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Drawbacks and aftermath of the Affordable Care Act: ex-ante moral hazard and inequalities in health care access

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Significance for public health

In the last years, the debate about the Affordable Care Act has been vigorous. For the first time, the US health system experienced a strong and revolutionary change with the introduction of a public programme into a previously totally private system. The debate about the consequences of this policy is open since the effects are unclear. The recent US presidential election proved the relevance of the debate. The analysis reported here is an attempt to add another piece to the puzzle, highlighting some critical aspects from a different point of view in a field that is still controversial.

Abstract

Background: Following the introduction of the Affordable Care Act, various studies have tried to identify the effects of the Reform, without reaching a clear consensus. The aim of this study was to investigate whether expansion of the Medicaid program has led to less inequality in access to health care and to a higher level of ex-ante moral hazard.

Design and Methods: The analysis was conducted on two-year longitudinal data (2014-2015) regarding a cohort of 15,898 individuals from a Medical Expenditure Panel Survey (MEPS). After a data cleaning procedure, a sample of 9,255 individuals was selected for the inequality part of the study and 2,307 for the ex-ante moral hazard analysis. Propensity score matching with nearest-neighbour and kernel matching algorithms, difference-in-difference models and concentration index, corrected according to Erreygers methodology, were adopted.

Results: The analysis showed that disparities were reduced between social classes although the ex-ante moral hazard is a real problem with the Affordable Care Act since individuals covered by public insurance tended to abuse the public service. Among those who benefited from the Act, a reduction in preventive behaviours was observed: there was an increase in smoking and a decrease in level of physical activity. As far as concerns access to health care, there was a decrease in inequality in emergency visits, inability to get care and getting care when needed among beneficiaries of the Reform.

Conclusions: This study demonstrates that the extension of Medicaid has had a dual effect of reducing disparities in access to health care but, at the same time, it seems to have induced people to take less care of themselves.

Introduction

The concepts of ex-ante and ex-post activities are pillars of the health insurance market, being associated with the main risks for insurance coverage. According to health insurance models, having insurance coverage could undermine an individual's attempt to conduct a healthy lifestyle and preventive activities. This phenomenon is called ex-ante moral hazard [1]. The ex-post moral hazard takes place after the loss of health has occurred. The consequence is an increment in health care use and/or sick leave [2].

While ex-post moral hazard in the health insurance market has been widely investigated, the evidence about ex-ante moral hazard and analyses of inequalities resulting from the expansion of Medicaid are scant. Medicaid[1] was introduced during President Lyndon Johnson's mandate (1965),

[1] Medicaid, a public health insurance programme, was designed for all individuals and families with a low income and limited family resources. It is based at federal and state levels and so has its own rules and eligibility for patients according to the state. There are two possible ways to apply for Medicaid: through the Health Insurance Marketplace (HIM) or through the state Medicaid Agency.

but its reform started in March 2010, when the Affordable Care Act (ACA) – also known as 'Obamacare' – was approved, with the final aims of improving access to health care, containing costs and reallocating expenditure.

As a result of the implementation of the ACA in 2014, Medicaid was expanded to a larger proportion of the population. First, the poverty threshold was raised from 100% to 133% and a tax credit premium was introduced for all people whose salary lay between 133% and 400% of the poverty threshold. As a consequence, the threshold to be considered poor passed from $11,489 per-subject per-year to $15,282$ after 2014. Secondly, employers with more than 50 employees were forced to supply insurance coverage; Thirdly, 'cherry picking' was forbidden and companies could not insure people based on their pre-existing conditions. According to the data for the sample of subjects that we studied,, the increase in the poverty threshold more than quadrupled the number of people considered poor (from 529 in 2014 to 2,307 in 2015). Although the ACA came into force in January 2014, its implementation was not obligatory and nineteen states decided not to adhere [3].

Some authors have postulated that public insurance plans could lead to less inequality in health care access [4,5,6] but to a higher level of ex-ante moral hazard, because of negative behaviours in those US households that benefit from the Reform [7,8,9]. The roots of this hypothesis lie in the principle that health insurance removes the financial consequences of illness, since expenditure for insured individuals who need healthcare assistance is no longer sustained privately by the person requiring the assistance. Studies supporting this hypothesis have some limitations: Dave *et al*. (2006) concluded that having public health insurance reduces the personal preventive behaviours only among elderly individuals [10]; Spenkuch *et al*. (2012) focused on Mexican states, considering changes from the demand side, while keeping all the characteristics and constraints of the supply side fixed[7]. Sommers *et al*. (2016) performed their analysis only in three US states (Kentucky and Arkansans which adopted the ACA and Texas which did not)[11]. Other studies are controversial: Cotti *et al*. (2019) concluded that the number of smokers and cigarette consumption decreased after the Reform [8]; Countermanche *et al*. (2017) discovered that the impact of Medicaid expansion was positive in terms of insurance coverage and access to care, but without statistically significant proof of the consequent unhealthy behaviours [9]; Simon *et al*. (2017) found that reported health was improved by the expansion of Medicaid [12].

