros, 2014; Krůtilová & Yaya, 2012; Wyszewianski, 1986). An increasing number of countries are acknowledging challenges such as inequitable healthcare financing and patient foregone treatment due to out-of-pocket healthcare payments. In response to these challenges, Türkiye implemented the Health Transformation Program in 2003 to enhance healthcare financing, access to healthcare services, and the quality of care.

Prior to the Health Transformation Program, one of the greatest challenges was the disparities in access to healthcare services (Savas et al., 2002; Sulku & Bernard, 2012). Lack of access to healthcare services has existed as a health problem for many years, especially for those in the informal sector and unemployed. Another important challenge faced by these individuals was the lack of adequate health insurance coverage, which contributed to higher out-of-pocket healthcare expenses, which may lead to a decline in seeking medical treatments, medications, and hospital visits. This predicament has amplified the disparity in the distribution of healthcare resources, ultimately undermining the equitable distribution of resources according to need.

Furthermore, five different health insurance schemes with various benefits packages existed before the Health Transformation Program: Social Insurance Organization covers formal sector employees. The Government Employees Retirement Fund provides benefits for retired civil servants, the Active Civil Servants Insurance Fund covers active civil servants, Bağ-Kur covers artisans, self-employed, and farmers, and the Green Card provides health insurance for low-income households. Five different insurance schemes with various benefits packages resulted in inefficiencies in the healthcare system and produced unstandardized patient care. With the help of the Health Transformation Program, these insurance schemes were integrated under one umbrella as the Social Security Institution, which expanded health insurance coverage to the entire population and offered improved access to standardized healthcare services, reducing inequities in healthcare financing and improving health outcomes of the population (Atun et al., 2013).

This paper examines the association between Green Card Health Insurance (GCHI) and household-level healthcare expenditures in Türkiye. The specific objective of this study is to understand how GCHI coverage is associated with out-of-pocket physician and hospital care expenses among low-income households. This study contributes to a larger body of research on the impact of non-contributory government-funded health insurance on healthcare expenditures in low-income households covering 14 years of individual-level data. To this end, the current study employs an observational approach due to the impracticality of random assignment in health insurance. Because GCHI holders and non-holders differ systematically in observed characteristics, we use the Entropy Balancing (EB) methodology to reweight the comparison group so that it resembles GCHI holders in these characteristics. Throughout the paper, we use the term Green Card Health Insurance (or Green Card) for the treatment.

The Green Card represents a non-contributory government-funded health insurance initiative aimed at the most disadvantaged segment of the population. Upon its introduction in 1992, the Green Card insurance program was limited to inpatient services, resulting in significantly low uptake rates (Menon et al., 2013; Tirgil & Özbuğday, 2020). Nevertheless, several measures have been implemented to enhance healthcare access and provide equitable healthcare financing for low-income individuals. For instance, in 2004, outpatient care services were incorporated into the benefits package of the Green Card insurance. Subsequently, in 2005, the program expanded to include coverage for outpatient prescription medications. As a consequence of these reforms, the uptake rates experienced an increase compared to prior statistics. The broadening of service coverage has facilitated improved access to healthcare and more equitable healthcare financing for those in need (OECD & World Bank, 2008).

A central government system administers a proxy-means test to ascertain eligibility for the Green Card insurance. The primary criterion determining eligibility for the Green Card is a household income per capita that is less than one-third of the minimum wage (Aran & Hentschel, 2012). This mechanism has enabled officials to more accurately identify and assist the most vulnerable households.

A significant and debated question within the literature pertains to the effectiveness of the Green Card Health Insurance Program for low-income households in terms of enrollment of vulnerable groups. While certain research suggests that uptake rates for the Program have improved over time (Aran & Hentschel, 2012), others contend that the program experiences a high non-participation rate (Erus et al., 2015). Despite the ongoing debate regarding the program's effectiveness related to enrollment rates, research has indicated that the program has contributed to the reduction of financial burdens experienced by low-income households concerning their out-of-pocket healthcare expenditures. According to Tirgil et al. (2019), Türkiye's Green Card program has substantially diminished out-of-pocket healthcare payments for low-income households, particularly those facing elevated healthcare costs (Tirgil et al., 2019).

Material and Methods

Ethics Statement

This study uses anonymized secondary microdata from the Turkish Statistical Institute Household Budget Surveys. Because the study does not involve primary data collection, human participants, or identifiable personal information, ethics committee approval was not required. The analysis was conducted in accordance with the data access and use conditions of the Turkish Statistical Institute.

Data

We use Household Budget Surveys (HBS) between 2005 and 2018 to examine the relationship between Green Card Health Insurance and household-level healthcare expenditures. HBSs are repeated cross-sectional datasets conducted by the Turkish Statistical Institute (TurkStat) annually and represent the 26-region level.

We have two primary dependent variables using physician and hospital expenditures from our datasets, which are in Turkish Lira. We construct our dependent variables by implementing an inverse hyperbolic sine transformation on physician and hospital expenditures. This transformation aims to address the right-skewness of our expenditure variables. Besides, we account for inflation in Türkiye and deflate our expenditures data using 2003 prices taken from TurkStat. Our analysis focuses on the intensive margin: the physician (hospital) expenditure sample is restricted to individuals living in households with positive physician (hospital) expenditures. The two estimation samples therefore differ in size (89,537 individuals for physician and 29,617 individuals for hospital expenditures). The unit of observation is the individual. Because expenditures are recorded at the household level, the same household expenditure is assigned to every member of the household, so that household outcomes are repeated across members. All reported N values refer to individuals, and standard errors are clustered at the household level to account for the correlation of outcomes within households. We also perform an extensive-margin analysis where we examine the probability of any positive expenditures. The full sample of individuals with non-missing information on all variables comprises 226,148 individuals; observations with missing values are excluded (complete-case analysis).

Our key independent variable, Green Card Health Insurance, is a dummy variable, taking 1 if the person has the insurance and 0 otherwise. Those not registered for GCHI might be uninsured or have other formal health insurance. To increase the power of our regression analysis, we keep all respondents without GCHI in the comparison group; as a robustness check, we restrict the comparison group to uninsured individuals. We do not use the TurkStat survey design weights in the main analysis, because the EB weights are constructed to make the comparison group resemble GCHI holders in their observed characteristics rather than to reproduce the national population, and the estimand of interest is therefore the association for GCHI holders.

Having discussed how to construct our key dependent and independent variables, the next part addresses ways of defining our control variables in this study. Our datasets contain rich information regarding individual-level and household-level characteristics, such as gender, age, educational attainment, marital status, household-level disposable income, employment status, presence of elderly and kids in the house, and a disability that prevents the respondent from working, which we take advantage of in our regression analysis in order to reduce the omitted variable bias.

Our gender variable is a dummy variable, taking 1 if the respondent is female and 0 if the respondent is male. Our age variable comprises absolute values of respondents' age. The education level of respondents is divided into four main categories: primary or less, secondary, high school, and university or more. Marital status comprises four categories: never married, married, divorced (including separated), and widowed.

In addition, we use household-level disposable income in our regression analysis, for which the inverse hyperbolic sine transformation is implemented. We also control inflation in Türkiye and deflate all monetary values using 2003 prices. Regarding respondents' employment status, working means doing or being associated with work to earn wages or profit, even for one hour during the last week of the survey month, comprising a dummy variable such that 1 indicates employed and 0 indicates unemployed.

The present study also utilizes the presence of the elderly and kids at home to analyze healthcare expenditures. The presence of the elderly is defined as a dummy variable, taking a value of 1 if an elderly aged 65 or above lives in the house and 0 otherwise. As for the presence of children at home, we define the variable as a dichotomous variable being 1 if kids aged 14 or below are present at home and 0 otherwise. We have another variable that might have an impact on healthcare expenditures, which we define as a dummy variable if the respondent is disabled or sick, which hinders him/her from looking for a job. Because this variable identifies individuals whose disability or illness prevents them from working, virtually no individual in our data is both employed and disabled.

