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The deadly effects of losing health insurance*

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Abstract

The number of undocumented migrants in developed countries has increased in recent years, which has generated discussions about the extent to which access to public programs should be restricted for this population. This is the first paper that estimates the effects of restricting access to one of these public programs, health care, on mortality rates of undocumented immigrants. We exploit the natural experiment that arises from a reform implemented in Spain in September 2012 that introduced this restriction. We show that, during the first three years of implementation, the restriction increased the mortality rate of undocumented immigrants by 16%. We also document small changes in the composition of the treated population with 5% of middle educated individuals being substituted by lower educated ones. However, this selective migration can only account for 10% of our mortality effects. Our results show the large effects of health insurance coverage on the health status of vulnerable populations and have important policy implications for developed countries currently receiving sizeable migration flows.

JEL classification: H51; I13; J15.

Keywords: Health insurance; Undocumented immigrants; Mortality rates.

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I. Introduction

Illegal immigrant flows to developing countries have increased substantially in recent years¹. In Europe data from Frontex (European agency for border control) shows that in 2015, the year in which the refugee crisis started, around 2 million people crossed the EU borders illegally. In the USA, this is an issue that has been important primarily since the 1990's and data from the PEW research centre estimates that in 2014 more than 11 million illegal immigrants were living in the USA, which represents 3.5% of the total population.

These increases in illegal immigration have put the immigration debate at the forefront of the political discussions. In particular, one of the items being discussed is whether and to what extent illegal immigrants should have access to public benefits and public programs. In this paper we focus on one of these public programs, health care, and provide the first evidence of the impacts of restricting access to the public health care system for undocumented migrants on the mortality rates of this population. In order to do that, we exploit a reform that introduced these restrictions in Spain in 2012. Using population level data from mortality registers and a differences-in-differences strategy, our results show that restricting access to the public health system for the undocumented population lead to strong increases in their mortality rates, by 16%. At the same time, this restriction could also affect the decision of undocumented migrants of staying in the country. We rule out this possibility as we don't find significant decreases in the affected population after the reform. Nonetheless, using data from the Spanish Labour Force survey, we document changes in the composition of the undocumented population in Spain as the proportion with low levels of education increases after the reform. Thus, middle educated individuals leave the country and these are substituted by lower educated individuals. As health and mortality rates are linked to education, we provide a back of the envelope calculation to show that changes in education levels can only explain a small part, 10%, of the mortality effects that we find. We also show that the effects of the restriction are higher for amenable mortality, defined as deaths from causes that should not occur in the presence of timely and effective interventions. Furthermore, the event study model points towards the effects of the reform increasing over time, as should be expected for an outcome such as mortality.

¹In the literature, illegal immigrants are also referred to as unauthorized immigrants, irregular immigrants or undocumented immigrants and we use them as synonyms in this paper.

We believe the paper makes, at least, two important contributions. First, as far as we are aware of, this is the first paper that looks at potential consequences of health care access for the undocumented population. This is an important contribution in terms of policy implications given the current increase in illegal immigrant flows to developed countries mentioned above. There is, however, an extensive literature evaluating the effects of health insurance coverage on health for several sub-groups of the native population (infants, pregnant women, the elderly, or the poor; see Levy and Meltzer 2008, Dave et al. 2015, Courtemanche et al. 2017 and Sommers et al. 2017 (among others) for reviews and discussions of the literature; Finkelstein 2007 and Finkelstein et al. 2007 focus on the introduction of Medicare). Yet, none of these papers focus on the undocumented population.

A second contribution is that this is the first paper that looks at the impacts of restricting access to the public health care system on mortality. A big part of the literature has focused on expansions in coverage of the main health insurance programs in the US (Medicaid and Medicare) with most of these studies showing positive health effects². However, the literature on health care restrictions is almost inexistent. There is one recent working paper by Tello-Trillo (2018) focusing on a 2005 disenrollment reform from the Medicaid program in Tennessee which looks at medical utilization and self-assessed health, but not at mortality. Therefore, although looking at a different group of the population, our results may be informative for current discussions on dismantelling some of the health care expansions in the USA for disadvantage groups of the native population or for some of the debates around Brexit in the UK.

The rest of the paper is organized as follows. Section II outlines the characteristics of the reform that restricted access to health care for undocumented immigrants. Section III describes the data and the identification strategy while Section IV presents the results of the models. In Section V we estimate the effect of the reform using alternative specifications and Section VI concludes.

²However, not all health care interventions necessarily lead to health improvements (Fisher 2003), and health insurance can induce risky health behaviors (Dave and Kaestner 2009; Dave et al. 2015).

II. The 2012 Spanish Health Reform

The Spanish National Health System offers free access to a comprehensive package of services and benefits covering primary care, specialized care and emergency care. It is funded almost entirely with taxes. Since 2002, the system is highly decentralized to the 17 Spanish regions (Autonomous Communities³), which are in charge of the management and provision of health care in their territories, and in designing and implementing legislation binding in the respective regions. Among other functions, the national government is in charge of designing and implementing national legislation applying to all regions and of undertaking the general coordination of the system. Until 2012, the coverage of the system was universal. All individuals living in Spain were entitled by law to receiving free access to the system irrespective of personal wealth, labor status or administrative situation in the country. In particular, undocumented immigrants were entitled to the same bundle of services as Spanish natives with the only requirement of being registered as residents in a municipality. This administrative procedure is relatively simple and it only requires the individual to document his/her place of residence in the municipal register. Examples of valid documents of residence are a letter from the landlord of the rented apartment or a bill from a service company (gas, electricity, etc.) with the name of the person and the address of the apartment. Once registered in the municipality, the individual can apply for a health care card that would be sent to his/her home and would entitle him/her direct access to the public health system⁴.

In 2012, with the official aim of saving resources and dissuading “health tourism”, the Spanish government implemented a reform of the health system with the approval of Royal Decree 16/2012. The new law, which came into effect in September 1 2012, restricted free access to the health care services for the population of undocumented immigrants, changing the universal nature of the system. In particular, the reform established that, from that point onwards, immigrants needed an official residence permit in Spain in order to be granted access to the system. The process to obtain a residence permit is long and many times unsuccessful; the immigrant has to be claimed by an employer for work

³Autonomous Communities are the 17 administrative units corresponding to the first level of regional decentralization in Spain. There are also two Autonomous Cities, Ceuta and Melilla, that are not included in our analysis

⁴Apart from guaranteeing access to health care, the registration also entitles undocumented immigrants to public education and other public services.

purposes, or otherwise he has to demonstrate that he has sufficient resources to cover the living expenses during his stay in the country. Undocumented immigrants were restricted access to all the services offered by the National Health System, with three exceptions: (1) Emergency care in the case of serious illness or accident, whichever the cause, until discharge; (2) Health care during pregnancy, birth and postpartum; and (3) Health care for individuals under 18 years old.

A precise figure of the number of individuals that have been restricted access to the health system as a result of the reform is difficult to obtain. However, and although the Spanish government has been reticent in providing this type of information, in a parliamentary response issued on November 15th 2013 (one year and a month and a half after the implementation of the reform) it stated that 748835 health cards had been withdrawn because the person was not residing legally in Spain when it was verified. In the “Spanish Program of National Reforms 2013”, a document that the Spanish government sends every year to the Council of the European Union and to the European Commission explaining the reforms implemented by the government, it is explicitly stated that with the implementation of the Royal Decree 16/2012 and with the intention of “avoiding fraud regarding the obtainance of the Spanish health card”, 873000 health cards of foreigners not legally residing in Spain had been withdrawn. This last number represents 13.87% of the immigrant population in Spain in 2012 and 1.86% of the total population. Some regional authorities tried to introduce a counter-balancing regional law granting access to the health care system for undocumented immigrants. However, as we are interested in the effects of the restriction on a strong health outcome such as mortality, and as individuals can move throughout the Spanish territory, we focus on the impact of the reform on the entire territory.

It is important to note that NGO’s working in Spain had been doing mainly an information task and were lacking the capacity to implement an alternative service to provide health care for undocumented immigrants (mostly because they did not have the necessary infrastructure in place before the reform). Some of the NGO’s, however, did a very intense job in collecting information on individual cases in which access to the health care system had been denied. In the appendix section we provide some of this individual cases which make it clear that the reform was implemented in a pretty strict way and, in some cases, even individuals that were legally entitled to public health care services were denied access. There is evidence, for example, of children being denied access to the system even if they were one of the three exceptions of the reform or of individuals with an officially regular situation in the country also being denied a health care card.

III. Data and Identification Strategy

A. Data

We use the *Death Registers by Cause of Death*, a dataset provided by the Spanish National Institute of Statistics, which registers all deaths occurred in Spain. We use data from the years 2009-2015 (2,766,658 deaths recorded in Spain), a period spanning several years before and after the reform, implemented in September 2012. For each individual death, the dataset contains information on the date of death, the cause of death, the nationality and country of birth of the individual, his/her gender, age and date of birth, and the Spanish region where the death occurred.

As is the case with most official datasets, the mortality registers (and the population statistics) do not provide information on the immigrant administrative status. Therefore, we calculate a proxy of each individual's undocumented status using data from the 2011 Census and data from the Ministry of Employment and Social Security on the number of residence permits in 2011 by nationality (other papers in the USA also use proxies for undocumented immigrants; for example Amuedo-Dorantes and Lopez 2015). For each nationality, we calculate the percentage of individuals living in Spain in 2011 in an irregular situation in the following manner; from the 2011 Census we take the number of individuals from a given nationality living in Spain and we subtract the number of individuals from that same nationality that have a residence permit in Spain in 2011. Thus, we get the number of individuals without a residence permit in 2011 for a given nationality. Then we divide it by the total number of individuals from that nationality (again from the 2011 Census) in order to get a percentage of undocumented individuals by nationality. This procedure gives us a snapshot picture of the percentage of undocumented individuals in Spain for each nationality one year before the introduction of the reform. We use only those nationalities for which there is at least one death in our sample period. The map in Figure 1 summarizes this information with lighter colored countries featuring lower percentages of undocumented population living in Spain in 2011 and darker countries showing higher percentages of undocumented population. For countries in grey color we do not have any observation in the death registers in our sample period and, therefore, are not included in our analysis. Table 1 reports the calculated percentage for each country (these numbers are very similar than the ones calculated by González-Enrriquez in 2009). Because the undocumented immigrant population is much younger than the native population (with a very low proportion of elderly individuals), we restrict both groups to individuals under 65 years old to make the mortality patterns

of both groups more comparable⁵. Therefore, the final number of deaths between 2009 and 2015 is 415,054.