To the best of my knowledge, only two studies have focused on the impact of the ACA on socioeconomic inequalities in access to health care, showing a positive effect on access to health care, with greater equality in use of preventive services, quality of care and access to a doctor [4,5]. On the other hand, the Oregon Health Insurance Experiment suggested that the expansion of Medicaid did not have strong positive effects on reducing inequalities [13, 14].

On the background of the lack of a common consensus in this field, the aim of this study was to shed light on the effects (drawbacks and aftermath) of the ACA on personal behaviours and possible inequalities in access to health care. Unlike previous studies, the analysis was performed on a heterogeneous dataset representative of the whole USA.

Design and Methods

This project started in October 2019. Two-year longitudinal data, derived from responses to the Medical Expenditure Panel Survey (MEPS)[2] were analysed. Each MEPS panel is a subsample of the National Health Interview Survey (NHIS), with enrichment of information from low-income households. The MEPS provides information about expenditures, payments, different insurance plans and healthcare use, demographics, socioeconomic status, self-reported health and health care access. The period under investigation was between 2014 and 2015. The two-year period was selected because the MEPS provides information on a two-yearly basis and no comparison between panels is possible because of anonymization of data. The initial dataset contained records for 15,898 individuals; 92.1% of the respondents' information was available for both years and in the remaining 7.9% of cases only for one year due to death, birth or the person left the country.

After the data cleaning procedure, including elimination of individuals for whom complete, two-year information was not available, and through an interaction between the poverty threshold and total personal income, a balanced dataset[3], was derived. All household members aged below 18 and above 65 years were excluded, since the former are eligible for other government health insurance programs (CHIP) and the Medicare program covers the latter. Finally, data from a sample of 9,255 individuals were selected for the inequality part of the study and data from 2,307 individuals were used for the behavioural analysis. Since no information about the state of provenience was available, individuals who did not have Medicaid insurance in 2014, but who were receiving public healthcare coverage in 2015 after the rise in the upper limit to define poverty, were assumed to come from those states adhering to the new "Obamacare" policy (https://www.healthcare.gov/.).

The variables considered in our analysis are reported in Table 1: *Race* represents a dummy variable which distinguished between white individuals and different minorities, grouped together; *Married* identifies whether the individual under observation was married or not in 2014 and/or 2015; *Years of education*[4] was assigned the value of zero if the individual had no education or, anyway, less then primary school level, then the score increased progressively; *Unemployment* identifies

[2]MEPS data started to be collected in 1996 and they are provided by the Agency for Healthcare Research and Quality (AHRQ).
[3]Characterized by the absence of missing values and the satisfaction of unbalanced conditions.
[4]The discrimination between high and low level of education was provided by Armstrong *et al.* (2014): below high school education, individuals are considered to have a low level of education. Thus, two dummy variables were generated for high and low level of education.

individuals without a job or the possibility of returning to work within the year of investigation; *Blood control, Breast exam, Check-up, Obesity, Junk and fat food eating, Low level of physical exercise, Smoking, Stroke, Heart attack,* and *High cholesterol level* are binary variables indicating specific behaviours, preventive and not, which an individual may adopt; *Self-assessed health*[5] is a categorical variable with a score ranging from 1 to 5; *Total personal income and Total family income* captures the individual's and family's income, respectively, in 2014 and 2015; *Medicaid insurance, Private insurance* and *Uninsured* are variables that document the type of insurance that the the subject had or whether the individual did not have insurance coverage.

The analysis was performed in different steps. First, probit models were run to understand whether or not individual behaviours (i.e. *preventive behaviours, check-up, obesity*[6]*, smoking, health condition*[7] and *low level of exercise*) were influenced by demographic and social variables. The probit non-linear regression model was necessary as a first step to investigate the probability with which an individual may or may not develop a specific behaviour (i.e., the dichotomous dependent variable). Probit models were conceived for the analysis of individual choices since individuals often make choices between two distinct alternatives. The interpretation of probit coefficients was essential to understand how the probability of adopting a specific behaviour varies. In probit models, the marginal effects, reported in Table 2, vary with the characteristics of the individuals. Based on the signs and significance of the estimated coefficients of the explanatory variables, it is possible to establish the effect on personal behaviours.