Table 1.

Descriptive Statistics

	Mean	SD	Observations
Dependent variables:			
Physician expenditures	2.829	1.218	89537
Hospital expenditures	3.139	1.613	29617
Control variables:			
Female	0.522	0.500	89537
Age	40.597	17.604	89537
Primary school or less	0.513	0.500	89537
Secondary school	0.198	0.398	89537
High school	0.168	0.374	89537
University or more	0.121	0.326	89537
Never married	0.234	0.423	89537
Married	0.694	0.461	89537
Widowed	0.055	0.228	89537
Divorced/Separated	0.018	0.131	89537
Household disposable income (arsinh)	10.170	0.668	89537
Employed	0.468	0.500	89537
Presence of elderly in house	0.378	0.485	89537
Presence of children in house	0.469	0.499	89537
Disabled	0.028	0.165	89537

Notes: Physician and hospital expenditures and household income are inverse hyperbolic sine (arsinh) transformations of real monthly values in 2003 prices. Statistics for physician expenditures and covariates refer to the physician expenditure sample; statistics for hospital expenditures refer to the hospital expenditure sample. Both samples are restricted to individuals in households with positive expenditure on the respective service. Observations are individuals. Data: TurkStat Household Budget Surveys, 2005-2018.

Table 1 presents the summary statistics for the variables used in this study. Statistics for the covariates and physician expenditures refer to the physician expenditure sample, whereas statistics for hospital expenditures refer to the hospital expenditure sample. As for control variables, just over half of those surveyed (52%) are female respondents. The mean age of individuals is about 41 years old. 51% of those interviewed indicated that they have primary or less education, while almost 20% of them have secondary education.

Approximately 70% of those who responded agreed that they are married. In contrast to that, 23% of the respondents are never married. In addition, well over 40% of those surveyed agreed they are employed. Those who reported that they have elderly in the house are 38%. On the other hand, 47% of those reported the presence of children at home. Just under 3% of those who responded agreed that they have a disability or sickness that hinders them from working.

Empirical Method

The ideal research design to measure the effect of health insurance on health expenditures would involve randomly assigning health insurance to individuals (Finkelstein et al., 2012). In other words, selection bias would be eliminated when individuals are randomly assigned to treatment and control groups. However, having health insurance is a decision individuals make and is shaped by many confounding factors. In econometric terms, the decision to have health insurance is endogenous, and the estimation results will be biased if this endogeneity is not considered.

The matching approach is one solution to reduce bias in observational studies (Caliendo & Kopeinig, 2008). The basic idea of matching methods is to find individuals without health insurance who are very similar to individuals with health insurance in terms of relevant characteristics and then attribute the average difference in health care expenditures between these two groups to the effect of insurance. The identifying assumption is unconfoundedness, selection on observables, or conditional independence. According to this assumption, the individual's healthcare expenditures, given the set of observed variables, X, are independent of whether they have health insurance.

However, if X is a multidimensional vector, it is impossible to condition on the relevant variables here. Instead, Rosenbaum and Rubin propose using a single-index variable called the propensity score (Rosenbaum & Rubin, 1983). Given the relevant characteristics, the propensity score is the probability of a statistical unit

receiving treatment (Rosenbaum & Rubin, 1983). The matching procedure based on the propensity score is called propensity score matching (PSM). However, propensity score matching has significant limitations. This matching method has the problem of checking the balance until the matching on the independent variables is improved cyclically. Although the balance on some independent variables is improved when this method is used, the balance on other control variables may deteriorate. Another method, Entropy Balancing, is a reweighting method that addresses selection on observed characteristics arising from the non-random treatment assignment. The method works by creating a balanced sample of treated and untreated units, where the balance is achieved on a set of covariates that are thought to predict the outcome. Entropy Balancing is based on the maximum entropy weighting algorithm. This method assigns a weight to each control unit so that the reweighted control group exactly matches pre-specified moments (such as the means, variances, and skewness) of the covariate distribution of the treatment group, while keeping the weights as close as possible to uniform weights. Thus, it helps to create a balanced sample in observational studies where the treatment group is defined by a binary variable (Hainmueller, 2012).

Table 2.

Covariate Balance Before and After Entropy Balancing - ***Panel A.*** *Covariates: first and second moments*

	Treated Mean	Treated Var.	Control (raw) Mean	Control (raw) Var.	Control (raw) Std. diff.	Control (EB) Mean	Control (EB) Var.	Control (EB) Std. diff.
Female	0.532	0.249	0.520	0.250	0.024	0.532	0.249	0.000
Age	38.500	384.629	40.889	298.818	-0.129	38.500	384.595	-0.000
Secondary school	0.220	0.171	0.195	0.157	0.062	0.220	0.171	0.000
High school	0.068	0.063	0.182	0.149	-0.352	0.068	0.063	0.000
University or more	0.016	0.016	0.135	0.117	-0.463	0.016	0.016	-0.000
Married	0.589	0.242	0.708	0.207	-0.252	0.589	0.242	0.000
Widowed	0.074	0.068	0.052	0.050	0.088	0.074	0.068	-0.000
Divorced/Separated	0.020	0.020	0.017	0.017	0.025	0.020	0.020	0.000
Household disposable income (arsinh)	9.626	0.423	10.245	0.403	-0.964	9.626	0.423	-0.000
Employed	0.384	0.236	0.480	0.250	-0.196	0.384	0.236	-0.000
Presence of elderly in house	0.417	0.243	0.373	0.234	0.090	0.417	0.243	0.000
Presence of children in house	0.625	0.234	0.447	0.247	0.362	0.625	0.234	0.000
Disabled	0.084	0.077	0.020	0.020	0.292	0.084	0.077	0.000

Table 2. Panel B.

Continuous covariates: third moment (skewness)

	Treated	Control (raw)	Control (EB)
Age	0.801	0.481	0.801
Income (arsinh)	-1.562	-0.440	-1.562

Table 2. Panel C.

Pairwise interactions (72 terms): summary of standardized mean differences

	Before EB (raw)	After EB
Mean |Std. diff.|	0.151	0.000
Maximum |Std. diff.|	0.468	0.000
Number of terms with |Std. diff.| > 0.10	37	0.000

Notes: Treated: Green Card holders. Control: all individuals without Green Card coverage; physician expenditure sample. Raw = unweighted control group; EB = control group reweighted with entropy balancing weights. Treated units receive a weight of 1. Std. diff. = standardized mean difference, (mean_T - mean_C) / sqrt((var_T + var_C)/2), computed with unweighted variances. Absolute values below 0.10 are conventionally taken to indicate adequate balance. For binary covariates, balancing the mean also balances the variance and skewness, so only the means and variances are reported in Panel A. Panel B reports skewness for the two continuous covariates, whose second and third moments are targeted directly. Panel C summarizes balance for the 72 pairwise interactions (interactions between mutually exclusive education or marital-status categories are excluded); term-by-term results are reported in Appendix Table A2. Data: TurkStat Household Budget Surveys, 2005-2018.

To predict the relationship between GCHI and household health expenditures, particularly physician and hospital expenditures, we first estimate the following model via the Ordinary Least Squares (OLS) method to report benchmark estimates:

$$y_{it} = \beta_0 + \beta_1 GCHI_{it} + \beta_2 X_{it} + \gamma_t + \delta_r + \varepsilon_{it} \quad (1)$$

where $GCHI_{it}$ is the treatment status of individuals, whichwe coded as 1 if the respondents were treated and 0 if not treated. i and t represent individuals in each household and time, respectively. X_{it} is a set of predetermined control variables, such as female, age, primary school, secondary school, high school, university or more, married, widowed, divorced and separated, income, employed, presence of elderly and kids at home, sick or disabled. Furthermore, γ_t stands for year-fixed effects and δ_r is for region-fixed effects, which captures time-invariant variation in health expenditures across 26 regions of Türkiye. In alignment with existing literature on health demand, we conceptualize the household as a unified decision-making entity (Alderman et al., 1995; Chiappori & Mazzocco, 2017). Consequently, within our framework, we model household-level health expenditure as a function of the individual insurance characteristics of its members, given that individual status serves as a primary determinant of the household's overall medical budget allocation.

