

# Naturalization and immigrants' health

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## Abstract

The “healthy immigrant effect” refers to the well-documented fact that immigrants are healthier than natives upon arrival, but their health level converges to that of natives over time. Unfortunately, we know little about whether environmental, institutional, or selective return migration mechanisms are behind the convergence. In this paper, I test whether immigrants' naturalization influences health convergence speed. Using restricted-access Spanish health data from the National and European Health Surveys, I estimate the impact of naturalization on health by exploiting that naturalization is possible after 2 years of residence for immigrants from specific countries and after 10 years for all other immigrants. I find that naturalization worsens immigrants' health and thus accelerates the speed of convergence to natives' health. Increases in employment are potential mechanisms behind this effect.

## KEYWORDS

healthy immigrant effect, immigrants' health, naturalization

## JEL CLASSIFICATION

J15, J61, I14

## 1 | INTRODUCTION

Most of the previous literature finds a “healthy immigrant effect” (HIE), meaning that immigrants have better health than comparable natives when they arrive in the host country and during their first years since migration. However, their health deteriorates with additional years of residence in the host country and approaches that of natives. The positive difference in health between recently arrived immigrants and natives is attributed to the positive health self-selection of migrants. It is also due to the additional hurdles they must overcome during their migration journey and to the health screening or positive selection that the host countries apply to prospective immigrants. However, little is known about the factors behind convergence in health over time. Naturalization favors immigrants' economic and social integration (Saurer (2017)). Does it also foster convergence in health? I study whether becoming a citizen of the hosting country affects immigrants' health, thus affecting the speed of convergence of immigrants' to natives' health.

I first document the healthy immigrant effect in the Spanish context by comparing the health of immigrants and natives and studying how this comparison changes with years since migration. I also document how convergence speed differs for naturalized and non-naturalized immigrants. Finally, I study the impact of gaining Spanish citizenship on immigrants' health and the mechanisms behind this impact. I use restricted-access data from the Spanish National Health Survey and the European Health Survey for 2011, 2014, 2017, and 2020. This dataset contains information on country of birth, nationality, years of residence in Spain, and various health measures.<sup>1</sup>