B. Identification Strategy

We collapse the individual level data by country of nationality and year and month to compute the mortality rate for each country of nationality and time period (at the year-month level). The corresponding population numbers to be used in the denominator for the mortality rates are extracted from official population statistics provided by the Spanish National Institute of Statistics. Based on our proxy of the percentage of undocumented population for each nationality, we use two treatment variables in order to identify the effect of the restriction in access to public health care on the mortality rate of undocumented migrants. The first one is a continuous treatment variable that is exactly the percentage that we have calculated (shown in Figure 1 and Table 1). Therefore, those nationalities with a higher proportion of undocumented migrants in 2011 will be "more treated" than those nationalities with lower percentages of undocumented migrants in Spain. It is important to note that the control group includes several countries of nationality with no undocumented population in Spain (not only Spanish nationals). However, as we are aware that there might be some degree of measurement error in this percentage, we use a second binary treatment variable which is zero for the control group (those with 0 percentage of undocumented immigrants, which is the same than in the continuous treatment variable) and is one for those nationalities with a positive percentage of undocumented. For each of these two definitions we estimate the same differences-in-differences model in which we compare the evolution of the mortality rates between the control and treatment groups before and after the reform. For the continuous treatment variable the model is:

$$Y_{ymc} = \beta_0 + \beta_1 PercU_c + \beta_2 After_{ym} + \beta_3 PercU_c * After_{ym} + \delta_y + \alpha_m + \lambda_c + u_{ymc} \quad (1)$$

Where subscript y refers to a specific year, m to a specific month of the year and subscript c refers to a specific country of nationality. Y_{ymc} is the mortality rate for each time

⁵Also, in 2012 copayments for some drugs were introduced for retired individuals (65+ years old) so the exclusion of this group is crucial to isolate the impacts of the health care access restrictions

period (year and month) and country of nationality. $PercU_c$ is our continuous treatment variable which reports the percentage of undocumented individuals for each nationality c . $After_{ym}$ is a dummy variable equal to 1 for observations after the implementation of the reform in September 2012 and equal to 0 for observations before the reform. We include fixed effects of year (δ_y), month of the year (α_m) and country of nationality (λ_c). Thus, we are controlling for any differences in mortality rates due to seasonality (with the month fixed effects) or yearly events and we also account for differences in mortality rates across countries of nationality. v_{ymc} is the error term. Standard errors are clustered at the country of nationality level and population weights are used in the estimation.

The second model that we estimate is exactly the same than the first one but uses as treatment variable a binary (instead of a continuous) treatment variable. Our coefficient of interest is β_3 , which measures the differential effect in the mortality rate between the treated and control group that results from the implementation of the reform. Under the assumption of parallel trends in the mortality rates of the two groups in the absence of the reform, and under the assumption that there are no other changes differentially affecting the two groups at the same time as the reform, β_3 measures the causal effect of the restriction in health care access on the mortality rate of the undocumented immigrant population.

IV. Results

A. Base Results

To provide preliminary descriptive evidence on the effects of the reform, Figure 2 shows the evolution of the mortality rates for the treated and control group during the analysis period 2009-2015, spanning several years before and several years after the implementation of the reform in September 2012 (indicated with a vertical line). The figure shows monthly mortality rates expressed as deaths per 100000 individuals (in dots) and a linear fit model.

Figure 2.A shows the mortality patterns for the treated group (nationalities with a positive percentage of undocumented immigrants) while Figure 2.B shows the same thing for the control group (nationalities with a zero percentage of undocumented immigrants). The Figure provides preliminary evidence that the reform has fostered an increase in the mortality rate of undocumented immigrants. Before the implementation of the reform, the mortality of the treated and control group followed a parallel mild decreasing trend. As this is a period of an ongoing economic crisis (that began in 2008), this result is consistent with several papers in the literature reporting reductions in mortality during

economic recessions. Furthermore, the implementation of the reform has no effect on the mortality trend of the control group, which keeps decreasing at a similar pace than before the reform. On the contrary, the mortality of undocumented immigrants reverses the downward trend and starts increasing after the implementation of the reform. The increase is quite substantial. Furthermore, the timing of the increase is consistent with what we would expect, with the effects on mortality resulting from treatment interruptions and lack of diagnoses (because of no regular screening) increasing over time.

Table 2 provides the results of the estimation of the differences-in-differences models (equation 1) for the two treatment variables. The dependent variable is the monthly mortality rate per 100000 individuals.

In the two specifications the results indicate a strong and significant positive effect of the introduction of the restriction on the mortality rate of undocumented immigrants. For the regression using the binary treatment variable (column 2), the differences in differences coefficient indicates that, in the three years from its implementation in September 2012, the reform has increased the monthly mortality rate of undocumented immigrants by 0.69 deaths per 100000 persons, with the coefficient significant at the 1% level. This effect corresponds to an increase of 16% with respect to the pre-reform monthly mortality rate of treated individuals, which was 4.35 deaths per 100000 persons per month.

A simple back of the envelope calculation will facilitate the interpretation of the magnitude of the effect. As the estimated number of undocumented individuals in 2011 is slightly below 2 million, the estimated effect of 0.69 deaths per 100000 individuals each month corresponds to an effect of about 162 deaths each year. That is, the estimates suggest that, since its implementation in September 2012, the reform has resulted in about 162 additional deaths per year.

In order to explore the heterogeneity of the effect, we present the results differentiated by gender and age groups. In Table 3 we can see that most of the effects are coming from men as the coefficient for women is closer to zero and not significant in any of the two specifications. On the contrary, results for men are very strong and highly significant and imply an increase in mortality rates by almost 24.5%, which implies 145 more deaths due to the reform. Table 4 reports the results for three different age groups (ages 0-19, ages 20-39 and ages 40-64). We can see that the reform significantly increases mortality rates in the three age groups. More specifically 28 more individuals aged 0-19 died as a result of the reform, 67 more individuals in the age group 20-39 and 69 more in the 40-64 age group. The impact is stronger for older individuals for whom we would expect treatment interruptions and lower screening levels to have a higher impact on their health (for example, some regular screening tests are only applied after a certain age threshold).

However, we also see increases in mortality for the younger group of undocumented immigrants; those age 18 or below who were, in principle, one of the exceptions of the reform. These results could be driven by either an increased fear of parents of being reported to the immigration authorities and/or mistakes in the administrative processes of the reform that would impede the fulfilment of the exceptions included in the law. There is evidence of similar effects in other countries: for example in the USA, Watson (2014) finds strong evidence that federal immigration enforcement policies reduce Medicaid participation for children of noncitizens even when children are entitled to Medicaid because they are USA citizens. Apart from that, there is also evidence that in Spain the exceptions to the health care access reform were not respected in some cases. In the appendix section we present anecdotal evidence collected by NGO's of individual cases of children that were denied access to the health care system as well as children that were denied the health care card even if they had a regular situation in Spain. Therefore, given the existence of these pitfalls in the implementation of the exceptions and the evidence of similar effects in other countries, it seems plausible to observe an increase in mortality for the 0-18 age group.

B. Cause of Death: Amenable Mortality

Amenable mortality⁶ is generally defined as "deaths from causes that should not occur in the presence of timely and effective interventions" (Holland et al. 2009). It has been used in previous studies mainly as a measure of the performance of the health system (see, for example, Nolte and McKee 2008, 2011). In those studies, which compare amenable mortality over time or between countries, the idea is that the performance or quality of a health care system can be measured by the amount of deaths that can be avoided if timely and effective medical care is available.

In our study, if the effects that we find are indeed attributable to a lack of health care access, we should find that the effects are stronger for conditions in which timely and effective medical care has a larger impact on mortality, that is, we should find that the effects are stronger for amenable mortality. This is precisely what we study in this section⁷. Using the International Classification of Diseases (ICD), we use the classification of dis-

⁶Also termed avoidable mortality, treatable mortality or preventable mortality in the literature.

⁷Sommers (2017) finds that the reduction of mortality that resulted from Medicaid expansions in the 2000s was indeed larger for amenable causes.

eases elaborated in Sommers et al. (2014) to distinguish causes of death between those (more) amenable to health care and those (less) amenable to health care, and estimate the differences-in-differences models separately for these two types of causes of death⁸. In each case, mortality rates are computed as the number of deaths due to the specific conditions (more amenable or less amenable conditions) divided by the total population for each nationality and year-month, as before. Figure 3 shows the descriptive graphs of the mortality patterns for the treated and the control group for amenable mortality. As it can be seen in panel A the death rate for amenable mortality for undocumented migrants was slightly decreasing before the reform and it shows an increasing trend after the reform is implemented. On the other hand, in panel B we can see that the mortality rate due to amenable mortality was also slightly decreasing for the control group before the policy and it continues in the same trend after the reform. Table 5 shows the result of the estimation using the binary treatment variable and we can see that the coefficient capturing the effects of the policy is more than two times larger and much more significant for amenable mortality than for non-amenable mortality. In fact, we estimate that the reform increased the number of deaths in 115 for amenable mortality and 47 for non-amenable mortality, which is a strong difference.

Overall, the results show that the reform has a much higher impact for more amenable mortality. The results, therefore, provide clear evidence that the reform has resulted in a higher increase for mortality resulting from causes of death more amenable to health care, as we would expect.

We go one step further and in Table 6 we show the results for specific groups of causes of death following the International Classification of Diseases (ICD 10).⁹ We can see that the strongest increases in mortality are due to infectious diseases, tumors and circulatory and respiratory diseases. In fact, the single biggest increase in the number of deaths as a result of the reform comes from tumors. Cancers in Spain are treated in a few public hospitals which have a specialized oncology department with the latest innovations in treatments and technology. Before the reform, both undocumented immigrants and the rest of the population in Spain were receiving the same treatment for cancer in those specialized public hospitals. As we can see in Figure 4, it is very clear that cancer mortality

⁸The detailed list of conditions classified as (more) amenable to health care can be found in Table 1 of the Supplement of Sommers et al. (2014). All conditions not appearing in this list are classified as (less) amenable to health care.

⁹Results of diseases for which there are less than 2% of deaths in our sample are not shown.

increased for undocumented immigrants after the reform while the same trend was not there for the control group. We believe that these results provide additional evidence of the importance of getting access to the health care system and the potential negative consequences of restricting this access for a vulnerable subgroup of the population.