To implement Entropy Balancing, we define individuals covered by GCHI as the treatment group and all other individuals as the control group. We proceed in two steps. First, we use the ebalance command in Stata (Hainmueller & Xu, 2013) to obtain weights for the control units. The balancing constraints are imposed on the means of (i) the 13 covariates in Equation 1, (ii) all 72 pairwise (first-order) interactions among them, excluding interactions between mutually exclusive education or marital-status categories, and (iii) the squared and cubed terms of the two continuous covariates, age and income. Balancing the means of the squared and cubed terms equates the second (variance) and third (skewness) moments of age and income across the two groups. For binary covariates, we do not include squared or cubed terms, because balancing their means also balances all of their higher moments. This yields 89 specified moment conditions. One of them, the interaction between employment and disability, is zero for all control individuals in every estimation sample, because the disability variable identifies individuals who cannot work; this constraint is therefore collinear with the normalization constraint and is dropped before estimation. As a result, 88 moment conditions are imposed in every specification. The weights are estimated separately on the estimation sample of each regression, including the health infrastructure subsamples and the uninsured-only comparison. Second, we use these weights in weighted least squares estimation of Equation 1 to estimate the association between GCHI and healthcare expenditures. Appendix Table A1 reports, for each physician expenditure specification, the estimation sample, the number of specified, dropped, and imposed moment conditions, the distribution of the weights, and the effective sample size (ESS); Appendix Table A2 lists all moment conditions together with their balance before and after reweighting.

Table 2 reports covariate balance before and after EB for the physician expenditure sample. Panel A presents the means and variances of the 13 covariates, Panel B the skewness of age and income, and Panel C a summary of the standardized mean differences for the 72 pairwise interactions. Before reweighting, GCHI holders differ markedly from the control group: they have lower household income (standardized difference of −0.96), are less likely to have a university degree (−0.46) or a high school diploma (−0.35), are less likely to be married (−0.25) or employed (−0.20), and are more likely to live with children (0.36) and to be disabled (0.29). Among the pairwise interactions, 37 of the 72 terms have absolute standardized differences above the conventional threshold of 0.10. After reweighting, the means and variances of all covariates, the skewness of age (0.801) and income (−1.562), and the means of all interactions are equal in the two groups; the largest absolute standardized difference across all imposed moment conditions is 0.000 (Appendix Tables A1 and A2).

Appendix Table A1 summarizes the EB weights for each physician expenditure specification. In the main specification, weights are estimated for 78,594 control individuals, who are reweighted to match 10,943 GCHI holders. The control weights sum to the number of treated individuals, have a mean of 0.139 and a maximum of 11.26, and imply an effective sample size of 17,814, or 22.7% of the control group. The corresponding effective sample sizes are 30.7% and 16.3% of the control group in the below- and above-median health infrastructure subsamples. The uninsured-only comparison relies on a smaller control group of 6,437 individuals and therefore on more variable weights (maximum of 43.9), although its effective sample size is 45.2% of the control group. In all specifications, the balancing constraints are satisfied, with a maximum absolute standardized difference of 0.000 after reweighting.

The next section of the regression analysis examines whether the association between GCHI and household-level physician and hospital expenditures differs by health infrastructure. First, we used the number of specialists per 100,000 people in 26 regions between 2005 and 2018 to proxy institutional capacity (i.e., health infrastructure) in Türkiye – this metric reflects the system's ability to meet advanced health needs, influencing household health-seeking behavior and expenditures – and divided our sample at the median of this measure into two subsamples. We re-estimate the EB weights separately within each subsample, so that GCHI holders and non-holders are balanced within each group (Appendix Table A1, rows 2 and 3).

Table 3.

The Association Between Green Card Health Insurance and Physician Expenditures

	(1) OLS	(2) Entropy Balancing
Green Card Health Insurance	-0.032*	-0.097***
	(0.019)	(0.019)
R-squared	0.209	0.259
N	89537	89537

Notes: The dependent variable is the inverse hyperbolic sine (arsinh) of real monthly household out-of-pocket physician expenditures (2003 prices), estimated on the intensive margin. Column 1 reports OLS estimates; column 2 reports weighted least squares estimates using EB weights. The control group consists of all individuals without Green Card coverage. All models control for female, age, education (reference: primary or less), marital status (reference: never married), arsinh of real household income, employment, presence of elderly members and children in the household, and sickness/disability, as well as year and NUTS-2 region fixed effects. Entropy balancing (EB) weights are

estimated separately on each estimation sample and equate the treated and control groups on the means of the 13 covariates and their 72 pairwise interactions, and on the second and third moments of age and income. Weight diagnostics and the full list of moment conditions for the physician expenditure specifications are reported in Appendix Tables A1 and A2. Standard errors clustered at the household level are in parentheses. * $p<.10$, ** $p<.05$, *** $p<.01$. Data: TurkStat Household Budget Surveys, 2005-2018.

Table 4.

The Association Between Green Card Health Insurance and Hospital Expenditures

	(1) OLS	(2) Entropy Balancing
Green Card Health Insurance	-0.156***	-0.247***
	(0.047)	(0.052)
R-squared	0.300	0.333
N	29617	29617

Notes: The dependent variable is the inverse hyperbolic sine (arsinh) of real monthly household out-of-pocket hospital expenditures (2003 prices), estimated on the intensive margin. Column 1 reports OLS estimates; column 2 reports weighted least squares estimates using EB weights. The control group consists of all individuals without Green Card coverage. All models control for female, age, education (reference: primary or less), marital status (reference: never married), arsinh of real household income, employment, presence of elderly members and children in the household, and sickness/disability, as well as year and NUTS-2 region fixed effects. Entropy balancing (EB) weights are estimated separately on each estimation sample and equate the treated and control groups on the means of the 13 covariates and their 72 pairwise interactions, and on the second and third moments of age and income. Weight diagnostics for the physician expenditure specifications and the full list of moment conditions are reported in Appendix Tables A1 and A2. Standard errors clustered at the household level are in parentheses. * $p<.10$, ** $p<.05$, *** $p<.01$. Data: TurkStat Household Budget Surveys, 2005-2018.

Analytical Strategy and Software

The empirical analysis proceeds in two steps. First, ordinary least squares models are estimated as benchmark specifications. Second, entropy balancing is used to reweight the comparison group so that individuals without Green Card Health Insurance resemble Green Card holders in observed characteristics. The balancing constraints are imposed on covariate means, pairwise interactions, and the second and third moments of continuous covariates. The final weighted least squares models include individual and household-level control variables, year fixed effects, and NUTS-2 region fixed effects. Standard errors are clustered at the household level. All analyses were conducted using Stata 18, including the `ebalance` package for entropy balancing.

Results

Table 3 reports the estimates for physician expenditures, with OLS estimates in column 1 and EB estimates in column 2. The OLS estimate points to a negative association between GCHI and physician expenditures (−0.032), which is significant at the 10% level. When the EB weights are used, the coefficient is larger in absolute value (−0.097) and significant at the 1% level. Because the dependent variable is transformed with the inverse hyperbolic sine, we convert the coefficients into approximate percentage differences as 100×[exp(β)−1] (Bellemare & Wichman, 2020). Accordingly, GCHI holders have approximately 3.1% (OLS) and 9.2% (EB) lower physician expenditures than comparable individuals without GCHI. Because expenditures measured in 2003 prices are small for many households, these percentage approximations should be interpreted with caution (Bellemare & Wichman, 2020).

Table 4 reports the corresponding estimates for hospital expenditures. GCHI is negatively and significantly associated with hospital expenditures in both columns. The OLS coefficient (−0.156) implies that GCHI holders have approximately 14.4% lower hospital expenditures than individuals who either have other insurance schemes or no insurance. The EB coefficient is larger in absolute value (−0.247), corresponding to approximately 21.9% lower hospital expenditures.