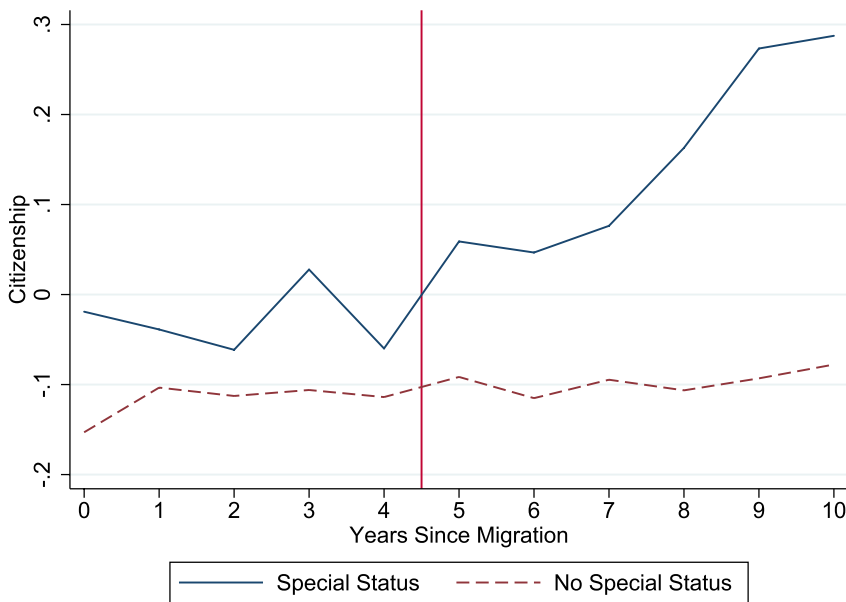
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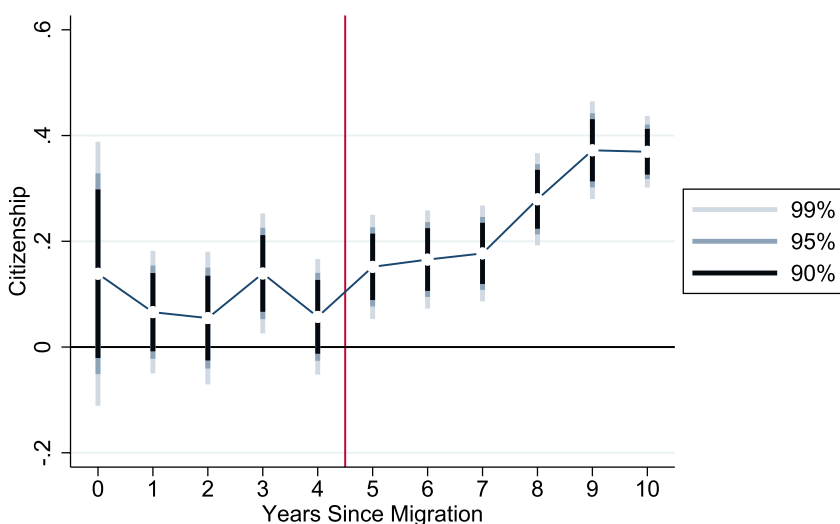
The Spanish case is particularly interesting because Spanish authorities make it easier for immigrants from former Spanish colonies or countries with a special relationship with Spain to gain Spanish citizenship. In particular, immigrants from these “special status” countries can apply for Spanish citizenship after 2 years of residence in Spain while all other immigrants can apply for Spanish citizenship only after 10 years of residence.<sup>2</sup> This difference in naturalization rules across countries of origin provides an opportunity to estimate the change in health as a consequence of becoming Spanish citizens. As the naturalization process lasts 2 years, I use the 4 years since migration cutoff as an exogenous shifter of the probability of becoming a Spanish citizen for treated immigrants.<sup>3</sup> I run IV regressions where I instrument having Spanish citizenship by the interaction of residing in Spain for more than 4 years and coming from a special-status country in a sample of immigrants who have been in Spain for less than 10 years.

Figure 1 illustrates the jump in the probability of gaining citizenship after 4 years of residence for immigrants from special-status countries. As years since migration are correlated with age, I condition on age dummies. While the proportion of immigrants from non-special-status countries who have citizenship remains stable, that from special-status countries is stable at a higher level up to the fourth year since migration (probably because more immigrants from special-status countries already have Spanish citizenship upon arrival) and increases significantly after that. Figure 2 shows the evolution of the differences in the (conditional on age) proportion of naturalized immigrants between special-status and non-special-status immigrants and the corresponding confidence intervals. Differences remain stable up to the fourth year since migration.<sup>4</sup> Immigrants from special-status countries are significantly and increasingly more likely to become Spanish citizens after that.

Figure 3 shows the evolution of a one-to-five health index over the years since migration separately for immigrants from special-status and non-special-status countries. As health worsens with age, I control for age dummies. Consistently with the



**FIGURE 1** Citizenship and years since migration by country of origin's status. Data is from the Spanish National Health Survey (2011 and 2017) and the European Health Survey (2014 and 2020). The sample includes all individuals born outside of Spain. Citizenship is the proportion of foreign-born individuals with Spanish citizenship, conditional on age dummies.