However, probit models cannot provide any information on the magnitude of policy effects. Thus, once those behaviours on which it was possible to observe an impact of the ACA had been identified, the second step of the analysis aimed to define how and how much the expansion of Medicaid resulted in negative behaviours in an individual and the change in ex-ante moral hazard (i.e. *preventive behaviours, smoking* and *low level of physical activity).* For this purpose, Propensity Score Matching (PSM) and Difference-in-Difference (DID) models were run.

PSM reduces distortion, solving the problem of bias generated by confounding variables, and avoids problems of endogeneity[8], through the adoption of a double-robust approach by combining the regression analysis and propensity score[16]. PSM is intended to obtain pairing of cases and controls under randomization. The propensity score can be defined as the conditional probability of

[5]Where 1=excellent health, 2=very good health, 3=good health, 4=fair health, 5=poor health. This means that the unitary marginal increment of Self-Assessed Health moves from a better condition to a worse one.

[6]This is calculated according to the Body-Mass Index (BMI) whose threshold for discriminating obese individuals is based on the international Body-Mass Index thresholds published by the NHS: for values above 30, the subject is considered obese.

[7]This variable expresses a series of negative health conditions: heart problems, high blood pressure, high cholesterol, stroke, diabetes, asthma, arthritis and cancer.

[8]Patients may adopt some specific behaviours because of lower income or their own individual characteristics.

having experienced the Medicaid expansion, given all the observed demographic and social characteristics, which may determine the selection, in a region of common support[9][17, 18]. Once the propensity score is computed, the process of matching, adopting nearest-neighbour and kernel matching algorithms, is provided by the so-called 'statistical twins' procedure, which is able to solve the problem of self-selection [19, 20]. In detail, the algorithm provides 'statistical twins' that differ only for having or not having Medicaid coverage. Subsequently, the Average Treatment Effect of Treated (ATET) is computed for the two groups in order to understand the average impact of the ACA on personal behaviours [21].

After determining the average effect of the policy, the DID approach was used to identify the true effect of the changing condition (treated vs. control) of Medicaid coverage, based on household income, before and after the expansion resulting from the ACA[10][22, 23]. The control group consisted of individuals not covered by the expansion of Medicaid, whereas the treatment group was formed by individuals who became beneficiaries of the ACA Reform. Of note, necessary and sufficient conditions[11]for the implementation of DID were respected[24]. In detail, it is reasonable to suppose that if in 2014 there had not been the Medicaid Reform, people would have not changed their personal behaviours. Thus, the DID (or 'double difference') estimator could be defined as the difference in average outcome in the treatment group before and after treatment minus the difference in average outcome in the control group before and after treatment [22].

The last step of the analysis, focused on the effects of the ACA in terms of healthcare access, was carried out using the concentration index methodology [25, 26]. The aim of this analysis was to establish whether the ACA had a positive or negative effect in terms of degree of inequalities among US citizens, including very poor and rich people (9,255 individuals). Attention was focused on the gaps generated by the Reforms on health care access and the possibility of prevention (i.e., *prevention, outpatients' visits, getting care when needed, inability to get care* and *emergency visits)*. Inequalities related to socioeconomic status are rank-based measures. Since indicators for healthcare access are dummy variables, Erreygers (2009) suggested a correction of the base index version [27], which is able to compute inequality in healthcare access [28]. Healthcare access and services can be represented as a function of a person's need for healthcare, the predisposition to use healthcare services and factors that enable or prevent the usage.

[9]Matching procedures try to select, from the non-treated individuals, a group of controls in which the distribution of observed variables is as similar as possible to the distribution in the treated group. In other words, for any confounding variable value, both in treatment and control groups, a unit *i* can be observed

[10]2014 is the pre-treatment period and 2015 indicates the post-treatment one.

[11] Similar dimension of groups, parallel trend assumptions and absence of systematic composition changes within each group.

Results

Table 1 shows the descriptive statistics for the low-income group (i.e., 2,307 individuals) and the whole sample. Individuals covered by Medicaid were more frequently younger and female (67%) and their mean years of education after primary school was less than four. According to the methodology of Armstrong *et al.* (2014), these individuals are categorized as having a low level of education. In our sample, such individuals accounted for nearly one-third (n=645 subjects, 28%) of the whole cohort. It is supposed that individuals with a lower level of educations are likely to have lower salaries, and therefore, are less likely to buy out-of-pocket insurance.

About 9% of the subjects with Medicaid insurance were married. With regard to ethnicity (White, 62%; Black 26%; Asian 7%; multiple ethnic groups 5%), Medicaid was extended to 185 new White subjects and 115 individuals from different ethnic groups.