The results of the heterogeneity analysis by health infrastructure are shown in Table 5, where the first two columns (columns 1-2) report the estimates of GCHI on physician expenditures and the last two columns (columns 3-4) on hospital expenditures. Column 1 shows that, in regions with below-median health infrastructure, GCHI is associated with approximately 6.0% lower physician expenditures (coefficient of −0.062, significant at the 5% level). In regions with above-median health infrastructure (column 2), the association is more than twice as large, at approximately 13.2% (−0.141, significant at the 1% level).

Turning to hospital expenditures, GCHI is associated with approximately 15.1% lower hospital expenditures in regions with below-median health infrastructure (−0.164, significant at the 5% level) and approximately 25.3% lower hospital expenditures in regions with above-median health infrastructure (−0.292, significant at the 1% level).

Table 5.

Variations in the Association Between Green Card Health Insurance and Health Expenditures: The Role of Health Infrastructure

	(1) Physician - Below Median Health Infrastructure	(2) Physician - Above Median Health Infrastructure	(3) Hospital - Below Median Health Infrastructure	(4) Hospital - Above Median Health Infrastructure
Green Card Health Insurance	-0.062**	-0.141***	-0.164**	-0.292***
	(0.026)	(0.029)	(0.078)	(0.061)

R-squared	0.311	0.126	0.282	0.390
N	39644	49893	10290	19327

Notes: All columns report weighted least squares estimates using EB weights. The dependent variable is the arsinh of real monthly household out-of-pocket physician expenditures in columns 1-2 and hospital expenditures in columns 3-4 (2003 prices, intensive margin). Health infrastructure is proxied by the number of specialist physicians per 100,000 population in the 26 NUTS-2 regions; the sample is split at the median. EB weights are estimated separately within each subsample and outcome, using the same set of moment conditions as in the main analysis (see Appendix Tables A1 and A2). All models control for female, age, education (reference: primary or less), marital status (reference: never married), arsinh of real household income, employment, presence of elderly members and children in the household, and sickness/disability, as well as year and NUTS-2 region fixed effects. Standard errors clustered at the household level are in parentheses. * $p<.10$, ** $p<.05$, *** $p<.01$. Data: TurkStat Household Budget Surveys, 2005-2018.

In all specifications, the EB estimates are larger in absolute value than the corresponding OLS estimates. This difference alone does not reveal the direction or the source of bias in either estimator. OLS adjusts for the covariates linearly and extrapolates across groups whose covariate distributions differ substantially (Table 2), whereas EB reweights the control group so that its covariate means, interactions, and the higher moments of age and income match those of GCHI holders, placing more weight on control individuals who resemble GCHI holders. The two estimators therefore use the observed covariates differently and, if the association varies across individuals, may refer to different populations. Importantly, EB balances observed covariates only; it does not address differences in unobserved characteristics, and neither estimate should be interpreted as a causal effect.

To test the robustness of our results, we re-estimated the models presented in Tables 3 and 4 by refining the definition of the 'Green Card' dummy variable. In the primary models, the variable is coded as 1 for Green Card holders and 0 for all other individuals. In this alternative specification, we restrict the control group to only those individuals who are non-insured. EB weights are re-estimated for this comparison (Appendix Table A1, row 4), and Tables A3 and A4 in the Appendix report the results. The findings are consistent with our main results but larger in magnitude: the EB estimates imply approximately 19.3% lower physician expenditures (−0.214) and 29.0% lower hospital expenditures (−0.342) for GCHI holders relative to uninsured individuals. One possible explanation is that uninsured individuals bear the full cost of the care they use, so that the difference relative to GCHI holders is larger than when the comparison group also includes individuals with other insurance coverage. Because this comparison relies on a smaller control group and more variable weights (Appendix Table A1), these estimates are less precise as a basis for comparison than the main estimates.

We also investigate whether GCHI is associated with the likelihood of incurring any out-of-pocket healthcare expenditure. Table A5 reports linear probability models estimated on the full sample, with EB weights re-estimated on that sample. In the EB specifications, GCHI is associated with a 1.7 percentage point lower probability of reporting any physician expenditure and a 2.3 percentage point lower probability of reporting any hospital expenditure. Relative to the sample means of these outcomes (39.6% and 13.1%), these differences correspond to reductions of about 4% and 18%, respectively. The OLS estimate for physician expenditure is small and statistically insignificant, whereas both EB estimates are significant at the 1% level. These patterns are consistent with a form of financial protection at the extensive margin.

Discussion

The literature reports a strong relationship between health insurance for low-income individuals and health expenditures. This study aims to assess the importance of non-contributory government-funded health insurance for low-income individuals in their out-of-pocket health expenditures.

Several studies make use of Entropy Balancing in applied micro research in Türkiye. In the context of public finance and regional development, Acar (2023) combined a difference-in-differences design with entropy balance to evaluate the causality between opening new state universities on provinces GDP per capita and unemployment rates. In the context of health economics, Tirgil et al. (2023) implemented an entropy-balancing reweighting strategy to analyze if transition to family centered primary healthcare model reduces out-of-pocket household's health expenditure. Also Tirgil (2021) evaluates the gender differentiated impacts of obesity on employment prospects. More recently, Kayaoglu (2026) combines entropy balancing weights with a continuous-treatment difference-in-differences design and instrumental variables to examine how public and private preschools affect mothers' employment status under educational reforms.

Regarding the research question, the results suggest strong evidence of a negative correlation between health insurance and physician expenditures for low-income households with GCHI compared with those without GCHI. Most striking was the substantial negative relation in household hospital expenditures. These results align with and extend previous research findings on the impact of the non-contributory Green Card program in Türkiye. Similar

to Tirgil and Özbuğday (2020), who highlighted the program's positive influence on reducing health expenses among people with low incomes for four years following the expansion of its benefits package, our findings are consistent with the Green Card program's role in mitigating the burden of healthcare costs.

Using a longer period of data and a reweighting approach that balances a rich set of observed characteristics, our findings are consistent with the view that the Green Card program is associated with lower out-of-pocket spending among low-income households, although they do not by themselves establish that the program caused these differences. This continuity in evidence underscores the sustained importance of the Green Card program as a potentially important mechanism for enhancing healthcare access and financial protection for Türkiye's low-income populations.

Our analysis of the association between GCHI and household physician and hospital expenditures by health infrastructure indicates that the negative association is larger among GCHI holders living in regions with greater institutional capacity. Several mechanisms could explain why this association is stronger in regions with robust institutional support. We do not test these mechanisms directly, and they should be viewed as hypotheses for future research. In regions characterized by strong health infrastructures, the advantages of GCHI may be magnified. Firstly, the improved accessibility and efficiency of healthcare services in well-equipped regions may enable insured individuals to maximize their coverage. This increased access may make healthcare services more readily available, permitting those with insurance to receive prompt care without unnecessary delays or bureaucratic obstacles. This could lead to cost savings through preventive measures and early interventions, allowing individuals to completely utilize their insurance benefits without logistical or administrative challenges. Secondly, higher rates of service utilization in areas with advanced healthcare facilities may encourage insured individuals to engage more proactively with the healthcare system. The knowledge that they possess coverage may make them more inclined to seek preventive services and early treatments, which are essential for reducing long-term healthcare expenditures. Preventive care has the potential to avert severe health issues that necessitate costly treatments, while timely management of existing health conditions can prevent complications, ultimately diminishing the demand for expensive healthcare services. Furthermore, the improved quality of care in regions with enhanced institutional capacities may allow more effective treatments and better health outcomes. High-quality care typically incorporates advanced medical technologies and up-to-date medical knowledge, which can enhance treatment efficacy. For insured individuals, their coverage is more likely to yield favorable health results, thereby reducing the necessity for further treatments and lowering overall healthcare costs. Evidence from other countries is consistent with this interpretation. For instance, García-Díaz et al. (2018) demonstrated that Seguro Popular decreased out-of-pocket health expenditures and enhanced welfare for insured households, particularly among older adults. Collectively, these factors may enhance the value of health insurance in regions with superior health infrastructure. Another example is Limwattananon et al. (2012) findings that the Universal Health Coverage Scheme improved equity in Thailand, with increased utilization among the rural poor and a reduction in out-of-pocket expenditures.