C. Parallel Trend Assumption and Timing of Effects

Although both our treatment and control groups are not restricted to individuals from one nationality (but they include individuals from several different nationalities), it could still be possible that some other factor could be affecting the mortality rates of either the treated or the control group before the reform. If this is the case, then the parallel trend assumption would not be fulfilled and our estimates would be invalidated. In order to provide a more formal test of the existence of parallel trends in the mortality rate of our treated and control group before the reform, we augment the differences-in-differences regression with leads and lags before and after the introduction of the policy. At the same time, this model will allow us to investigate the time pattern of the policy effects. In particular, we estimate event study models of the form:

$$Y_{ymc} = \beta_0 + \beta_1 PercU_c > 0 + \sum_{i=-2}^3 \alpha_i Year(i) + \sum_{i=-2}^3 \theta_i PercU_c > 0 * Year(i) + \delta_y + \alpha_m + \lambda_c + v_{ymc} \quad (2)$$

Where $Year(i)$ is the i th year before/after the implementation of the reform. We include the same fixed effects than in equation 1. Leads and lags are specified in years to get a more visible idea of the existence of parallel trends in the outcome variable. However, these are not calendar years but each lead/lag represents exactly 12 months before/after the reform (the year in which the reform is introduced goes from September 2012 to September 2013, the first year after is from October 2013 to October 2014, and so on). That is the reason why we can also include month and calendar year fixed effects. We have set the base year (omitted in the regression) as the third year before the implementation of the reform. The coefficients on the interaction terms between $PercU_c > 0$ and each of the years (the θ_i), therefore, measure that year's increase in the difference in mortality rates between undocumented immigrants and the control group with respect to 3 years before the implementation of the reform. The years go from 3 years before implementation to 3 years after. To facilitate visualization, Figure 5 shows a plot of the interaction coefficients with 95% confidence intervals. The figure also reports,

for each year, the percentage change in the mortality rate with respect to the base year (3 years before the implementation of the reform).

We can see in Figure 5 that the pattern of the coefficients provides clear evidence of the existence of parallel trends before the reform in the mortality rates of the treated and control groups. The coefficients for the two years before the implementation of the reform are not statistically different from 0, which indicates that the mortality of both groups follows a parallel trend before the reform. The coefficient increases and becomes significant in the year the reform is introduced. At the same time, the magnitude of the coefficient increases substantially in the first and second year after the introduction of the reform. Overall, the results of this event study model suggest that there are no other unobserved factors differentially affecting the mortality of the treatment and the control group before the reform. The timing and the magnitude of the coefficients are also consistent; arguably, one expects that both treatment interruptions and lower diagnoses rates would take some time to be translated into deaths for the majority of diseases. Thus, in the year that the reform is introduced, mortality rates significantly increase by 9.15% while in the first and second years after its introduction, the health care access restrictions increase the mortality rate of undocumented immigrants by 15.77 and 36.6%, respectively.

D. Selective Migration

Although the previous results provide evidence in favor of our identification strategy, there is one factor that could be biasing our results. It may be the case that the restriction in access to health care is inducing some undocumented immigrants to migrate to neighboring countries or to their countries of origin in the lookout for better access to health care. If this is the case, and this migration is related with their health condition, this phenomena could be biasing our estimates. In this section we perform several robustness checks to study this possibility. First, Figure 6 shows the evolution of the population of our treated group and, although there is a decreasing trend since 2009 because of the ongoing economic crisis in Spain, this reduction in the treated population does not seem to accelerate after the reform. To provide a formal proof for the lack of a migratory response, we estimate the same type of differences-in-differences models outlined in equation 1 above but using the log of population and the population in numbers as the dependent variables. That is, we formally test whether the reform induced a differential change in the population of undocumented immigrants with respect to the population in the control group. Table 7 shows the results of this estimation for both genders (columns 1 and 4) as well as for men (columns 2 and 5) and women (columns 3 and 6) separately.

The first three columns present the results for the dependent variable being the log of population while the last three columns show the results for population in numbers.

We can see that none of the interaction terms capturing the impact of the reform is significant pointing towards the lack of a migration response from undocumented migrants, as was already suggested by Figure 5. Most undocumented migrants come from Africa, Latin-America or Asian countries and, although access to health care may be an important element in the decision to migrate, our results show that restricting access to the health care system does not provide incentives for undocumented migrants to leave the country. Furthermore it is important to note that, even if none of the population results are significant, the coefficients for men (columns 2 and 5) are much smaller than the coefficients for women while, as showed above, most of the mortality effects are driven by men. This reinforces the idea that our mortality findings are not biased by changes in the population of undocumented migrants.

Finally, even if there are no significant reductions in the treated population as a result of the reform, individuals that leave and enter the country after the reform could be, to some extent, selected in health characteristics. In order to explore this possibility we use data from the second quarter interviews of the Spanish labour force survey from 2009 to 2015. We estimate the same model than in equation 1 but using as dependent variables different educational categories and age groups, which are features closely related to the health status¹⁰. More precisely, we run regressions for the following binary dependent variables: the individual has primary education or less, he/she has secondary education, tertiary education, less than 10 years old or less than 50 years old¹¹. We include fixed effects of region in Spain, region of nationality of the individual (we don't know the exact nationality but the region of nationality: see Table 11 in the Appendix for a list of regions and countries included) and year. Standard errors are clustered by region of nationality. We can see in Table 8 that undocumented immigrants after the reform are less likely to have secondary education and are more likely of having primary education or below. However, the change in educational achievement of undocumented migrants after the reform is quite small; there is a decrease by 4.85% in those undocumented migrants with secondary education and these are substituted by lower educated migrants (there is

¹⁰Unfortunately, we do not have any dataset with information on health characteristics and country of nationality for the years 2009 to 2015.

¹¹We have also run regressions with different age groups and the results are also not significant.

an increase by 4.48% of undocumented migrants with primary education or below).

As it is well known that lower educated individuals have higher mortality rates, in order to assess how much of our mortality effects can be explained by the differences in education of undocumented migrants after the reform, we perform a back of the envelope calculation in the following way: We calculate mortality rates by educational category for undocumented immigrants in 2012 using the 2011 Census and death registers by education level in 2012 (which is the first year in which death registers include information on educational achievement). Our estimates show that mortality rates of undocumented immigrants with primary education and below are 45.19 per 100000 individuals per year; mortality rates for those with secondary education are 28.08 per 100000 per year and mortality rates for those with tertiary education are 25.66 per 100000 per year. Thus, 17.11 more undocumented immigrants with primary education or less are dying every year with respect to those with secondary education. As the change in educational composition affected almost 5% of the undocumented population, this means that after the reform there were 94078 more undocumented migrants with primary education or below. Therefore, the increase in the number of deaths due to the change in the educational composition of undocumented immigrants is only of 16.1 more deaths per year, which accounts for less than 10% of the mortality effects of the reform (an increase in mortality of 162 undocumented immigrants per year).

Overall the results in this section suggest that, although there is some evidence of selective migration among undocumented migrants after the reform, this can only explain a very small part (10%) of our estimated mortality effects, providing further credit for the causal interpretation of the effects presented in the previous sections.

V. Alternative Specifications

A. Double Nationality

The death register includes both the country of nationality as well as the country of birth. Thus, in this section we use this distinction in order to estimate regressions comparing individuals of the same country of birth but with different nationalities. Individuals from European Union countries were, in principle, still able to access the health care system in Spain after the reform; therefore, we select a sample of individuals born outside the EU. Then, we use the same differences-in-differences model than in equation 1 to compare differences in mortality rates after the reform for individuals with a EU nationality versus those without a EU nationality (third country nationals) from the same country of birth. Thus, individuals born in a EU country are not included in the

sample. In the regression we include month, year and country of birth fixed effects and standard errors are clustered at the country of birth level. The treatment group will be those individuals born in a non-EU country and without EU nationality and the control group will be individuals born in the same non-EU country but with EU nationality. As in our baseline regressions, we only include individuals below the age of 65 years old and we include population weights in the model. Table 9 shows the results of these specifications and we can see that the estimated effects of the health care access reform are very strong and highly significant in the two specifications (controlling only for country of birth fixed effects in the first column and additionally controlling for year and month fixed effects in the second column). When we compare only individuals born in the same (non-EU) country, the estimated effects of losing health care insurance are much bigger than in our baseline regressions. It is also important to note that this is a potentially less representative sample than our baseline sample as it only includes individuals from countries with citizens that have gained EU citizenship, which is a much easier process for individuals from Latin-American countries than for individuals from African or Asian countries, for example. In any case, with this alternative specification we estimate that restricting access to the health care system increased the number of deaths in 896 per year for the affected population.

B. Regional level estimates

In this section, we use an alternative specification to try to account for the fact that health care and immigration policies are, to a certain extent, run at the regional level in Spain (at the level of Autonomous Communities). Although the law was issued at the national level and affected the entire Spanish territory, there were some attempts by regional authorities to circumvent the prohibition. Of course, if you are very sick you would have incentives to move to another region looking for access to the health care system. Furthermore, as explained above, even in regions that tried to circumvent the national law, there is evidence from NGO's reports that the law was also applied in those regions. Nonetheless, in order to control for any remaining potential differences at the regional level, in this section we use the binary treatment variable defined above and collapse the data at the regional level for each month and year. Instead of collapsing the data by country of nationality, we will now run the analysis at the regional level for the treatment and control group. This strategy will allow us to include both regional fixed effects (to control for any fixed differences in mortality rates at the regional level) as well as linear-specific regional trends (which will allow us to control for any smooth changes in regional policies affecting mortality rates).

Therefore, the model that we estimate is:

$$Y_{ymru} = \beta_0 + \beta_1 Undoc_u + \beta_2 After_{ym} + \beta_3 Undoc_u * After_{ym} + \lambda_r * t + \delta_y + \alpha_m + \lambda_r + v_{ymru} \quad (3)$$

Where Y_{ymru} is the mortality rate of undocumented immigrants or the control group, u , in year y , month m and region r , $Undoc_u$ is the binary treatment variable used in our baseline specifications which equals 1 for nationalities with a positive percentage of undocumented individuals in 2011 in Spain and zero otherwise. $After_{ym}$ is a dummy variable equal to 1 for observations after the reform, $\lambda_r * t$ is a linear specific regional trend for each of the 17 regions in Spain and δ_y , α_m and λ_r are year, month and region fixed effects. v_{ymru} is an error term. Standard errors are now clustered within regions using the wild bootstrapping method proposed in Cameron et al. (2008) and observations are population-weighted.