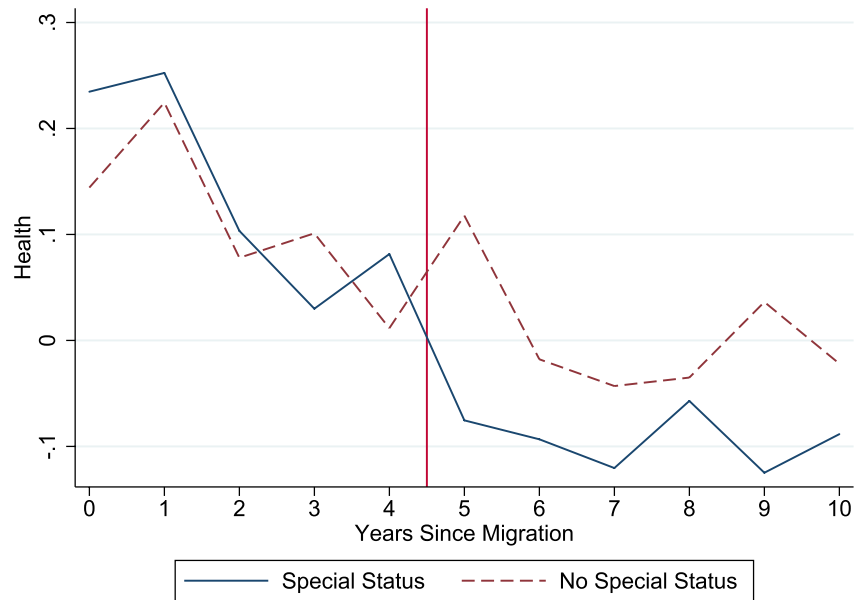


**FIGURE 2** Differences in citizenship and years since migration by country of origin's status. Data is from the Spanish National Health Survey (2011 and 2017) and the European Health Survey (2014 and 2020). The sample includes all individuals born outside of Spain. Citizenship is the proportion of foreign-born individuals with Spanish citizenship, conditional on age dummies.

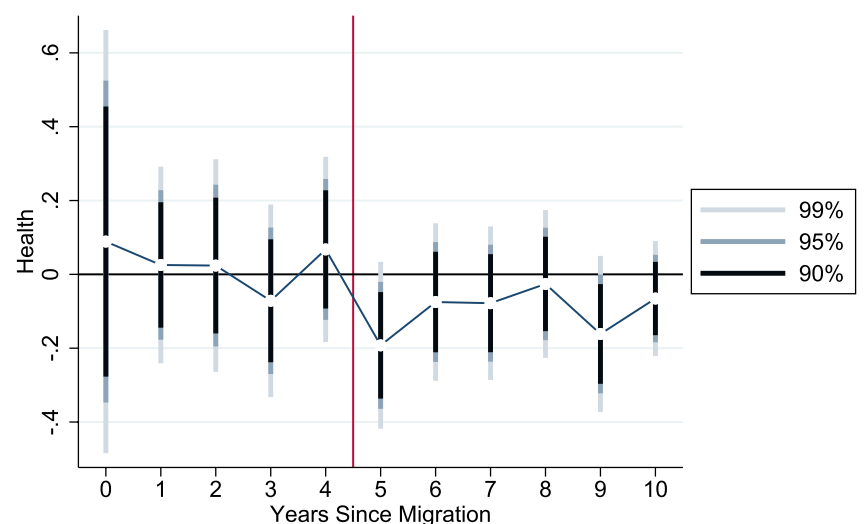
healthy immigrant hypothesis, immigrants' health levels deteriorate over time for the two sets of immigrants. Although average health levels are comparable for immigrants who have resided for less than 4 years in Spain, the health of immigrants from special-status countries remains consistently lower than that of other immigrants after 4 years of residence. Figure 4 shows differences in a one-to-five health index between immigrants from special-status and non-special-status countries over years since migration. These differences are positive (or null) for immigrants with less than 5 years of residence in the host country. They become negative after 4 years of residence in Spain, although they are statistically significant only for immigrants with five and 9 years of residence. These two figures illustrate my main result that naturalization worsens immigrants' health.

I find evidence in favor of the healthy immigrant effect. The average immigrant with less than 5 years of residence has a health index 0.078 points higher than natives. Instead, immigrants with more than 5 years of residence have a health index that is 0.031–0.077 points lower than natives. I also find that the healthy immigrant effect differs for naturalized and non-naturalized immigrants. Naturalized immigrants experience a reduction of 0.05 in their health index, and their health converges more slowly to that of natives after that (0.002 points per year instead of the 0.005 points for non-naturalized immigrants).