This study's findings have several important implications for future practice. First, the lower physician and hospital expenditures observed among GCHI holders point to the potential role of health insurance in lowering financial barriers to healthcare access. A compelling argument exists for policies that broaden insurance coverage and enrich benefits, particularly for low-income populations. This could involve revising the benefit package to encompass various services and treatments.

Second, the negative association between GCHI and healthcare expenditures is weaker in regions with weaker health infrastructure. If this pattern is confirmed by causal evidence, it would support targeted investments in healthcare facilities, machinery, and staffing in these under-resourced areas to ensure the equitable delivery of health insurance scheme benefits across all locales.

Conclusion and Recommendations

This paper argues that health insurance for low-income individuals negatively correlates with healthcare expenditures, specifically physician and hospital spending. The second aim of this study was to investigate whether the association between GCHI and healthcare costs varies with health infrastructure.

This study identifies that low-income individuals with GCHI spend less on physician and hospital expenses than comparable individuals without GCHI. One of the main findings of this study is that the negative association

between GCHI and healthcare spending is larger in regions with better health infrastructure. These findings are relevant for understanding how non-contributory health insurance relates to the medical costs faced by low-income households.

One weakness of this study that could have influenced the measurements of health insurance on healthcare expenditures is the presence of unmeasured or unobserved confounders. Therefore, our estimates should be interpreted as associations rather than causal effects. In observational studies, there exists the potential for bias from unobserved confounders, and the entropy-balancing preprocessing method does not resolve that issue. Another limitation is reliance on a partial equilibrium model, missing potential spillover effects like changes in healthcare access among non-participants. Larger-scale implementation could cause broader market effects (such as shifts in provider supply, capacity, or prices) not captured by our current approach. In addition, our analysis of expenditure levels is restricted to households with positive expenditures, and the percentage interpretations of the inverse hyperbolic sine coefficients are only approximate when expenditures are small (Bellemare & Wichman, 2020). Despite its limitations, the study contributes to our understanding of the relationship between health insurance and healthcare costs.

Further research is needed to determine whether a causal relationship exists between health insurance and healthcare expenditures. Hence, a key policy priority should be the planning and implementation of rigorous experimental studies to better understand the impact of health insurance on healthcare costs. Additionally, exploring alternative methodologies to address unobserved confounders in observational studies could provide stronger evidence for policymakers to make informed decisions.

Etik Komite Onayı: Bu çalışma, Türkiye İstatistik Kurumu Hanehalkı Bütçe Anketlerinden elde edilen anonimleştirilmiş ikincil mikro verileri kullandığından; birincil veri toplama, insan katılımcılarla doğrudan etkileşim veya müdahale ya da kimliği belirlenebilir kişisel veri kullanımı içermediğinden etik kurul onayı gerektirmemektedir. Analizler, Türkiye İstatistik Kurumunun veri erişim ve kullanım koşullarına uygun şekilde yürütülmüştür.
Hakem Değerlendirmesi: Dış bağımsız.
Çıkar Çatışması: Yazar, çıkar çatışması olmadığını beyan etmiştir.
Finansal Destek: Yazar, bu çalışma için finansal destek almadığını beyan etmiştir.
Yapay Zeka Kullanımı: Bu çalışmada yapay zekâ destekli araçlardan yalnızca dilbilgisi, yazım ve anlatım açıklığı kontrolleri için yararlanılmıştır. Çalışmanın araştırma fikri, veri analizi, yöntemsel tasarımı, bulguların yorumlanması ve nihai içeriğine ilişkin tüm sorumluluk yazara aittir.

Ethics Committee Approval: Ethics committee approval was not required for this study because it uses anonymized secondary microdata from the Turkish Statistical Institute Household Budget Surveys and does not involve primary data collection, direct interaction or intervention with human participants, or identifiable personal information. The analysis was conducted in accordance with the data access and use conditions of the Turkish Statistical Institute.
Peer-review: Externally peer-reviewed.
Conflict of Interest: The author has no conflicts of interest to declare.
Financial Disclosure: The author declared that this study has received no financial support.
Use of Artificial Intelligence: AI-supported tools were used only for grammar, spelling, and clarity checks. The research idea, data analysis, methodological design, interpretation of findings, and final content of the manuscript remain the sole responsibility of the author.

References

Acar, Y. (2023). The economic impact of universities: empirical evidence from Turkish provinces. *Applied Economics Letters*, *30*(19), 2825–2831. [CrossRef]

Alderman, H., Chiappori, P.-A., Haddad, L., Hoddinott, J., & Kanbur, R. (1995). Unitary versus collective models of the household: Is it time to shift the burden of proof? *The World Bank Research Observer*, *10*(1), 1–19. [CrossRef]

Aran, M. A., & Hentschel, J. (2012). *Protection in good and bad times? The Turkish Green Card health program (Policy Research Working Paper No*. 6178). World Bank. [CrossRef]

Atun, R., Aydın, S., Chakraborty, S., Sümer, S., Aran, M., Gürol, I., ... & Akdağ, R. (2013). Universal health coverage in Turkey: enhancement of equity. *The Lancet*, *382*(9886), 65–99. [CrossRef]

Baird, K. E. (2016). The incidence of high medical expenses by health status in seven developed countries. *Health Policy*, *120*(1), 26–34. [CrossRef]

Bellemare, M. F., & Wichman, C. J. (2020). Elasticities andthe inverse hyperbolic sine transformation. *Oxford Bulletin of Economics and Statistics*, *82*(1), 50–61. [CrossRef]

Caliendo, M., & Kopeinig, S. (2008). Some practical guidance for the implementation of propensity score matching. *Journal of Economic Surveys*, *22*(1), 31–72. [CrossRef]

Chiappori, P.-A., & Mazzocco, M. (2017). Static and intertemporal household decisions. *Journal of Economic Literature*, *55*(3), 985–1045. [CrossRef]

Erus, B., Yakut-Çakar, B., Cali, S., & Adaman, F. (2015). Health policy for the poor: an exploration on the take-up of means-tested health benefits in Turkey. *Social Science & Medicine*, *130*, 99–106. [CrossRef]

Finkelstein, A., Taubman, S., Wright, B., Bernstein, M., Gruber, J., Newhouse, J. P., ... & Oregon Health Study

Group. (2012). The Oregon health insurance experiment: Evidence from the first year. *The Quarterly Journal of Economics*, *127*(3), 1057–1106. [CrossRef]

García-Díaz, R., Sosa-Rubí, S. G., Serván-Mori, E., & Nigenda, G. (2018). Welfare effects of health insurance in Mexico: The case of Seguro Popular de Salud. *PLOS ONE*, *13*(7), e0199876. [CrossRef]

Hainmueller, J. (2012). Entropy balancing for causal effects: A multivariate reweighting method to produce balanced samples in observational studies. *Political Analysis*, *20*(1), 25–46. [CrossRef]

Hainmueller, J., & Xu, Y. (2013). Ebalance: A Stata package for entropy balancing. *Journal of Statistical Software*, *54*, 1–18. [CrossRef]

Kayaoglu, A. (2026). *Which Childcare Raises Maternal Employment?: Public, Private, and the Rationed Margin*. Preprint SSRN, Article 6809307. [CrossRef]

Kronenberg, C., & Barros, P. P. (2014). Catastrophic healthcare expenditure–drivers and protection: the Portuguese case. *Health Policy*, *115*(1), 44–51. [CrossRef]

Krůtilová, V., & Yaya, S. (2012). Unexpected impact of changes in out-of-pocket payments for health care on Czech household budgets. *Health Policy*, *107*(2–3), 276–288. [CrossRef]