Results are presented in Table 10. Column 1 shows the results including region, year and month fixed effects while column 2 additionally includes linear specific regional trends. We can see in both columns that we estimate a positive and significant increase in mortality rates after the reform for undocumented immigrants. Also, it is important to note that the inclusion of the region specific linear trends changes minimally the significance and magnitude of the coefficients of interest, reinforcing the lack of regional changes that can affect mortality rates and reinforcing our baseline results. Finally, when we calculate the impact of the policy with respect to the mean of the pre-reform mortality rate (for the treated group), we can see that our estimates suggest an increase in mortality rates by 15.54%, which is a very similar result than the estimates in our baseline specifications showed in Table 2 (an increase by 16.4%).

Overall, the results in this section show that we also find significant mortality effects of the reform when we run alternative specifications and that both the significant levels as well as the magnitudes of the reform are remarkably similar across specifications, which gives further credit to the causal interpretation of our estimates.

VI. Conclusions

The unprecedented increase in international migration flows to developed countries over the last decades has placed immigration issues at the forefront of media coverage and political debates in destination countries. The recent refugee crisis in the EU or the steady increase in inflows of undocumented migrants in the USA, with recent estimates

pointing towards more than 11 million undocumented individuals living in the USA in 2014, are only two of many examples of these migratory pressures. The political debate has often been focused on the potential negative consequences of immigration for the labor market prospects of the native population or its negative effect on the public accounts. In this context, many governments in developed countries are implementing restrictions in access to public programs for undocumented immigrants, with little knowledge on the consequences that these type of restrictions can have both for the affected population as well as for the society as a whole. In this paper, we contribute to this discussion by focusing on one of these programs, public health care, and assessing the potential consequences of restricting access to the system for undocumented immigrants.

In order to do that, we focus on a reform that was introduced in Spain in 2012 that introduced this restriction and we study the impact on mortality rates of undocumented immigrants. We use population level data from mortality registers and a novel method to calculate a proxy for undocumented status to run differences-in-differences models. Our results show that the restriction resulted in large and significant increases in mortality rates of the affected population. In particular, we estimate that the reform increased the mortality rate of undocumented immigrants by 16% during its first three years of implementation, an effect that corresponds to 162 additional deaths per year as a result of the reform. We also show that the effects of the restriction in access to health care are much higher for deaths considered amenable to health care, that is, deaths that would not occur in the presence of timely and effective medical care.

Reasonably, our analysis shows that the effects of the reform on mortality increase with respect to time after implementation. Thus, there are reasons to believe that the long term effects of the reform are going to be even stronger. Although we do report some selective migration of undocumented migrants with respect to education, we provide evidence that these movements can only explain 10% of our mortality effects.

Overall, these results suggest that health insurance coverage can have large impacts on the health status of vulnerable populations with few alternatives to access health care, and provide evidence that restrictions in public health insurance coverage specifically targeted to the immigrant population have strong negative consequences for their health. Finally, it is possible that these negative effects can produce spillover effects to the native population as one of the increases in the mortality rate that we document comes from infectious diseases.

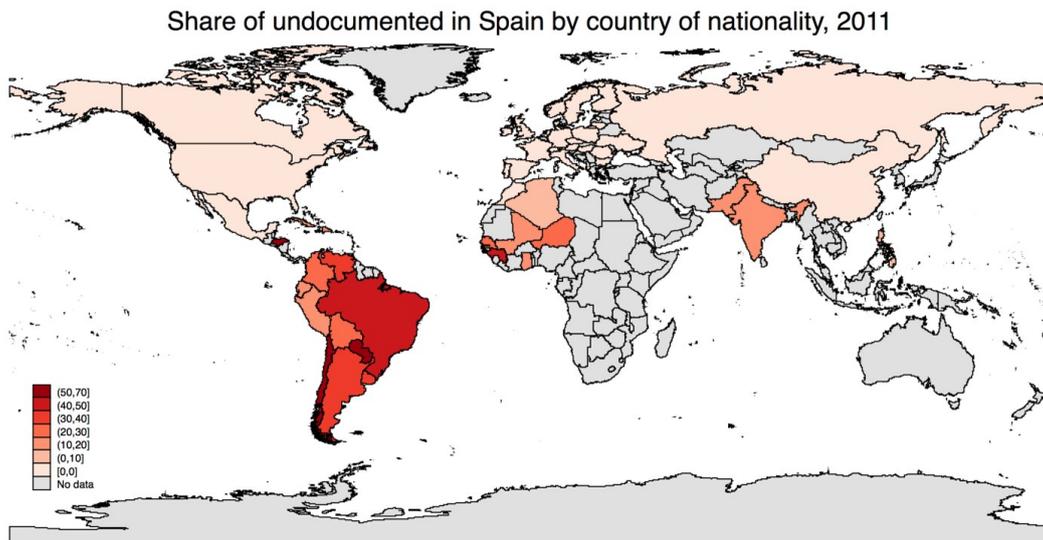
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Figures and Tables

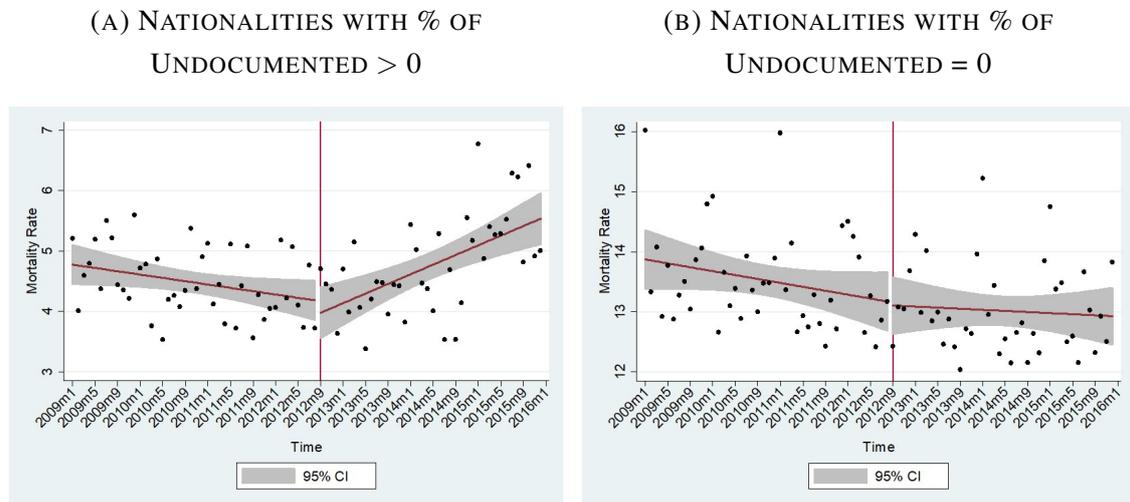
FIGURE 1—SHARE OF UNDOCUMENTED IN SPAIN BY COUNTRY OF NATIONALITY, 2011



Notes: For each nationality, we calculate the percentage of individuals living in Spain in 2011 in an irregular situation in the following manner: from the 2011 Census we take the number of individuals from a given nationality living in Spain and we subtract from that the number of individuals from that same nationality that have a residence permit in Spain in 2011. Thus, we get the number of individuals without a residence permit in 2011 for a given nationality and we divide it by the total number of individuals from that nationality from the 2011 Census in order to get a percentage of undocumented individuals.

Source: Data from the Spanish Census in 2011 (population data by nationality) and The Spanish Ministry of Employment and Social Security (residence permits data by nationality in 2011).

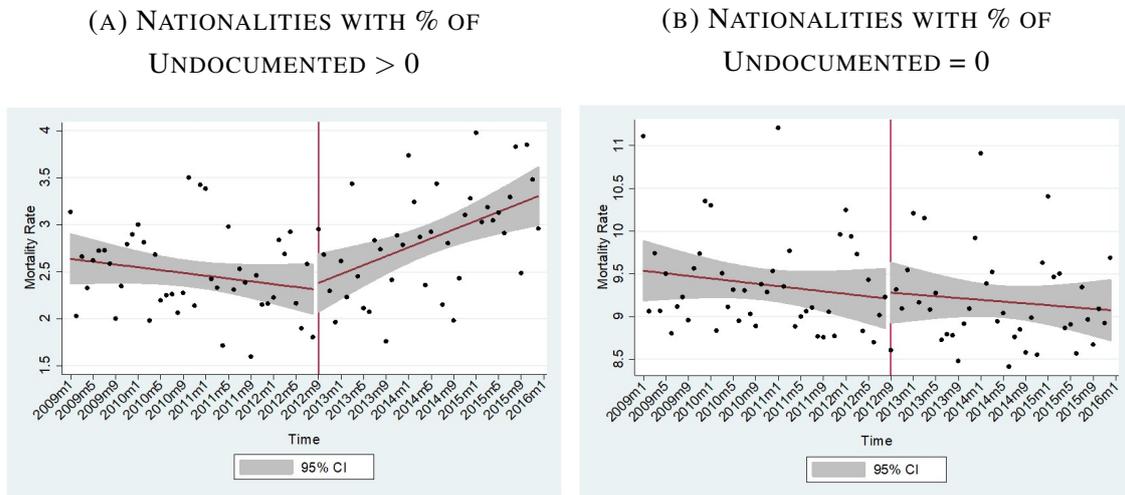
FIGURE 2—EVOLUTION OF MORTALITY RATES FOR TREATED AND CONTROL GROUPS DURING ANALYSIS PERIOD 2009-2015



Notes: The figures show scatterplots of the monthly mortality rates expressed as deaths per 100000 individuals. They include linear fits with 95% confidence intervals. The vertical line indicates the implementation of the restriction in access the healthcare.

Source: Data from the Spanish Mortality Registers 2009 to 2015 and population data from the Spanish National Institute of Statistics.