In line with MEPS data, between 2014 and 2015, the number of unemployed decreased (from 1,695 to 1,597) and the percentage of insured increased in both the private and public sectors. According to the data, the number of individuals considered very poor and covered by Medicaid increased from 736 (31.9% of all individuals) in 2014 to 899 (39%) in 2015. The problem of not knowing from which state each individual came from was overcome by considering individuals not covered in 2014 and 2015 to belonging to those states not adopting the ACA. Among the 2,307 individuals, 736 were insured before and after the Reform, 1,271 were uninsured before and after the Reform (i.e. the control group); and 300 subjects (13%), with the increase in the poverty threshold, gained Medicaid insurance (i.e. the treated group). It is worth noting that 18 individuals in the treated group (i.e. about 6% of this group) became smokers after the ACA came into force, 42 (14%) stopped physical activity, and 26 (9%) stopped taking care of themselves through the adoption of preventive behaviours.

When comparing the inequality sample (9,255 subjects) with the group of individuals with a low income, the average age, the percentage of married individuals (10% increase) and the average years of education (about 5 years after the end of primary school) were higher in the former group.

As expected, low-income individuals were more frequently covered by Medicaid or uninsured and less frequently owned private insurance. Furthermore, the average personal income in the low-income group was ten times less than that of the whole sample and the average family income was almost half.

As reported in Table 2, probit models showed a positive relationship between age and personal behaviours. In detail, between the two years of the Medicaid expansion, older people used more prevention, had more check-ups, had worse health conditions, were more frequently obese, performed less physical exercise and smoked less. Males did less prevention and had fewer periodic check-ups,

with changes between the two years from about 4% to 9% and from about 11% to 14%, respectively. Males had fewer physical problems thanks to higher levels of physical activity. They were also less frequently obese and smokers so they suffered fewer negative health conditions. Ethnicity played a key role (p-value < 0.001) for all the behaviours (i.e. obesity, smoking, check-up, health conditions and low level of physical activity) taken into account except for preventive behaviours. Having a low level of education had a negative impact in terms of obesity, smoking, low level of physical activity and health conditions. In other words, with a higher level of education the prevalence of smokers decreased, individuals were less obese, exercised more and suffered less from negative health conditions. Unemployment showed significant positive correlations with prevention and check-ups, negative correlations with smoking, physical activity and health conditions, and only a negative trend for obesity. In all cases self-assessed health was significant (p-value <0.001), with a positive effect at the margin with preventive behaviours, check-ups, low level of physical activity, the incidence of obesity, smoking prevalence and negative health conditions for worse reported health. The Obama Reform (ACA) had a significant impact at the margin in terms of preventive behaviours, smoking and low level of physical activity. According to the results of this study it can be inferred that having Medicaid coverage generates a reduction of prevention, increasing the negative behaviours of smoking and a sedentary life.

Figure 1 provides a graphical representation of the PSM procedure, showing data before and after the matching procedure. Despite the limited time horizon, PSM (Table 3) demonstrated that the ACA had strong effects on personal negative behaviours in the sample of low-level individuals. The Reform resulted in an approximately 8% increase in smokers, 12.5% reduction in physical activity and 4.3% decrease in individuals who used prevention.

These results were also highlighted with the DID approach (Table 4), although the impact with this model was weaker. As shown in the table, the expansion of Medicaid led to an increment in negative behaviours: 1,5% and 4,9% increases for smoking and low level of physical activity and a 1% reduction in the proactive behaviour of taking care of oneself ($p < 0.10$).

Table 5 reports the results of the inequality analysis. Medicaid increased disparities in preventive activities in favour of rich people (from 6.7% to 8%), in other words the gap between rich and poor individuals got larger between the two years. Outpatient visits, although not significant, remained stable over the two years (0.1%). Following the ACA Reform, disparities in Emergency visits increased, in favour of poor people, with an increment of 1.2%, which means that poor individuals are more protected in the case of emergencies, rather than in the case of prevention or regular check-ups. The disparity in inability to get care when needed, which was greater among poor people in 2014, decreased slightly between 2014 and 2015 (0.3%). Finally, the ability of individuals

to get care when needed had a pro-rich distribution, in line with the expectations, since it is the reverse of the previous variable. Anyway, in this case the improvement among the poor was greater (2.8%).

Discussion

The aim of the study was to investigate the possible drawbacks and aftermath of the Medicaid Reform in terms of higher levels of ex-ante moral hazard and possible reduction of inequalities, given that the economic literature focusing on this field is limited and controversial.