In the sample of immigrants who arrived less than 10 years ago, I find that naturalization is unrelated to health when I control for individual characteristics like male, age, married, years of residence in Spain, country of origin, and region of residence.<sup>5</sup> However, coefficients significantly change when I instrument immigrants' naturalization by the interaction of being born in a special-status country and residing in Spain for 4 years or more. I find that having Spanish nationality reduces immigrants' health as measured by the one-to-five health index by 1.31 points and increases the likelihood of declaring to be in bad or very bad health by 0.23. Hence, the lack of association between naturalization and health is due to unobserved



**FIGURE 3** Health and years since migration by country of origin's status. Data is from the Spanish National Health Survey (2011 and 2017) and the European Health Survey (2014 and 2020). The sample includes all individuals born outside of Spain. Health is a one-to-five index indicating whether the individual declares to be in very bad, bad, regular, good, or very good health, conditional on age dummies.



**FIGURE 4** Differences in health and years since migration by country of origin's status. Data is from the Spanish National Health Survey (2011 and 2017) and the European Health Survey (2014 and 2020). The sample includes all individuals born outside of Spain. Health is a one-to-five index indicating whether the individual declares to be in very bad, bad, regular, good, or very good health, conditional on age dummies.

immigrants' characteristics such that those obtaining Spanish nationality have better health than non-naturalized ones. However, when using comparable immigrants, I estimate a negative effect of naturalization on health.

## 1.1 | Related literature

Several articles have documented the healthy immigrant effect. For the US see Anderson, Bulatao, Cohen, on Race, Council, et al. (2004), Abraido-Lanza, Dohrenwend, Ng-Mak, and Turner (1999), Antecol and Bedard (2006), and Giuntella (2013). Chen, Ng, Wilkins, et al. (1996), Deri (2003), McDonald (2003) and Laroche (2000) have documented a health advantage among immigrants to Canada, while Donovan, d'Espaignet, Merton, and Van Ommeren (1992), Chiswick, Lee, and Miller (2008), and Powles, Hage, and Cosgrove (1990) do so for immigrants to Australia. Finally, Farré (2016) provides evidence that the healthy immigrant effect is also present in a sample of Ecuadorians who moved to Spain after the 1990s economic collapse. In all these setups, immigrants are positively selected with respect to natives and individuals who stayed in their country of origin. Positive selection of naturalized immigrants in the form of return migration could be behind my results. An additional explanation of the healthy immigrant effect is that immigrants have healthier habits in their country of origin, which disappear as they integrate into the host society. The latter explanation is consistent with my findings if immigrants adopt the habits of the host society faster after naturalization.

Several previous studies have looked at the value of migrants' legal status on their own and their children's welfare, focusing on regularizations of residence status, changes in access to citizenship, and the EU enlargements. All these changes have beneficial effects on a range of different outcomes: labor market outcomes (Gathmann and Keller (2018)), birth weight (Salmasi and Pieroni (2015)), consumption (Dustmann, Fasani, and Speciale (2017)), crime (Pinotti (2017)) and immigrant children's educational attainment (Felfe, Rainer, and Saurer (2020)). These studies conclude that naturalization fosters the convergence of immigrants' and natives' outcomes. My study investigates whether this is also the case for health outcomes. This paper is the first to study whether naturalization affects immigrants' health.

## 2 | INSTITUTIONAL FRAMEWORK AND DATA

During the twenty-first century's first decade, Spain experienced one of the largest migration waves in European history. Consequently, a significant share of today's population is foreign-born: 16% of the 47.4 million Spanish residents in 2022 were born abroad. The Spanish migration is characterized by a great variety of countries of origin, with representative shares of immigrants from Africa, South America, Europe, and Asia.<sup>6</sup>

The Spanish Civil Code lays out the details of Spanish nationality. There are four modes to acquire Spanish nationality for foreign-born individuals: option, discretionary conferral, possession of status, and residence. Any person who is or has been under the parental authority of a Spanish national, whose mother or father was Spanish and born in Spain, or adopted persons over 18, may opt for Spanish nationality. Foreign-born individuals may gain Spanish nationality by discretionary conferral, which includes reasons relating to culture, sport, science, and solidarity, among others. Acquiring Spanish nationality by possessing status implies possessing and using Spanish nationality for at least 10 years in goodwill.<sup>7</sup> Finally, most naturalized immigrants achieve their status by residency.