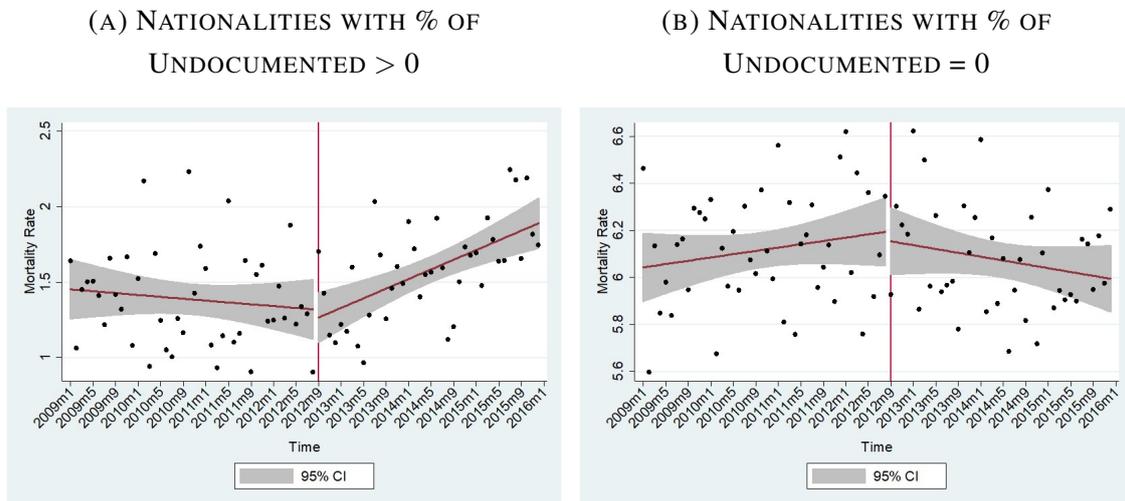
FIGURE 3—EVOLUTION OF MORTALITY RATES FOR TREATED AND CONTROL GROUPS DURING ANALYSIS PERIOD 2009-2015 FOR AMENABLE MORTALITY



Notes: The figures show scatterplots of the monthly mortality rates expressed as deaths per 100000 individuals. They include linear fits with 95% confidence intervals. The vertical line indicates the implementation of the restriction in access the healthcare.

Source: Data from the Spanish Mortality Registers 2009 to 2015 and population data from the Spanish National Institute of Statistics.

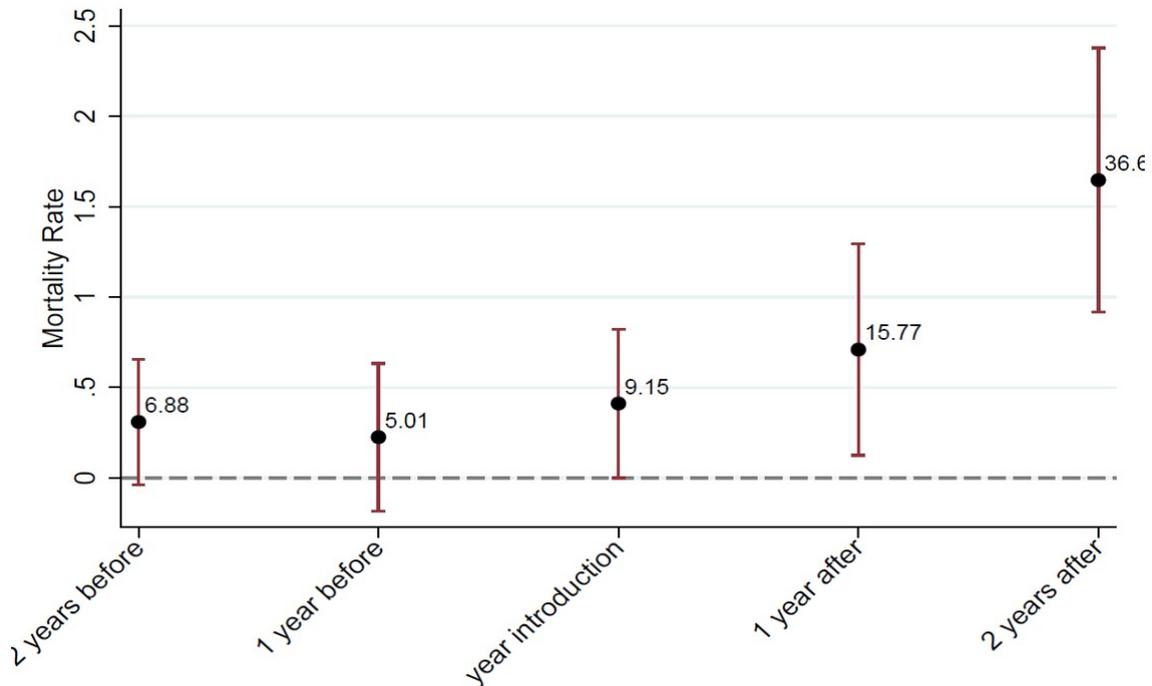
FIGURE 4—EVOLUTION OF MORTALITY RATES FOR TREATED AND CONTROL GROUPS DURING ANALYSIS PERIOD 2009-2015 FOR CANCER MORTALITY



Notes: The figures show scatterplots of the monthly mortality rates expressed as deaths per 100000 individuals. They include linear fits with 95% confidence intervals. The vertical line indicates the implementation of the restriction in access the healthcare.

Source: Data from the Spanish Mortality Registers 2009 to 2015 and population data from the Spanish National Institute of Statistics.

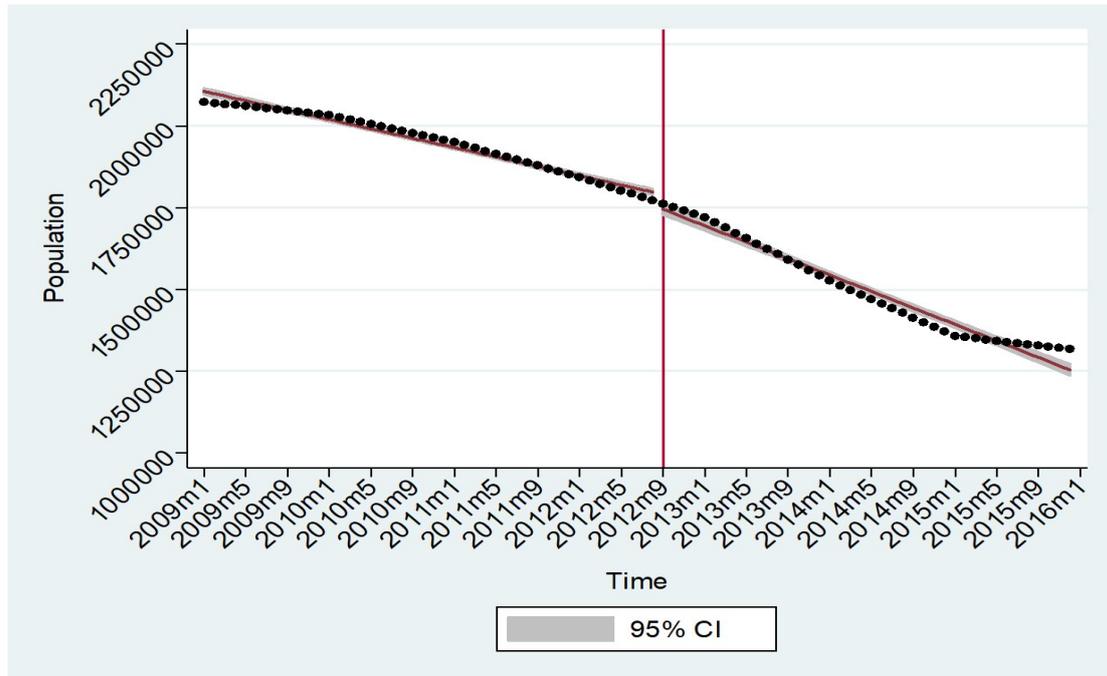
FIGURE 5—EFFECT OF RESTRICTION IN HEALTHCARE ACCESS ON THE MORTALITY OF UNDOCUMENTED IMMIGRANTS. EVENT STUDY ESTIMATES



Notes: The figure shows the interaction coefficients of the event study (equation 2) with 95% confidence intervals. For each year, the coefficient measures that year's increase in the difference in mortality rates between undocumented immigrants and the control group with respect to 3 years before the implementation of the reform. The figure also reports, for each year, the percentage change in the mortality rate with respect to the base year.

Source: Data from the Spanish Mortality Registers 2009 to 2015 and population data from the Spanish National Institute of Statistics.

FIGURE 6—EVOLUTION OF THE POPULATION OF UNDOCUMENTED IMMIGRANTS DURING ANALYSIS PERIOD 2009-2015



Notes: The figure shows the evolution of the population of undocumented immigrants in Spain. The vertical line indicates the implementation of the restriction in access the healthcare.

Source: Data from the Spanish National Institute of Statistics 2009 to 2015.

TABLE 1—PROPORTION OF UNDOCUMENTED IMMIGRANTS IN 2011
BY COUNTRY OF NATIONALITY

Country of Nationality	Proportion of Undocumented Immigrants in 2011
Germany	0
Austria	0
Belgium	0
Bulgaria	0
Canada	0
China	0
Denmark	0
Spain	0
United States of America	0
Finland	0
France	0
Hungary	0
Ireland	0
Italy	0
Lithuania	0
Morocco	0
Mexico	0
Norway	0
Netherlands	0
Poland	0
Portugal	0
United Kingdom	0
Czech Republic	0
Romania	0
Russia	0
Sweden	0
Switzerland	0
Ukraine	0

Notes: For each nationality, we calculate the percentage of individuals living in Spain in 2011 in an irregular situation in the following manner: from the 2011 Census we take the number of individuals from a given nationality living in Spain and we subtract from that the number of individuals from that same nationality that have a residence permit in Spain in 2011. Thus, we get the number of individuals without a residence permit in 2011 for a given nationality and we divide it by the total number of individuals from that nationality from the 2011 Census in order to get a percentage of undocumented individuals.

Source: Data from the Spanish Census in 2011 (population data by nationality) and The Spanish Ministry of Employment and Social Security (residence permits data by nationality in 2011).