Descriptive statistics of the low-income sample (i.e., 2,307 subjects), proved that individuals covered by Medicaid are more frequently younger and female, probably due to socioeconomic drivers. As already reported by Blau and Kahan (2006) and Angelov *et al*. (2016) these individuals have lower incomes because they are at the beginning of their career or because of the gender gap and, consequently, it is more likely for them to end up below the poverty threshold [29, 30]. By contrast, there were few married individuals in this group, probably because the increase of income in a family reduces the possibility of obtaining public insurance coverage [31, 32]. In line with MEPS data, between 2014 and 2015, the number of unemployed decreased (from 1,695 to 1,597) and the percentage of insured increased in both the private and public sectors (from 31.9% to 39%). As expected in the inequality sample (9,255 subjects), on average, individuals were older, more frequently married and had a higher level of education than low-income individuals. Among the 2,307 subjects in the low-income group, 736 individuals were insured before and after the Reform, 1,271 were uninsured before and after the Reform (i.e. the control group); and 300 subjects (13%) gained Medicaid insurance after the increase of the poverty threshold (i.e. treated group).

Through probit models, the ex-ante moral hazard was confirmed for *prevention, smoking* and *low level of physical activity.* Thus, from a general perspective older people, suffering from more physical problems, use more prevention and young individuals tend to smoke more for social acceptance [33] and because of a more stressful life [34]. In line with literature, race and gender had an impact in terms of prevention and personal behaviours. Ethnicity played a key role (p-value < 0.001) in all cases but prevention. The main explanation can be provided by the intrinsic characteristics of individuals. According to Cossrow and Falkner (2004), in recent years there has been an increase in obesity among African-Americans and Hispanic/Mexican-Americans rather than Caucasian [35]; moreover, Giga *et al*. (2008) noted that all non-Caucasian individuals face fewer employment opportunities with the direct consequences of some negative personal behaviours [36]. Furthermore, individual lifestyles may generate some racial disparities (e.g. physical exercise ensures the possibility of obtaining social and educational results and incentives). In detail, Egli *et al*. (2011)

studied these differences in college students and concluded that race differences provided significant differences in eight of 14 exercise motivations [37].

Higher levels of education had a positive impact on prevention and personal behaviours. This result confirms the analyses of Feinstein *et al.* (2006) and Fonseca *et al.* (2019), who concluded that more years of education lead to a higher level of health, with more years of schooling being associated with a reduction in reported poor health [38, 39]. Unemployment reduced negative health conditions and increased the level of physical activity. The former effect could be explained by the characteristics of the sample: younger individuals have a higher probability both of being unemployed and of being in good health. The latter effect could be explained by the availability of more free time. Self-assessed health was in line with expectations: a lower level of reported health and higher level of prevention are observed more frequently in people with more negative health conditions and behaviours. In fact, individuals who feel worse tend to adopt more proactive behaviours to change their negative condition and, at the same time, they represent that part of the population in a disadvantaged health state. Finally, having Medicaid coverage generated a reduction of prevention and increased negative behaviours such as smoking and a sedentary lifestyle. This is in line with literature: individuals covered by public insurance, relieved of personal expenditure on health, tend to abuse the public service, acquiring some negative behaviours (i.e. ex-ante moral hazard) [4,6].

Probit models cannot provide any information regarding the magnitude of an individual's negative behaviours and changes in ex-ante moral hazard after implementation of a new policy. Thus, adopting PSM and DID methodologies, a second analysis was conducted on those behaviours for which the ACA had been seen to have an impact (i.e. *preventive behaviours, smoking* and *low level of physical activity)*. Despite the limited time horizon, in the sample of low-income individuals, PSM demonstrated that the Medicaid expansion had strong negative effects on personal behaviours, with an increase of smokers, and reductions in physical activity and prevention. Importantly, smoking and physical exercise are two behaviours that people can change immediately. Therefore, the PSM procedure was able to capture ($p < 0.05$) the proactive negative behaviour and the reduction in prevention. These results were confirmed by the application of DID.

Finally, the concentration index was used to evaluate any inequalities generated by the Reforms on access to healthcare and the possibility of prevention (i.e. *prevention, outpatient visits, getting care when needed, inability to get care* and *emergency visits)*. Differently from Kino and Kawachi (2018), in this study, Medicaid coverage increased disparities in *preventive behaviours* in favour of rich people, due to the fact that implementation of the ACA increased both the demand and supply sides [5]. Garthwaite (2012) proved that as public programmes increased the number of individuals with health insurance, the number of hours of assistance spent with a single patient

decreased [40]. Consequently, rich people, taking advantages of their private plans, may benefit from the healthcare system more than poor individuals. By contrast, when dealing with *emergency visits,* the ACA favoured poor people, protecting them better in the case of emergencies. Reductions in disparities were also observed when the *inability to get care when needed* and *getting care when needed,* were considered. Although Medicaid should reduce disparities, improving the healthcare status of poor individuals, the concentration index demonstrated an increase of benefits in daily and normal care even for rich people, because of spill over and indirect effects.