Lara, J. L. A., & Ruiz Gómez, F. (2011). Determining factors of catastrophic health spending in Bogota, Colombia. *International Journal of Health Care Finance and Economics*, *11*, 83–100. [CrossRef]

Limwattananon, S., Tangcharoensathien, V., Tisayaticom, K., Boonyapaisarncharoen, T., & Prakongsai, P. (2012). Why has the Universal Coverage Scheme in Thailand achieved a pro-poor public subsidy for health care? *BMC Public Health*, *12*(Suppl 1), S6. [CrossRef]

Menon, R., Mollahaliloglu, S., & Postolovska, I. (2013). *Toward universal coverage: Turkey's green card program for the poor*. World Bank. [CrossRef]

Njagi, P., Arsenijevic, J., & Groot, W. (2018). Understanding variations in catastrophic health expenditure, its underlying determinants and impoverishment in sub-Saharan African countries: a scoping review. *Systematic Reviews*, *7*, 1–23. [CrossRef]

OECD-WB. (2008). *OECD Reviews of Health Systems: Turkey*. OECD Publishing. [CrossRef]

Pal, R. (2012). Measuring incidence of catastrophic out-of-pocket health expenditure: with application to India. *International Journal of Health Care Finance and Economics*, *12*, 63–85. [CrossRef]

Rosenbaum, P. R., & Rubin, D. B. (1983). The central role of the propensity score in observational studies for causal effects. *Biometrika*, *70*(1), 41–55. [CrossRef]

Savas, S. B., Karahan, Ö., Saka, R. Ö., Thomson, S., Mossialos, E., & World Health Organization. (2002). *Health Care Systems in Transition: Turkey*. [CrossRef]

Su, T. T., Kouyaté, B., & Flessa, S. (2006). Catastrophic household expenditure for health care in a low-income society: a study from Nouna District, Burkina Faso. *Bulletin of the World Health Organization*, *84*(1), 21–27. [CrossRef]

Sulku, S. N., & Bernard, D. M. (2012). Financial burden of health care expenditures: Turkey. *Iranian Journal of Public Health*, *41*(3), 48. [CrossRef]

Tirgil, A. (2021). Obesity and employment: Evidence from Turkey. *International Journal of Management Economics and Business*, *17*(3), 643–659. [CrossRef]

Tirgil, A., & Özbuğday, F. C. (2020). Does public health insurance provide financial protection against out-of-pocket health payments? *Evidence from Turkey. Sosyoekonomi*, *28*(45), 11–24. [CrossRef]

Tirgil, A., Altun, A., & Yanikkaya, H. (2023). Does family medicine reduce household health expenditures: evidence from Türkiye. *Journal of Public Health Policy*, *44*(1), 75–89. [CrossRef]

Tirgil, A., Dickens, W. T., & Atun, R. (2019). Effects of expanding a non-contributory health insurance scheme on out-of-pocket healthcare spending by the poor in Turkey. *BMJ Global Health*, *4*(4), e001540. [CrossRef]

Van Minh, H., Phuong, N. T. K., Saksena, P., James, C. D., & Xu, K. (2013). Financial burden of household out-of pocket health expenditure in Viet Nam: findings from the National Living Standard Survey 2002–2010. *Social Science & Medicine*, *96*, 258–263. [CrossRef]

Wyszewianski, L. (1986). Families with catastrophic health care expenditures. *Health Services Research*, *21*(5), 617. [CrossRef]

Extended Abstract

Amaç: Bu çalışma, düşük gelirli bireylere yönelik katkı payı gerektirmeyen devlet destekli sağlık sigortası olan Yeşil Kart ile hanehalkı düzeyindeki sağlık harcamaları arasındaki ilişkiyi incelemeyi amaçlamaktadır. Özellikle, Yeşil Kart sahipliğinin düşük gelirli hanehalklarının cepten ödedikleri hekim ve hastane bakım harcamalarıyla nasıl ilişkili olduğu incelenmiştir.

Yöntem: Çalışmada, 2005-2018 yılları arasındaki Türkiye İstatistik Kurumu (TÜİK) Hanehalkı Bütçe Anketleri (HBA) verileri kullanılmıştır. Araştırma, sağlık sigortasının rastgele atanamaması nedeniyle gözlemsel bir yaklaşıma dayanmaktadır. Yeşil Kart sahipleri ile diğer bireyler arasındaki gözlenen özellik farklılıklarını dengelemek için Entropi Dengeleme (Entropy Balancing) yöntemi kullanılmıştır. Ağırlıklar; 13 kontrol değişkeninin ve bunların ikili etkileşimlerinin ortalamaları ile yaş ve gelirin ikinci (varyans) ve üçüncü (çarpıklık) momentleri dengelenecek şekilde hesaplanmış ve toplam 88 moment koşulu uygulanmıştır. Bu yöntem yalnızca gözlenen değişkenleri dengelediği için gözlenmeyen farklılıklardan kaynaklanabilecek yanlılığı gidermez. Analiz, ilgili harcaması pozitif olan hanelerde yaşayan bireylerle sınırlandırılmıştır. Regresyon analizinde, bireysel ve hanehalkı özellikleri (cinsiyet, yaş, eğitim düzeyi, medeni durum, hanehalkı harcanabilir geliri, istihdam durumu, evde yaşlı ve çocuk bulunması, engellilik durumu), yıl ve bölge sabit etkileri kontrol edilmiştir. Bağımlı değişkenler olan hekim ve hastane harcamaları, sağa çarpıklığı gidermek için ters hiperbolik sinüs dönüşümüne tabi tutulmuş ve enflasyon için 2003 fiyatlarına göre düzeltilmiştir.

Bulgular: Çalışma, düşük gelirli hanehalklarında Yeşil Kart sahipliğinin, önemli ölçüde daha düşük sağlık harcamalarıyla ilişkili olduğunu ortaya koymuştur. Entropi Dengeleme ağırlıkları kullanıldığında, Yeşil Kart sahipliğinin yaklaşık olarak hekim harcamalarında %9.2, hastane harcamalarında ise %21.9 daha düşük harcamayla ilişkili olduğu bulunmuştur. Heterojenlik analizi, sağlık altyapısı daha güçlü olan bölgelerde (yani, sağlık altyapısı medyanın üzerinde olan bölgelerde) Yeşil Kart ile sağlık harcamaları arasındaki negatif ilişkinin daha belirgin olduğunu göstermiştir. Daha iyi sağlık altyapısına sahip bölgelerde Yeşil Kart sahipliği, yaklaşık olarak hekim harcamalarında %13.2 ve hastane harcamalarında %25.3 daha düşük harcamayla ilişkilidir. Bu farklılık, daha iyi erişilebilirlik, daha yüksek hizmet kullanımı ve daha kaliteli bakım gibi faktörlerle ilişkili olabilir.

Sonuç ve Öneriler: Bu çalışma, düşük gelirli bireyler için sağlık sigortasının, özellikle hekim ve hastane harcamalarında, sağlık harcamalarıyla negatif ilişkili olduğunu göstermektedir. Bulgular, sağlık sigortasının sağlık hizmetlerine erişimdeki finansal engelleri azaltmada önemli bir rol oynayabileceğine işaret etmektedir. Sağlık altyapısı zayıf olan bölgelerde sigorta ile harcamalar arasındaki ilişkinin daha zayıf olması, bu bölgelerde sağlık tesisleri, ekipman ve personel yatırımlarına yönelik hedeflenen politikaların önemli olabileceğine işaret etmektedir. Her ne kadar çalışma gözlemsel bir nitelik taşısa ve ölçülemeyen karıştırıcı faktörler nedeniyle nedensel çıkarımların dikkatli yorumlanması gerekse de, Yeşil Kart programı ile cepten yapılan sağlık harcamaları arasındaki ilişkiye dair uzun dönemli kanıt sunmaktadır. Gelecekteki araştırmaların, sağlık sigortası ve sağlık harcamaları arasındaki nedensel ilişkiyi daha iyi anlamak için deneysel çalışmalar ve gözlemsel çalışmalardaki gizli karıştırıcı faktörleri ele alan alternatif metodolojileri keşfetmesi önerilmektedir.