TABLE 1 CONTINUED—PROPORTION OF UNDOCUMENTED IMMIGRANTS
IN 2011 BY COUNTRY OF NATIONALITY

Country of Nationality	Proportion of Undocumented Immigrants in 2011
Philippines	0.055
Algeria	0.077
Pakistan	0.115
Gambia	0.122
India	0.128
Ghana	0.148
Peru	0.159
Dominican Republic	0.162
Ecuador	0.192
Cuba	0.194
Mali	0.200
Colombia	0.225
Senegal	0.243
Nigeria	0.279
Bolivia	0.283
Uruguay	0.317
Argentina	0.338
Venezuela	0.377
Equatorial Guinea	0.434
Brazil	0.443
Honduras	0.509
Paraguay	0.534
Chile	0.679

Notes: For each nationality, we calculate the percentage of individuals living in Spain in 2011 in an irregular situation in the following manner: from the 2011 Census we take the number of individuals from a given nationality living in Spain and we subtract from that the number of individuals from that same nationality that have a residence permit in Spain in 2011. Thus, we get the number of individuals without a residence permit in 2011 for a given nationality and we divide it by the total number of individuals from that nationality from the 2011 Census in order to get a percentage of undocumented individuals.

Source: Data from the Spanish Census in 2011 (population data by nationality) and The Spanish Ministry of Employment and Social Security (residence permits data by nationality in 2011).

TABLE 2—EFFECT OF RESTRICTION IN HEALTHCARE ACCESS ON THE MORTALITY OF UNDOCUMENTED IMMIGRANTS. DIFFERENCES-IN-DIFFERENCES ESTIMATES

	(1) Continuous Treatment	(2) Binary Treatment
Percentage Undoc.	-0.7379*** (0.0033)	
Post-reform	-0.1964*** (0.0407)	
Percentage*Post	0.0181** (0.0075)	
Dummy percentage>0		-8.7389*** (0.0960)
Post-reform		-0.2071*** (0.0467)
Dummy>0*Post		0.6973*** (0.2036)
Observations	4,284	4,284
R-squared	0.8722	0.8724
Pre-reform mortality rate		4.35
Percent increase	0.24%	16.04%
Estimated increase number of deaths due to the reform (less 2 million UI)		162 per year

*** p<0.01, ** p<0.05, * p<0.1

Notes: The dependent variable is the monthly mortality rate expressed as deaths per 100000 individuals. Standard errors (in parentheses) are clustered at the country of nationality level. Regressions include fixed effects at the country of nationality, year and month level. Regressions include population weights.

Source: Data from the Spanish Mortality Registers 2009 to 2015 and population data from the Spanish National Institute of Statistics.

TABLE 3—EFFECT OF RESTRICTION IN HEALTHCARE ACCESS ON THE MORTALITY OF UNDOCUMENTED IMMIGRANTS. DIFFERENCES-IN-DIFFERENCES ESTIMATES BY GENDER

	(1) Continuous Treatment		(3) Binary Treatment	
	Men	Women	Men	Women
Percentage Undoc.	-1.3669*** (0.0052)	-0.1822*** (0.0032)		
Post-reform	-0.3613*** (0.0734)	-0.0249 (0.0453)		
Percentage*Post	0.0338*** (0.0121)	0.0040 (0.0058)		
Dummy percentage>0			-16.1454*** (0.1389)	-2.1479*** (0.0901)
Post-reform			-0.3811*** (0.0857)	-0.0261 (0.0453)
Dummy>0*Post			1.2442*** (0.3065)	0.1346 (0.1650)
Observations	4,284	4,200	4,284	4,200
R-squared	0.8497	0.6430	0.8501	0.6430
Pre-reform mortality rate			5.09	3.52
Percent increase			24.47%	3.83%
Estimated increase number of deaths due to the reform (less 2 million UI)			145	15

*** p<0.01, ** p<0.05, * p<0.1

Notes: The dependent variable is the monthly mortality rate expressed as deaths per 100000 individuals. Standard errors (in parentheses) are clustered at the country of nationality level. Regressions include fixed effects at the country of nationality, year and month level. Regressions include population weights.

Source: Data from the Spanish Mortality Registers 2009 to 2015 and population data from the Spanish National Institute of Statistics.

TABLE 4—EFFECT OF RESTRICTION IN HEALTHCARE ACCESS ON THE MORTALITY OF UNDOCUMENTED IMMIGRANTS. DIFFERENCES-IN-DIFFERENCES ESTIMATES BY AGE GROUPS

	(1)	(2)	(3)	(4)	(5)	(6)
	Continuous Treatment			Binary Treatment		
	Ages 0-19	Ages 20-39	Ages 40-64	Ages 0-19	Ages 20-39	Ages 40-64
Percentage Undoc.	0.2764*** (0.0044)	-0.0804*** (0.0026)	-1.2251*** (0.0078)			
Post-reform	0.0098 (0.0306)	0.0100 (0.0478)	-0.4981*** (0.0886)			
Percentage*Post	0.0156* (0.0081)	0.0140** (0.0057)	0.0296* (0.0160)			
Dummy percentage>0				2.9645*** (0.1373)	-1.0970*** (0.0931)	-14.5629*** (0.1998)
Post-reform				0.0023 (0.0293)	-0.0011 (0.0511)	-0.5115*** (0.0977)
Dummy>0*Post				0.5775** (0.2520)	0.5257** (0.1998)	1.2035*** (0.4008)
Observations	3,864	4,200	4,284	3,864	4,200	4,284
R-squared	0.2115	0.2531	0.7991	0.2124	0.2540	0.7993
Pre-reform mortality rate				1.97	2.69	9.41
Percent increase				29.28%	19.55%	12.79%
Estimated increase number of deaths due to the reform (less 2 million UI)				28	67	69

*** p<0.01, ** p<0.05, * p<0.1

Notes: The dependent variable is the monthly mortality rate expressed as deaths per 100000 individuals. Standard errors (in parentheses) are clustered at the country of nationality level. Regressions include fixed effects at the country of nationality, year and month level. Regressions include population weights.

Source: Data from the Spanish Mortality Registers 2009 to 2015 and population data from the Spanish National Institute of Statistics.

TABLE 5—EFFECT OF RESTRICTION IN HEALTHCARE ACCESS ON THE MORTALITY OF UNDOCUMENTED IMMIGRANTS. DIFFERENCES-IN-DIFFERENCES ESTIMATES FOR AMENABLE AND NON-AMENABLE MORTALITY

	(1) Amenable Mortality	(2) Non-Amenable Mortality
Dummy percentage>0	-6.0475*** (0.0613)	-2.6914*** (0.0560)
Post-reform	-0.1277*** (0.0333)	-0.0794*** (0.0252)
Dummy>0*Post	0.4933*** (0.1333)	0.2040* (0.1124)
Observations	4,200	4,284
R-squared	0.8755	0.5269
Pre-reform mortality rate	2.49	1.85
Percent increase	19.77%	11.02%
Estimated increase number of deaths due to the reform (less 2 million UI)	115	47

*** p<0.01, ** p<0.05, * p<0.1

Notes: The dependent variable is the monthly mortality rate expressed as deaths per 100000 individuals. Standard errors (in parentheses) are clustered at the country of nationality level. Regressions include fixed effects at the country of nationality, year and month level. Regressions include population weights.

Source: Data from the Spanish Mortality Registers 2009 to 2015 and population data from the Spanish National Institute of Statistics.

TABLE 6—EFFECT OF RESTRICTION IN HEALTHCARE ACCESS ON THE MORTALITY OF UNDOCUMENTED IMMIGRANTS.
DIFFERENCES-IN-DIFFERENCES ESTIMATES BY CAUSE OF DEATH

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	Infectious	Tumors	Blood	Endocrine	Mental	Nervous	Circulatory	Respiratory	Digestive	Skin	Osteomuscular	Genitourinary	Perinatal	Malformations	Other symptoms	External
Dummy percentage>0	-0.3431*** (0.0127)	-3.7747*** (0.0426)	-0.0076 (0.0076)	-0.1526*** (0.0074)	-0.1707*** (0.0046)	-0.0726*** (0.0115)	-1.2637*** (0.0234)	-1.1555*** (0.0115)	-0.9111*** (0.0115)	0.0403*** (0.0044)	-0.0097** (0.0040)	-0.0060 (0.0043)	0.1466*** (0.0119)	0.1401*** (0.0067)	-0.5550*** (0.0156)	-1.2534*** (0.0384)
Post-reform	-0.0258* (0.0130)	-0.0665** (0.0272)	-0.0003 (0.0053)	-0.0088 (0.0103)	0.0010 (0.0028)	-0.0118** (0.0047)	0.0106 (0.0142)	-0.0386*** (0.0068)	0.0315*** (0.0110)	0.0010* (0.0005)	-0.0136*** (0.0048)	-0.0088*** (0.0031)	-0.0108 (0.0072)	-0.0059 (0.0048)	-0.0742*** (0.0080)	0.0157 (0.0202)
Dummy>0*Post	0.0813*** (0.0255)	0.2416*** (0.0902)	-0.0178 (0.0152)	0.0468*** (0.0149)	0.0217** (0.0094)	-0.0210 (0.0229)	0.0987** (0.0481)	0.0664*** (0.0234)	0.0379 (0.0238)	-0.0147 (0.0092)	0.0190** (0.0080)	0.0141 (0.0087)	0.0388 (0.0237)	0.0432*** (0.0134)	0.0265 (0.0311)	0.0233 (0.0762)
Observations	4,032	4,116	3,108	3,360	2,604	3,780	4,200	3,948	4,032	1,176	2,688	3,192	3,360	3,024	4,032	4,284
R-squared	0.2160	0.8687	0.0319	0.2523	0.0949	0.3269	0.5879	0.4152	0.4030	0.0213	0.0277	0.0998	0.1529	0.2079	0.1922	0.1984
Pre-reform mortality rate	0.31	1.34	0.11	0.03	0.04	0.11	0.71	0.22	0.19	0.01	0.04	0.06	0.08	0.04	0.45	0.78
Percent increase	26.45%	18.08%	-16.76%	151.07%	48.35%	-19.45%	13.92%	30.36%	19.64%	-173.00%	43.85%	23.11%	48.69%	115.34%	5.83%	2.99%
Estimated increase number of deaths due to the reform (less 2 million UI)	19	56		11	5		23	15			4			10		5

*** p<0.01, ** p<0.05, * p<0.1

Notes: The dependent variable is the monthly mortality rate expressed as deaths per 100,000 individuals. Standard errors (in parentheses) are clustered at the country of nationality level. Regressions include fixed effects at the country of nationality, year and month level. Regressions include population weights.

Source: Data from the Spanish Mortality Registers 2009 to 2015 and population data from the Spanish National Institute of Statistics.