In order to be granted Spanish nationality by residency, immigrants need to reside legally and continuously in Spain immediately before the application for at least 10 years. This requisite becomes 5 years for refugees, 2 years for nationals of Latin American countries, Andorra, the Philippines, Equatorial Guinea, Portugal or persons of Sephardic origin, and 1 year for Spaniards' spouses, individuals born in Spanish territory or with parents entitled to the Spanish nationality.<sup>8</sup>

According to the Spanish National Statistics Institute, the number of citizenship acquisitions in 2021 was 144,012, of which 121,760 (85%) were "by residence", 21,712 (15%) were "by option", and a negligible 540 were granted for any other reason or unknown reasons. Out of those individuals who were naturalized "by option", 96.2% were below twenty.

Spain is part of the European Union, meaning that EU citizens enjoy the same rights as Spanish nationals. They can seek employment, study in another member state of the EU, and move freely from one EU country to another without an entry visa.

In this study, I combine data from the 2011 and 2017 waves of the Spanish National Health Survey (SNHS) and the 2014 and 2020 waves of the European Health Survey (EHS). Both surveys consist of four modules on health status, healthcare use, health determinants, and socioeconomic background variables. Although the two surveys are not identical, they share a set of harmonized variables. They target the population aged at least 15 and living in private households. Their frequency is every 6 years, alternating each other every 3 years. The two surveys are representative of the Spanish population.

TABLE 1 Descriptive statistics.

Variable	All	Native	Immigrant	Special status	No special status	Citizenship	No citizenship
Overall health	3.755 (0.915)	3.736 (0.92)	3.949 (0.835)	3.922 (0.835)	3.972 (0.833)	3.861 (0.871)	3.99 (0.813)
Bad health	0.094 (0.292)	0.098 (0.298)	0.049 (0.217)	0.051 (0.221)	0.048 (0.213)	0.065 (0.247)	0.041 (0.199)
Immigrant	0.090 (0.286)	0 (0)	1 (0)	1 (0)	1 (0)	1 (0)	1 (0)
Citizenship	0.940 (0.238)	0.999 (0.024)	0.336 (0.472)	0.493 (0.5)	0.202 (0.401)	1 (0)	0 (0)
Special-status country	0.042 (0.2)	0 (0)	0.461 (0.499)	1 (0)	0 (0)	0.677 (0.468)	0.352 (0.478)
Years since migration	50.581 (21.648)	54.065 (19.025)	15.359 (13.503)	14.19 (11.592)	16.36 (14.875)	21.951 (15.509)	12.019 (10.941)
Male	0.463 (0.499)	0.465 (0.499)	0.443 (0.497)	0.387 (0.487)	0.491 (0.5)	0.396 (0.489)	0.466 (0.499)
Age	52.998 (18.98)	54.069 (19.025)	42.186 (14.64)	41.525 (14.26)	42.752 (14.936)	45.12 (15.251)	40.699 (14.09)
Married	0.53 (0.499)	0.528 (0.499)	0.543 (0.498)	0.48 (0.5)	0.596 (0.491)	0.519 (0.5)	0.555 (0.497)
Europe	0.939 (0.239)	1 (0)	0.287 (0.452)	0.045 (0.208)	0.494 (0.500)	0.184 (0.388)	0.339 (0.474)
Africa	0.017 (0.130)	0 (0)	0.190 (0.392)	0.006 (0.079)	0.348 (0.476)	0.133 (0.340)	0.219 (0.414)
America	0.040 (0.195)	0 (0)	0.439 (0.496)	0.939 (0.239)	0.010 (0.097)	0.651 (0.477)	0.331 (0.471)
Asia	0.004 (0.062)	0 (0)	0.043 (0.203)	0.009 (0.094)	0.072 (0.259)	0.023 (0.150)	0.053 (0.224)
Oceania	0 (0.009)	0 (0)	0.001 (0.030)	0 (0)	0.002 (0.040)	0.001 (0.030)	0.001 (0.027)
European Union	0.932 (0.252)	1 (0)	0.247 (0.431)	0.045 (0.207)	0.420 (0.494)	0.141 (0.348)	0.300 (0.459)
North America	0.003 (0.054)	0 (0)	0.032 (0.177)	0.061 (0.240)	0.008 (0.087)	0.054 (0.226)	0.022 (0.146)
N. Observations	88,863	80,855	8008	3695	4313	2693	5315