Appendix

Table A1.

*Entropy Balancing Weight Diagnostics by Specification: Physician Expenditures - **Panel A.** Estimation samples and moment conditions*

	N (estimation sample)	N treated	N control	Moment conditions specified	Dropped (collinearity)	Moment conditions imposed
(1) Physician, main (Table 3; control: all non-GCHI)	89,537	10,943	78,594	89	1	88
(2) Physician, below-median health infrastructure (Table 5, col. 1)	39,644	7,567	32,077	89	1	88
(3) Physician, above-median health infrastructure (Table 5, col. 2)	49,893	3,376	46,517	89	1	88
(4) Physician, control: uninsured (Table A3)	17,380	10,943	6,437	89	1	88

Table A1. Panel B.

Distribution of entropy balancing weights (control units)

	Sum of weights	Mean	SD	Min	P99	Max	ESS	ESS / N control (%)	Max |Std. diff.| after EB
(1) Physician, main (Table 3; control: all non-GCHI)	10,943.0	0.139	0.257	0.000	1.128	11.258	17,814.3	22.7	0.000
(2) Physician, below-median health infrastructure (Table 5, col. 1)	7,567.0	0.236	0.354	0.000	1.608	9.017	9,845.5	30.7	0.000
(3) Physician, above-median health infrastructure (Table 5, col. 2)	3,376.0	0.073	0.164	0.000	0.647	6.690	7,598.7	16.3	0.000
(4) Physician, control: uninsured (Table A3)	10,943.0	1.700	1.870	0.000	8.810	43.918	2,912.3	45.2	0.000

Notes: Each row corresponds to a separate entropy balancing (EB) specification estimated on the estimation sample of the corresponding regression. Weight statistics refer to control units; treated units receive a weight of 1. Effective sample size ESS = (sum of w)^2 / (sum of w^2), computed over control units. Max |Std. diff.| is the largest absolute standardized mean difference between treated and reweighted control units across all imposed moment conditions. Moment conditions specified: the 13 covariates, their 72 pairwise interactions (excluding interactions between mutually exclusive education or marital-status categories), and the squared and cubed terms of age and income; each term is listed in Table A2. Before estimation, terms that are collinear with other terms or with the constant among the control units of the estimation sample were identified with _rmcoll and removed. Terms dropped because of collinearity: (1) Employed x Disabled; (2) Employed x Disabled; (3) Employed x Disabled; (4) Employed x Disabled. Data: TurkStat Household Budget Surveys, 2005-2018.

Table A2.

Moment Conditions Used in Entropy Balancing and Their Balance (Physician Expenditures, Main Specification)

	Moment order	Imposed (1 = yes)	Treated mean	Control (raw) mean	Control (raw) Std. diff.	Control (EB) mean	Control (EB) Std. diff.
(1) Female	1	1	0.532	0.520	0.024	0.532	0.000
(2) Age	1	1	38.500	40.889	-0.129	38.500	-0.000
(3) Secondary school	1	1	0.220	0.195	0.062	0.220	0.000
(4) High school	1	1	0.068	0.182	-0.352	0.068	0.000
(5) University or more	1	1	0.016	0.135	-0.463	0.016	-0.000
(6) Married	1	1	0.589	0.708	-0.252	0.589	0.000

(7) Widowed	1	1	0.074	0.052	0.088	0.074	-0.000
(8) Divorced/Separated	1	1	0.020	0.017	0.025	0.020	0.000
(9) Household disposable income (arsinh)	1	1	9.626	10.245	-0.964	9.626	-0.000
(10) Employed	1	1	0.384	0.480	-0.196	0.384	-0.000
(11) Presence of elderly in house	1	1	0.417	0.373	0.090	0.417	0.000
(12) Presence of children in house	1	1	0.625	0.447	0.362	0.625	0.000
(13) Disabled	1	1	0.084	0.020	0.292	0.084	0.000
(14) Female x Age	1	1	20.962	21.211	-0.010	20.962	0.000
(15) Female x Secondary school	1	1	0.097	0.087	0.033	0.097	0.000
(16) Female x High school	1	1	0.021	0.080	-0.270	0.021	0.000
(17) Female x University or more	1	1	0.003	0.060	-0.327	0.003	-0.000
(18) Female x Married	1	1	0.310	0.358	-0.102	0.310	0.000
(19) Female x Widowed	1	1	0.063	0.045	0.079	0.063	0.000
(20) Female x Divorced/Separated	1	1	0.015	0.012	0.027	0.015	0.000
(21) Female x Household disposable income (arsinh)	1	1	5.108	5.322	-0.043	5.108	0.000
(22) Female x Employed	1	1	0.126	0.147	-0.062	0.126	0.000
(23) Female x Presence of elderly in house	1	1	0.236	0.202	0.082	0.236	0.000
(24) Female x Presence of children in house	1	1	0.336	0.232	0.232	0.336	0.000
(25) Female x Disabled	1	1	0.035	0.012	0.152	0.035	0.000
(26) Age x Secondary school	1	1	4.762	5.394	-0.056	4.762	0.000
(27) Age x High school	1	1	1.859	6.259	-0.386	1.859	0.000
(28) Age x University or more	1	1	0.442	5.020	-0.465	0.444	-0.000
(29) Age x Married	1	1	25.413	31.652	-0.260	25.413	0.000
(30) Age x Widowed	1	1	5.406	3.596	0.103	5.406	-0.000
(31) Age x Divorced/Separated	1	1	0.922	0.740	0.029	0.922	0.000
(32) Age x Household disposable income (arsinh)	1	1	368.969	417.910	-0.270	368.972	-0.000
(33) Age x Employed	1	1	14.160	18.734	-0.220	14.160	-0.000
(34) Age x Presence of elderly in house	1	1	19.286	17.799	0.055	19.286	0.000
(35) Age x Presence of children in house	1	1	22.224	16.149	0.288	22.224	0.000
(36) Age x Disabled	1	1	4.274	1.049	0.265	4.274	0.000
(37) Secondary school x Married	1	1	0.062	0.089	-0.103	0.062	0.000
(38) Secondary school x Widowed	1	1	0.000	0.002	-0.043	0.000	0.000
(39) Secondary school x Divorced/Separated	1	1	0.002	0.003	-0.004	0.002	0.000
(40) Secondary school x Household disposable income (arsinh)	1	1	2.138	1.990	0.037	2.138	0.000
(41) Secondary school x Employed	1	1	0.079	0.082	-0.011	0.079	0.000
(42) Secondary	1	1	0.062	0.054	0.034	0.062	0.000

school x Presence of elderly in house							
(43) Secondary school x Presence of children in house	1	1	0.159	0.106	0.158	0.159	0.000
(44) Secondary school x Disabled	1	1	0.006	0.002	0.075	0.006	0.000
(45) High school x Married	1	1	0.028	0.120	-0.356	0.028	0.000
(46) High school x Widowed	1	1	0.000	0.002	-0.046	0.000	0.000
(47) High school x Divorced/Separated	1	1	0.001	0.004	-0.052	0.001	0.000
(48) High school x Household disposable income (arsinh)	1	1	0.668	1.893	-0.367	0.668	0.000
(49) High school x Employed	1	1	0.028	0.100	-0.295	0.028	0.000
(50) High school x Presence of elderly in house	1	1	0.020	0.056	-0.187	0.020	0.000
(51) High school x Presence of children in house	1	1	0.042	0.084	-0.173	0.042	0.000
(52) High school x Disabled	1	1	0.002	0.001	0.033	0.002	0.000
(53) University or more x Married	1	1	0.004	0.098	-0.439	0.004	-0.000
(54) University or more x Widowed	1	1	0.000	0.001	-0.042	0.000	-0.000
(55) University or more x Divorced/Separated	1	1	0.000	0.003	-0.070	0.000	-0.000
(56) University or more x Household disposable income (arsinh)	1	1	0.162	1.451	-0.468	0.162	-0.000
(57) University or more x Employed	1	1	0.005	0.099	-0.432	0.005	-0.000
(58) University or more x Presence of elderly in house	1	1	0.004	0.031	-0.208	0.004	-0.000
(59) University or more x Presence of children in house	1	1	0.007	0.063	-0.307	0.007	-0.000
(60) University or more x Disabled	1	1	0.000	0.000	0.010	0.000	-0.000
(61) Married x Household disposable income (arsinh)	1	1	5.640	7.251	-0.342	5.640	-0.000
(62) Married x Employed	1	1	0.277	0.377	-0.215	0.277	-0.000
(63) Married x Presence of elderly in house	1	1	0.231	0.251	-0.046	0.231	0.000
(64) Married x Presence of children in house	1	1	0.395	0.345	0.103	0.395	0.000
(65) Married x Disabled	1	1	0.040	0.009	0.199	0.040	0.000
(66) Widowed x Household disposable income (arsinh)	1	1	0.703	0.524	0.075	0.703	-0.000
(67) Widowed x Employed	1	1	0.007	0.006	0.013	0.007	0.000
(68) Widowed x Presence of elderly in	1	1	0.062	0.039	0.105	0.062	-0.000