TABLE 7—EFFECT OF RESTRICTION IN HEALTHCARE ACCESS ON POPULATION.
DIFFERENCES-IN-DIFFERENCES ESTIMATES

	(1)	(2)	(3)	(4)	(5)	(6)
	Ln(population)			Population		
	Both Genders	Men	Women	Both Genders	Men	Women
Dummy Percentage>0	2.2151*** (0.0250)	2.7301*** (0.0237)	1.2836*** (0.0309)	68,725.6458*** (4,139.4193)	53,387.4759*** (2,096.1463)	15,290.3829*** (2,194.1778)
Post-reform	0.0180 (0.0248)	0.0175 (0.0234)	-0.0002 (0.0311)	2,862.2926 (4,203.7522)	-40.6887 (2,168.5404)	2,913.8323 (2,254.2277)
Dummy>0*Post	-0.0456 (0.0539)	-0.0463 (0.0510)	-0.0032 (0.0666)	-8,827.7626 (8,915.6723)	-1,393.4994 (4,514.7765)	-7,331.3375 (4,725.9213)
Observations	4,284	4,284	4,200	4,284	4,284	4,200
R-squared	0.9950	0.9956	0.9927	1.0000	1.0000	1.0000

*** p<0.01, ** p<0.05, * p<0.1

Notes: The dependent variable is the logarithm of the population in columns 1 through 3 and the population (number of individuals) in columns 4 through 6. Standard errors (in parentheses) are clustered at the country of nationality level. Regressions include fixed effects at the country of nationality, year and month level.

Source: Data from the Spanish National Institute of Statistics 2009 to 2015.

TABLE 8—EFFECT OF RESTRICTION IN HEALTHCARE ACCESS ON EDUCATIONAL AND AGE COMPOSITION OF POPULATION. DIFFERENCES-IN-DIFFERENCES ESTIMATES

	(1) Primaria Edu & Illiterate	(2) Secondary Edu	(3) Tertiary Edu	(4) Less than 10 y.o.	(5) Less than 50 y.o.
Dummy Treated	0.0749*** (0.0010)	0.0108*** (0.0012)	-0.1200*** (0.0046)	0.0466*** (0.0067)	0.3063*** (0.0060)
Post-reform	-0.0629*** (0.0004)	0.0139*** (0.0005)	0.0351*** (0.0003)	-0.0028** (0.0006)	-0.0406*** (0.0003)
Treated*Post	0.0112*** (0.0007)	-0.0136*** (0.0003)	-0.0135 (0.0066)	0.0064 (0.0098)	-0.005 (0.0088)
Observations	991,299	991,299	991,299	991,299	991,299
Pre-reform Rate	0.25	0.28	0.13	0.11	0.91
Percent Increase	4.48%	4.85%			

*** p<0.01, ** p<0.05, * p<0.1

Notes: Standard errors (in parentheses) are clustered at the region of nationality level. Regressions include fixed effects at the level of the Spanish region, region of nationality and year.

Source: Data from the Spanish Labour Force Survey 2009 to 2015 (second quarter interviews).

TABLE 9—EFFECT OF RESTRICTION IN HEALTHCARE ACCESS
ON THE MORTALITY OF UNDOCUMENTED IMMIGRANTS.
DIFFERENCES-IN-DIFFERENCES ESTIMATES EXPLOITING
BOTH COUNTRY OF NATIONALITY AND COUNTRY OF BIRTH

	(1)	(2)
Immigrant dummy	-13.30*** (3.91)	-13.38*** (3.93)
Post-reform	-5.96*** (1.44)	-5.30*** (0.98)
Post-reform*Immigrant	7.07*** (1.25)	7.15*** (1.27)
FE country of birth	X	X
FE year, month		X
Observations	5,376	5,376
Pre-reform mortality rate	3.88	3.88
Percent increase	182%	184%

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Notes: The dependent variable is the monthly mortality rate expressed as deaths per 100000 individuals. Standard errors (in parentheses) are clustered at the country of birth level. Regressions include population weights.

Source: Data from the Spanish Mortality Registers 2009 to 2015 and population data from the Spanish National Institute of Statistics.

TABLE 10—EFFECT OF RESTRICTION IN HEALTHCARE ACCESS
ON THE MORTALITY OF UNDOCUMENTED IMMIGRANTS.
DIFFERENCES-IN-DIFFERENCES ESTIMATES AT THE REGIONAL
LEVEL

	(1)	(2)
Dummy percentage>0	-8.5581*** (3.0464)	-8.5826*** (3.0551)
Post-reform	-0.2017 (0.1349)	-0.2043 (0.1314)
Dummy>0*Post	0.6180*** (0.0000)	0.6733*** (0.0000)
FE region	X	X
FE year, month	X	X
Region specific linear trends		X
Observations	2,856	2,856
R-squared	0.8559	0.8606
Pre-reform mortality rate	4.33	4.33
Percent increase	14.27%	15.54%

*** p<0.01, ** p<0.05, * p<0.1

Notes: The dependent variable is the monthly mortality rate expressed as deaths per 100000 individuals. Standard errors (in parentheses) are clustered at the Spanish region level and calculated using the wild bootstrapping method proposed in Cameron et al. (2008). Regressions include population weights.

Source: Data from the Spanish Mortality Registers 2009 to 2015 and population data from the Spanish National Institute of Statistics.

Appendix

FIGURE A1—EXAMPLES OF ANECDOTAL EVIDENCE OF INDIVIDUALS THAT HAVE BEEN DENIED THE HEALTH CARE CARD OR ACCESS TO THE HEALTH CARE SYSTEM IN SPAIN. COLLECTED FROM SEVERAL REPORTS BY NGO’S

J. G. is a Venezuelan woman aged 56. In 2014 she arrived in the Canary Islands owing to a family regrouping process. J. suffers from diabetes and needs insulin. However, although she is legally resident in Spain the National Social Security Institute (Instituto Nacional de Seguridad Social, INSS) refuses to issue her a health card. As a consequence of this refusal, J. is unable to obtain not only the medical follow-up she needs but also the insulin she must have as it is only available on prescription.

Source: Taken from “Five myths for five years of health exclusion”, Reder, April 2017.

KCM is a 9-month-old baby born in Spain from Nigerian parents who have a valid residence permit. They have a family record book and a Spanish birth certificate but the baby does not have a healthcare card because you must have a passport to get one. The family lacks the financial means to apply for one. They received a bill for a consultation with a paediatrician. With the support of a social organisation they have issued a plea, the result of which has been put on hold until the new regional legislation is approved (The Autonomous Region of Valencia).

Source: Taken from “Anatomy of the Healthcare Reform” Reder, 2015.

Rosa is a 71-year-old Uruguayan woman who has been living in Spain for many years with her daughter and her granddaughters, who are her only family. She registered more than three years ago and she used to have a healthcare card. She suffers from a chronic cardiovascular disease. She has had to go to the emergency ward on several occasions, because this is the only way for her to access the healthcare system. She has already received several invoices but she does not have the financial means to pay them.

She was referred to a specialist hospital with persistent respiratory insufficiency - she needed urgent surgery to replace an aortic valve. When she was discharged she received a medical report referring her for follow-up care with her general practitioner. But, to complete the vicious circle, she cannot receive this follow-up care because she does not have a healthcare card.

M is a woman who came to Galicia in 2012 with her husband and her two sons, aged 2 and 5, thanks to a post-university study grant. Upon arrival she immediately started the applications to request a healthcare card, but she was initially refused by the Office of Social Security. With the support of a social worker from her health centre she was able to get medical care for her children, as they were minors, whilst her application for access to the Galician Programme for the Social Protection of Public Health was being processed, thanks to the support of a REDER member organisation. Firstly, this request was also rejected, and only after an appeal and showing INSS documentation was it recognised that these minors lacked regulated access to medical care and the regional delegation of La Coruña gave a positive response.

However, just 10 days later, M received a letter once again refusing healthcare via the Galician Programme because they had discovered that the parents of the two minors had a regular administrative status. As a consequence they cancelled and withdrew the healthcare cards. (Galicia).

Source: Taken from “Anatomy of the Healthcare Reform” Reder, 2015.

SPAIN IS LEAVING THE OLD AND SICK TO DIE WITHOUT HEALTHCARE

Carlos was 66 when he died with his daughter Natalia (photo on the page on the left) unable to make the Administration give him regulated access to the medical care he required. He was suffering from diabetes and Alzheimer's disease and had arrived in Spain, where all his children live, in 2009. He went to live in Galicia with his daughter and his son-in-law, where he had a healthcare card and received regulated treatment. However, when the family moved region, due to work reasons, Carlos was left without medical care. In the office of the INSS he was refused a healthcare card as his daughter's beneficiary and they demanded that he take out private insurance. In April 2014, he suffered a general deterioration and went to the emergency ward where it was recommended that he be admitted. However the insurance refused to pay for the cost of both the admission and the prescribed treatment. He therefore had to request voluntary discharge as the family could not afford to pay for this. As a consequence his situation deteriorated over the following weeks, leading to further admissions to the emergency ward. But he never received the appropriate treatment and follow-up care for his disease, and he died. Cases like Carlos' pile up without any signs of solutions for the powerless families and people who bravely try to help them see their right to healthcare recognised.

By fighting for their rights, some families are starting to see that the courts agree with them. This was the case for Margarita, an 81-year-old Colombian who had been living in Burgos for almost a decade until she was able to get a permit for family reunification. The INSS refused her a healthcare card, stating that "foreign nationals who request to be registered on the Registro

Central de Extranjeria (Central Register for Foreign Nationals), or for the appropriate residency permit, after 24 April 2012 will not have the right to healthcare financed by the national health system". At the same time Hilda, a 77 year-old Venezuelan, was experiencing a similar story in Barcelona. A legal resident since 2011, thanks to a family reunification process, the INSS refused her a healthcare card claiming that Hilda should have had private health insurance when she requested legal residency in Spain in order to be granted this. In Madrid 80-year-old Colombian Victor, suffering from COPD, had arrived in Spain in 2013 thanks to the efforts of his daughter in having him granted family reunification. However, this reunification did not come accompanied with a healthcare card, which he was refused by the INSS because he had never paid social contributions in Spain.

In all of these cases the law clearly sided with the affected people, arguing that the decision made by the Foreign Nationals Register to give residency to a person is, for all intents and purposes, a legal ruling, and the INSS has no competence to interpret these rulings nor to limit their scope judging the requirements for a regularisation as being met and withdrawing the part of this relating to healthcare.