Conclusions

The final aim of the ACA – also known as 'Obamacare' – was to improve access to health care and to increase the number of individuals covered by public insurance.

Through the analysis of two-year longitudinal data (2014 - 2015) provided by the MEPS and the implementation of econometric strategies (probit models, PSM, DID models and the concentration index), I observed thatt the ACA had a dual effect: on the one hand, personal negative behaviours increased, specifically less prevention, more smoking and lower levels of physical activity; on the other hand, disparities were reduced in the case of emergency care with indirect benefits in daily and normal care also for rich individuals.

In conclusion, the ACA produced a paradox: the pursuit of better healthcare leads individuals to take less care of themselves

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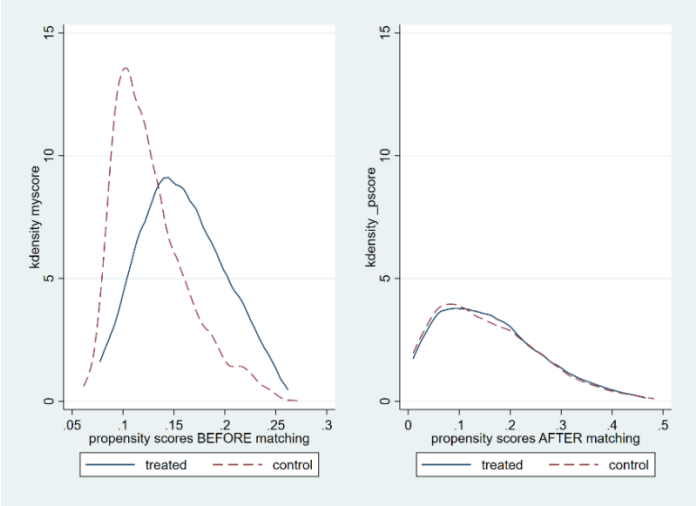
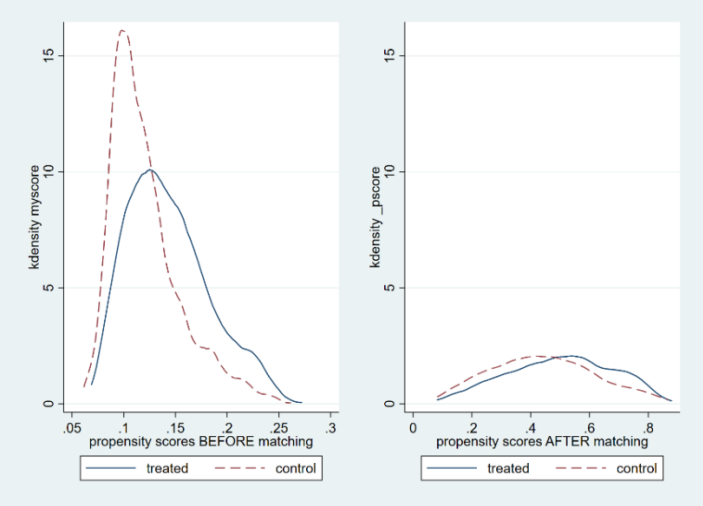
Figure 1. Distribution of individuals (treated vs not-treated) before and after the propensity score matching procedure.

A. Smoking



B. Low Level of Physical Activity



C. Preventive Behaviours

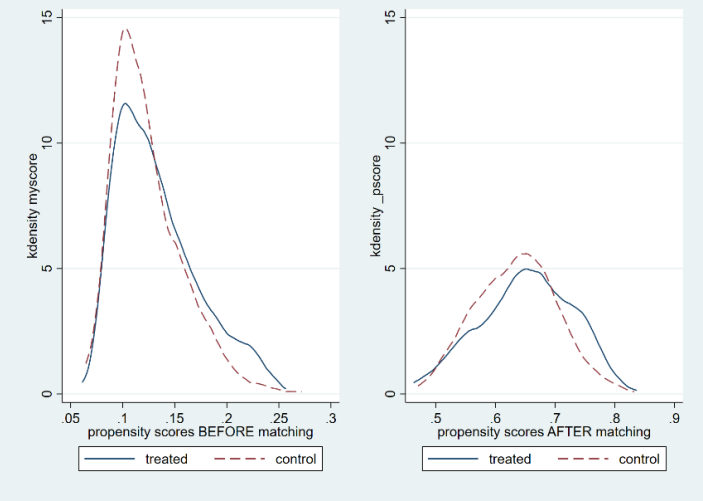


Table 1. Variables, Mean and Standard Deviation of low-income individuals and whole US sample – 2014 and 2015.