house							
(69) Widowed x Presence of children in house	1	1	0.035	0.015	0.126	0.035	-0.000
(70) Widowed x Disabled	1	1	0.012	0.004	0.090	0.012	0.000
(71) Divorced/Separated x Household disposable income (arsinh)	1	1	0.196	0.174	0.016	0.196	0.000
(72) Divorced/Separated x Employed	1	1	0.007	0.009	-0.027	0.007	0.000
(73) Divorced/Separated x Presence of elderly in house	1	1	0.009	0.008	0.016	0.009	0.000
(74) Divorced/Separated x Presence of children in house	1	1	0.011	0.006	0.059	0.011	0.000
(75) Divorced/Separated x Disabled	1	1	0.004	0.001	0.061	0.004	0.000
(76) Household disposable income (arsinh) x Employed	1	1	3.712	4.960	-0.252	3.712	-0.000
(77) Household disposable income (arsinh) x Presence of elderly in house	1	1	4.009	3.801	0.043	4.009	0.000
(78) Household disposable income (arsinh) x Presence of children in house	1	1	6.064	4.596	0.298	6.064	0.000
(79) Household disposable income (arsinh) x Disabled	1	1	0.807	0.201	0.284	0.807	0.000
(80) Employed x Presence of elderly in house	1	1	0.141	0.148	-0.022	0.141	0.000
(81) Employed x Presence of children in house	1	1	0.251	0.239	0.027	0.251	-0.000
(82) Employed x Disabled	1	0	0.000	0.000	–	0.000	–
(83) Presence of elderly in house x Presence of children in house	1	1	0.170	0.074	0.296	0.170	0.000
(84) Presence of elderly in house x Disabled	1	1	0.044	0.012	0.196	0.044	0.000
(85) Presence of children in house x Disabled	1	1	0.036	0.006	0.210	0.036	0.000
(86) Age squared	2	1	1,866.834	1,970.753	-0.060	1,866.838	-0.000
(87) Age cubed	3	1	107,527.639	107,503.186	0.000	107,527.652	-0.000
(88) Income squared	2	1	93.078	105.368	-0.987	93.079	-0.000
(89) Income cubed	3	1	903.662	1,087.664	-0.984	903.675	-0.000

Notes: Specification: physician expenditures, main specification - Table 3. Each row is one moment condition in the entropy balancing (EB) constraint set; all conditions are imposed on the mean of the listed term (ebalance, targets(1)). Moment order 1 = covariate or pairwise interaction; 2 = squared term; 3 = cubed term. Balancing the squared and cubed terms of age and income equates their second and third moments. For binary covariates, mean balance implies balance in all higher moments, so no higher-order terms are included. Imposed = 0 indicates a term removed before estimation because it is collinear with other terms or with the constant among control units. Std. diff. = (mean_T - mean_C) / sqrt((var_T + var_C)/2), computed with unweighted variances. Data: TurkStat Household Budget Surveys, 2005-2018.

Table A3.

The Association Between Green Card Health Insurance and Physician Expenditures (Control Group: Uninsured)

	(1) OLS	(2) Entropy Balancing
Green Card Health Insurance	-0.173***	-0.214***
	(0.030)	(0.036)
R-squared	0.329	0.324
N (Observation)	17380	17380

Notes: The dependent variable is the inverse hyperbolic sine (arsinh) of real monthly household out-of-pocket physician expenditures (2003 prices), estimated on the intensive margin. The control group is restricted to uninsured individuals. Column 1 reports OLS (Ordinary Least Squares) estimates; column 2 reports weighted least squares estimates using EB weights re-estimated for this comparison. All models control for female, age, education (reference: primary or less), marital status (reference: never married), arsinh of real household income, employment, presence of elderly members and children in the household, and sickness/disability, as well as year and NUTS-2 region fixed effects. Entropy balancing (EB) weights are estimated separately on each estimation sample and equate the treated and control groups on the means of the 13 covariates and their 72 pairwise interactions, and on the second and third moments of age and income. Weight diagnostics for the physician expenditure specifications and the full list of moment conditions are reported in Appendix Tables A1 and A2. Standard errors clustered at the household level are in parentheses. * p<.10, ** p<.05, *** p<.01. Data: TurkStat Household Budget Surveys, 2005-2018.

Table A4.

The Association Between Green Card Health Insurance and Hospital Expenditures (Control Group: Uninsured)

	(1) OLS	(2) Entropy Balancing
Green Card Health Insurance	-0.278***	-0.342***
	(0.073)	(0.087)
R-squared	0.403	0.407
N	4179	4179

Notes: The dependent variable is the inverse hyperbolic sine (arsinh) of real monthly household out-of-pocket hospital expenditures (2003 prices), estimated on the intensive margin. The control group is restricted to uninsured individuals. Column 1 reports OLS estimates; column 2 reports weighted least squares estimates using EB weights re-estimated for this comparison. All models control for female, age, education (reference: primary or less), marital status (reference: never married), arsinh of real household income, employment, presence of elderly members and children in the household, and sickness/disability, as well as year and NUTS-2 region fixed effects. Entropy balancing (EB) weights are estimated separately on each estimation sample and equate the treated and control groups on the means of the 13 covariates and their 72 pairwise interactions, and on the second and third moments of age and income. Weight diagnostics for the physician expenditure specifications and the full list of moment conditions are reported in Appendix Tables A1 and A2. Standard errors clustered at the household level are in parentheses. * p<.10, ** p<.05, *** p<.01. Data: TurkStat Household Budget Surveys, 2005-2018.

Table A5.

Extensive Margin: Green Card Health Insurance and the Probability of Any Out-of-Pocket Expenditure

	Any physician expenditure		Any hospital expenditure	
	(1)	(2)	(3)	(4)
	OLS	Entropy Balancing	OLS	Entropy Balancing
Green Card Health Insurance	-0.006	-0.017***	-0.031***	-0.023***
	(0.006)	(0.006)	(0.004)	(0.004)
Mean of dependent variable	0.396	0.396	0.131	0.131
R-squared	0.122	0.173	0.140	0.143
N	226,148	226,148	226,148	226,148

Notes: Linear probability models estimated on the full sample of individuals with non-missing covariates. The dependent variable equals 1 if the household reports positive physician (hospital) out-of-pocket expenditure and 0 otherwise. EB weights are re-estimated on this sample with the same moment conditions as in the main analysis. All models control for female, age, education (reference: primary or less), marital status (reference: never married), arsinh of real household income, employment, presence of elderly members and children in the household, and sickness/disability, as well as year and NUTS-2 region fixed effects. Standard errors clustered at the household level are in parentheses. * p<.10, ** p<.05, *** p<.01. Data: TurkStat Household Budget Surveys, 2005-2018.