However, this situation continues today and there are many cases which still require urgent care. Like that of J.M.S., an 80-year-old Argentine man and Spanish resident since 2013. Despite having private insurance, they refused to pay for his treatment when he was diagnosed with COPD. Or that of C.S.C.M., an 80 year-old Cuban with hypertension and heart disease with mitral insufficiency who was refused a card by the INSS.

Source: Taken from "Anatomy of the Healthcare Reform" Reder, 2015.

Mujer con cáncer de cuello uterino sin atención médica por no poder cumplir trámite administrativo

Samira, ciudadana marroquí de 34 años, es atendida por Médicos del Mundo desde noviembre de 2013 porque carece de tarjeta sanitaria y no puede acceder al Programa Aragonés de Protección Social de la Salud Pública. El motivo: no dispone de la documentación marroquí que justifica la no exportación del derecho a la asistencia sanitaria.

Tras revisión ginecológica y en las pruebas pertinentes realizadas se le diagnostica infección por el virus del papiloma humano (VPH) que necesita posteriores pruebas en el Hospital Nuestra Señora de Gracia de Zaragoza. Tras una biopsia se diagnostica Cáncer de Cuello Uterino y la necesidad de una conización cervical urgente. Al no disponer de tarjeta sanitaria no ha recibido citación para la correspondiente cirugía.

Samira cumple los requisitos para el acceso al Programa Aragonés de Protección Social de la Salud Pública: más de 6 meses empadronada en la Comunidad Autónoma de Aragón y pasaporte en vigor. Sin embargo, hasta ahora ha resultado técnicamente imposible conseguir el informe de no exportación del derecho a la asistencia sanitaria que debe emitir su país de origen.

Paciente con cáncer sin recursos económicos para afrontar gastos de medicación

Mujer de 56 años procedente de Rumanía con NIE en regla, fue diagnosticada en septiembre de 2013 de Adenocarcinoma pulmón estadio IV, afectación ganglionar, pulmonar y tiroidea, tromboembolismo pulmonar bilateral incidental. Sufre dolor debido a su tumor. Recibe el alta hospitalaria, octubre de 2013, bajo seguimiento y control domiciliario por médico de Atención Primaria y Especialistas correspondientes.

Acude a Médicos del Mundo al día siguiente de recibir el alta porque carece de suficientes recursos económicos para afrontar el gasto de tratamiento: la medicación para el dolor oncológico tiene un precio de casi 200€ mensuales, el resto de las medicinas asciende a otros 200€ al mes.

Gracias a la mediación de Médicos del Mundo junto con el Equipo de Soporte de Atención a Domicilio (ESAD) y con la trabajadora social del hospital se consigue que le sea suministrada la medicación. Actualmente se le ha denegado la Tarjeta Autonómica Sanitaria (TAS) al no poder demostrar que reside en esta comunidad autónoma desde antes de la entrada en vigor del Real Decreto-ley 16/2012.

Source: Taken from “Dos años de reforma sanitaria: más vidas humanas en riesgo”, Doctores del Mundo: Spain, 2014.

Alpha Pam murió de tuberculosis sin conocer su diagnóstico

Este ciudadano senegalés residente en Mallorca, sin autorización de residencia y, por ende sin tarjeta sanitaria, inició su periplo por los centros de salud seis meses antes de su fallecimiento. Acudió, siempre según el testimonio de su compañero de piso, en más de siete ocasiones al Centro de Salud de referencia, CS Can Picafort. Su estado de salud no mejoró durante todo este tiempo, a pesar de las continuas visitas. En este Centro de salud siempre fue atendido por Urgencias. Las personas que nos ofrecen su testimonio no saben precisar si en todas esas ocasiones fue atendido por personal de enfermería o de medicina.

En algún momento del mes de marzo, Alpha acudió de nuevo al Centro de Salud Can Picafor acompañado por su compañero de piso. Allí se le facilitó cierta medicación, aunque nunca se le indicó verbalmente diagnóstico alguno. La doctora que le atendió le indicó que acudiera al Hospital de Inca, a fin de que le fueran realizadas unas radiografías. Cabe recordar que las personas que no cuentan con tarjeta sanitaria no pueden ser derivadas a atención especializada dentro del sistema de salud, motivo por el que tuvo que acudir a través de urgencias hospitalarias.

Alpha acude a finales del mes de marzo, por primera vez, al hospital de Inca. En esta ocasión no le acompaña nadie. Una vez allí, se le deniega el acceso a urgencias por carecer de tarjeta sanitaria. Es el personal administrativo de Admisión quien le deniega la atención. Se repite esta situación el día 4 de abril, denegándosele por segunda vez la atención por urgencias como consecuencia de no contar con tarjeta sanitaria.

El día 13 de abril, Alpha Pam acude nuevamente al hospital de Inca, esta vez, acompañado de su amigo y compañero de piso. Tras insistir vehementemente, preocupado por las negativas anteriores, es atendido en Admisión donde se le recogen los datos tanto del paciente como del acompañante y son instados a firmar un compromiso de pago por la atención que aún no había recibido.

Aunque tanto el enfermo como su acompañante expresan que la doctora del centro de salud había prescrito la realización de radiografías, no le es practicada prueba alguna, haciendo caso omiso de esta petición. La atención médica que recibe en esta ocasión apenas dura más de cinco minutos.

El estado de salud de esta persona, a simple vista ya denotaba indicios claro de enfermedad, con grandes dolores torácicos. Padeecía de temblores continuos, que duraban horas, escalofríos, sensación de vómito, cansancio extremo, somnolencia. Aunque nunca esputó sangre. Sin embargo, en ningún momento se decidió su ingreso. Le fueron prescritos medicamentos que no le causan ningún efecto. El paciente fallecido siempre tomó la medicación prescrita por unos y otros facultativos. De hecho, habría estado dispuesto a abonar el precio de las pruebas que hubieran hecho, si se lo hubieran demandado.

En cambio, Alpha Pam murió sin conocer el diagnóstico de su enfermedad: tuberculosis. El único diagnóstico que facilitaron fue bronquitis, sin valorar otros indicios. El día 24 de abril de 2013, el Alpha Pam muere en su domicilio, rodeado de abundante sangre, en forma de grandes charcos.

Source: Taken from “Dos años de reforma sanitaria: más vidas humanas en riesgo”, Doctores del Mundo: Spain, 2014.

TABLE A1—REGIONS INCLUDED IN THE CONTROL AND TREATMENT GROUP IN THE SPANISH LABOUR FORCE SURVEY DATASET.

Control Group		Treatment Group	
Country	Region	Country	Region
Spain	EU-15	Algeria	Africa
Germany	EU-15	Cape Verde	Africa
Austria	EU-15	Egypt	Africa
Belgium	EU-15	Gambia	Africa
Denmark	EU-15	Equatorial Guinea	Africa
Finland	EU-15	Libya	Africa
France	EU-15	Morocco	Africa
Greece	EU-15	Senegal	Africa
Ireland	EU-15	South Africa	Africa
Italy	EU-15	Sudan	Africa
Luxemburg	EU-15	Occidental Sahara	Africa
The Netherlands	EU-15	Tunisia	Africa
Portugal	EU-15	Ethiopia	Africa
United Kingdom	EU-15	Angola	Africa
Sweden	EU-15	Democratic Republic of Congo	Africa
Cyprus	EU-25	Camerun	Africa
Slovenia	EU-25	Ghana	Africa
Estonia	EU-25	Guinea	Africa
Hungary	EU-25	Guinea-Bissau	Africa
Latvia	EU-25	Mali	Africa
Lithuania	EU-25	Mauritania	Africa
Malta	EU-25	Nigeria	Africa
Poland	EU-25	Other African Countries	Africa
Czech Republic	EU-25	Costa Rica	Centre-America and Caribbean
Slovakia	EU-25	Cuba	Centre-America and Caribbean
Bulgaria	EU-27	El Salvador	Centre-America and Caribbean
Romania	EU-27	Guatemala	Centre-America and Caribbean
Canada	North-America	Haití	Centre-America and Caribbean
USA	North-America	Honduras	Centre-America and Caribbean
		México	Centre-America and Caribbean
		Nicaragua	Centre-America and Caribbean
		Panamá	Centre-America and Caribbean
		Puerto Rico	Centre-America and Caribbean
		República Dominicana	Centre-America and Caribbean
		Other Countries in Central America and the Caribbean	Centre-America and Caribbean
		Argentina	South-America
		Bolivia	South-America
		Brasil	South-America
		Chile	South-America
		Colombia	South-America
		Ecuador	South-America
		Paraguay	South-America
		Perú	South-America
		Uruguay	South-America
		Venezuela	South-America

Notes: These are the regions and countries that can be included and how we classify them into the treatment and control group using the percentage of undocumented for each nationality living in Spain in 2011. We try to match as much as possible the same countries than in the mortality registers although the LFS includes a larger number of countries than the mortality registers.

Source: Spanish Labour Force Survey 2009 to 2015 (second quarter interviews).

TABLE A1 CONTINUED—REGIONS INCLUDED IN THE CONTROL AND TREATMENT GROUP IN THE SPANISH LABOUR FORCE SURVEY DATASET.

Control Group		Treatment Group	
Country	Region	Country	Region
		Other Countries in South America	South-America
		China	Eastern Asia
		North Korea	Eastern Asia
		South Korea	Eastern Asia
		Japan	Eastern Asia
		Mongolia	Eastern Asia
		Taiwan	Eastern Asia
		Saudi Arabia	Middle-East
		Irak	Middle-East
		Israel	Middle-East
		Jordan	Middle-East
		Lebanon	Middle-East
		Syria	Middle-East
		Palestine	Middle-East
		Other Countries in the Middle East	Middle-East
		Bangladesh	South Asia
		Cambodia	South Asia
		Philippines	South Asia
		India	South Asia
		Indonesia	South Asia
		Iran	South Asia
		Laos	South Asia
		Pakistan	South Asia
		Sri Lanka	South Asia
		Thailand	South Asia
		Vietnam	South Asia
		Kazajstan	South Asia
		Kirguistan	South Asia
		Tayikistan	South Asia
		Turkmenistan	South Asia
		Uzbekistan	South Asia
		Other Countries in South Asia	South Asia

Notes: These are the regions and countries that can be included and how we classify them into the treatment and control group using the percentage of undocumented for each nationality living in Spain in 2011. We try to match as much as possible the same countries than in the mortality registers although the LFS includes a larger number of countries than the mortality registers.

Source: Spanish Labour Force Survey 2009 to 2015 (second quarter interviews).



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