	Low-income individuals				*Whole US sample*			
	2014		*2015*		*2014*		*2015*	
Variable	**Mean**	**Std. Dev**	**Mean**	**Std. Dev**	**Mean**	**Std. Dev**	**Mean**	**Std. Dev**
Age	35.5722	14.4258	36.5722	14.4258	40.1844	13.2567	41.1844	13.2567
Sex	0.3303	0.4704	0.3303	0.4704	0.4708	0.4992	0.4708	0.4992
Race	0.6242	0.4844	0.6242	0.4844	0.6674	0.4712	0.6674	0.4712
Married	0.3424	0.4746	0.35215	0.4776	0.4629	0.4986	0.4736	0.4993
Years of Education	3.7642	2.0121	3.7642	2.0121	4.8567	2.3947	4.8567	2.3947
Unemployment	0.7350	0.4414	0.6922	0.4617	0.2922	0.4548	0.2886	0.4531
Blood Control	0.7282	0.4450	0. 7152	0.4514	0.7431	0.4370	0.7051	0.4385
Breast Exam	0.3026	0.4595	0.3108	0.4629	0.2790	0.4485	0.2824	0.4502
Check Up	0.6030	0.4894	0.5961	0.4908	0.6001	0.4899	0.6159	0.4864
Obesity	0.3237	0.4680	0.3213	0.4670	0.3231	0.4667	0.3316	0.4708
Junk and Fat food Eating	0.2744	0.4463	0.3130	0.4638	0.3059	0.4608	0.3335	0.4715
Low level Physical Exercise	0.3658	0.4818	0.4109	0.4921	0.3922	0.4827	0.4217	0.4939
Smoking	0.0997	0.2997	0.0863	0.2808	0.0735	0.2609	0.0727	0.2597
Stroke	0.0269	0.1618	0.0325	0.1774	0.0213	0.1447	0.0216	0.1560
Heart Attack	0.0212	0.1442	0.0256	0.1579	0.0184	0.1343	0.0216	0.1454
High Cholesterol Level	0.1964	0.3973	0.2172	0.4124	0.2228	0.4161	0.2460	0.4307
Self-Assessed Health	2.5067	1.1781	2.5267	1.1317	2.3407	1.0555	2.3412	1.0407
Total Personal Income	3168.248	3786.913	4679.147	4958.745	31268.03	35171.14	32806.87	35652.18
Total Family Income	39225.84	46826.14	40677.20	46558.95	63040.5	57794.99	65105.43	58784.02
Medicaid Insurance	0.3191	0.4662	0.3897	0.4878	0.1498	0.3569	0.1921	0.3940
Private Insurance	0.2679	0.4430	0.3016	0.4591	0.5213	0.4996	0.5679	0.4954
Uninsured	0.2618	0.4397	0.2280	0.4196	0.1957	0.3967	0.1655	0.3717
Individuals	*2,307*		*2,307*		*9,255*		*9,255*	

Table 2. Probit models marginal effect results.

	2014			2015		
A. Preventive Behaviours	Coeff.	Std.Err.		Coeff.	Std.Err.	
Age	0.0021	0.0007	***	0.0042	0.0006	***
Sex	- 0.0364	0.0204	*	- 0.0873	0.0195	***
Race	0.0096	0.0200		0.0165	0.0193	
High Education	0.0197	0.0202		0.0326	0.0196	*
Unemployment	0.0405	0.0216	*	0.0044	0.0201	
Self-Assessed-Health	0.0370	0.0089	***	0.0443	0.0089	***
ACA	- 0.0565	0.0291	**	- 0.0301	0.0290	*
B. Check-Up	Coeff.	Std.Err		Coeff.	Std.Err	
Age	0.0028	0.0007	***	0.0040	0.0007	***
Sex	- 0.1083	0.0198	***	- 0.1438	0.0193	***
Race	- 0.4954	0.0199	**	- 0.0444	0.0196	**
High Education	0.0137	0.0201		0.0443	0.0196	**
Unemployment	0.0720	0.0213	**	0.0363	0.0208	*
Self-Assessed-Health	0.0589	0.0086	***	0.0689	0.0089	***
ACA	0.0243	0.0297		- 0.0026	0.0286	
C. Obesity	Coeff.	Std.Err		Coeff.	Std.Err	
Age	0.0011	0.0007		0.0007	0.0007	
Sex	- 0.1213	0.0200	***	- 0.1296	0.0198	***
Race	- 0.0582	0.0190	**	- 0.0273	0.0192	
High Education	- 0.0760	0.0196	***	- 0.0491	0.0196	**
Unemployment	- 0.0090	0.0207		- 0.0276	0.0206	
Self-Assessed-Health	0.0438	0.0090	***	0.0477	0.0090	***
ACA	0.0211	0.0281		- 0.0035	0.0284	
D. Smoking	Coeff.	Std.Err		Coeff.	Std.Err	
Age	- 0.0003	0.0005		- 0.0011	0.0004	**
Sex	- 0.0599	0.0139	***	- 0.0474	0.0131	***
Race	- 0.0272	0.0122	**	- 0.0473	0.0117	***
High Education	- 0.0453	0.0122	**	- 0.0584	0.0129	***
Unemployment	- 0.0405	0.0132	**	- 0.0212	0.0122	*
Self-Assessed-Health	0.0217	0.0059	***	0.0232	0.0059	***
ACA	0.0410	0.0179	**	0.0505	0.0168	**
E. Health Conditions	Coeff.	Std.Err		Coeff.	Std.Err	
Age	0.0092	0.0006	***	0.0093	0.0006	***
Sex	- 0.0976	0.0179	***	- 0.0911	0.0181	***
Race	- 0.1066	0.0167	***	- 0.1060	0.0172	***
High Education	- 0.1396	0.0171	***	- 0.1315	0.0176	***
Unemployment	- 0.1146	0.0182	***	- 0.0781	0.0192	***
Self-Assessed-Health	0.0520	0.0079	***	0.0480	0.0086	***
ACA	- 0.1147	0.0182		- 0.0247	0.0266	
F. Low level of Physical Activity	Coeff.	Std.Err		Coeff.	Std.Err	
Age	0.0026	0.0007	***	0.0023	0.0007	**

Sex	- 0.1812	0.0195	***	- 0.2031	0.0193	***
Race	- 0.0562	0.0193	**	- 0.0228	0.0193	
High Education	- 0.0513	0.0193	**	- 0.0329	0.0201	*
Unemployment	- 0.0642	0.0208	**	- 0.0272	0.0214	
Self-Assessed-Health	0.0586	0.0086	***	0.0618	0.0092	***
ACA	0.0716	0.0290	**	0.0741	0.0291	**
Number of individuals: 2,307						

*Note: *** indicates p <0.001, ** indicates p <0.05 and * indicates p <0.1*

Table 3. Propensity score matching for preventive behaviours, smoking and low level of physical activity.

	Nearest-Neighbour			Kernel		
	Preventive Behaviour	*Smoking*	*Low level of Physical Activity*	*Preventive Behaviour*	*Smoking*	*Low level of Physical Activity*
Average Treatment Effect on the Treated (ATET)	- 0.061 (0.040) *	0.077 (0.037) ***	0.109 (0.060) ***	- 0.043 (0.033) **	0.080 (0.012) ***	0. 125 (0.029) ***
Number of individuals: 2,307						

**** indicates p <0.001, ** indicates p <0.05 and * indicates p <0.1 – Robust Standard Errors between parentheses*

Table 4. Mean in Control and Treatment groups and difference between Treatment and Control in preventive behaviours, smoking and low level of physical activity.

		Preventive Behaviours	*Smoking*	*Low level of Physical Activity*
Before				
	Control (C)	0.394	- 0.055	- 0.094
	Treated (T)	0.543	0.002	- 0.067
	Diff (T-C)	0.149	0.057	0.027
		(0.021)	(0.015)	(0.021)
		***	***	
After				
	Control (C)	0.400	- 0.083	- 0.077
	Treated (T)	0.538	0.010	0.002
	Diff (T-C)	0.138	0.072	0.076
		(0.020)	(0.013)	(0.020)
		***	***	***
Difference-in-Difference (DID)		- 0.010	0.015	0.049
		(0.028)	(0.019)	(0.028)
		*	**	*
Number of individuals: 2,307				

**** indicates p <0.001, ** indicates p <0.05 and * indicates p <0.1 – Robust Standard Errors between parentheses*

Table 5. Concentration indexes with Erreygers correction relative to 2014 and 2015 in healthcare access.

	Preventive Behaviours	*Outpatient Visits*	*Emergency Visits*	*Inability to Get Care*	*Got Care When Needed*
2014	0.067 (0.042) *	0.010 (0.013)	- 0.071 (0.020) *	- 0.023 (0.001) ***	0.139 (0.008) ***
2015	0.080 (0.029) *	0.011 (0.014)	- 0.083 (0.018) **	- 0.020 (0.006) *	0.111 (0.150) ***
Number of individuals: 9,255					

**** indicates p<0.001, ** indicates p <0.05 and * indicates p<0.1 – Robust Standard Errors between parentheses*