Note: Natives and Immigrants sample. Data is from the Spanish National Health Survey (2011 and 2017) and the European Health Survey (2014 and 2020). Health is a one-to-five index indicating whether the individual declares to be in very bad, bad, regular, good, or very good health. Bad health is an indicator equal to one if the individual declares to be in bad or very bad health. For each variable, the numbers in the first row represent mean values, and the numbers in parentheses in the second row represent standard deviations.

The SNHS and EHS contain individualized samples for adults and children. For this work, I restrict my attention to the adult samples starting in 2011. I do not consider previous editions of these surveys because they did not ask for information on the respondent's nationality, country of birth, or the number of years of residence in Spain, critical variables of my analysis. I had access to the latter information for the years in which it existed by signing a confidentiality agreement.

In my analysis, I use two samples. I test the healthy immigrant hypothesis using a sample of natives and immigrants. I use a second sample including only immigrants to estimate the effect of naturalization on immigrants' health. Table 1 describes the main variables for the sample of natives and immigrants used to document the healthy immigrant effect. The average level of health is slightly below "good health". Natives' average health index is 0.2 points lower than immigrants'. Immigrants from special-status and non-special-status countries have very similar levels of health on average. Non-naturalized immigrants are

slightly healthier than naturalized ones. 9.4% of individuals in my sample declare to be in bad or very bad health. This condition is much more common among natives (9.8%) than immigrants (4.9%). Immigrants from special-status countries are slightly more likely to be in bad or very bad health than those from non-special-status countries (5.1% vs. 4.8%), and naturalized immigrants are more likely to be in bad or very bad health than non-naturalized immigrants (6.5% vs. 4.1%).

Nine percent of my sample is foreign-born. Almost 34% of the immigrants have Spanish nationality. The proportion is 2.5 times higher for immigrants from special-status countries. Immigrants from a special-status country represent four percent of the total sample and 46% of the immigrant sample. Two-thirds of immigrants with Spanish citizenship are from special-status countries, while this proportion decreases to 35% for non-naturalized immigrants. The average immigrant has been in Spain for slightly more than 15 years. The average immigrant from a non-special-status country has been in Spain for 2 years more than the average special-status immigrant. The average naturalized immigrant has been in Spain for 22 years, while the average number of years in Spain is 12 for non-naturalized immigrants.

Less than half of the sample is male. The group of immigrants from non-special-status countries has the highest proportion of males (49%), followed by non-naturalized and natives (47%), naturalized (40%), and immigrants from special-status countries (39%). The average individual in our sample is 53 years old. The eldest subsample is that of natives (54 years old on average). Immigrants from special-status and non-special-status countries have similar ages on average (43 and 42, respectively), while naturalized immigrants are almost five years older than non-naturalized ones. Finally, slightly more than half of the sample is married: 60% of non-special-status immigrants, 56% of non-naturalized, 53% of natives, 52% of naturalized, and 48% of special-status immigrants are married.

My sample is composed of 44% immigrants from America (3% from North America), 29% from Europe (25% from the European Union), 19% from Africa, and 4% from Asia. Immigrants from special-status countries are mostly American (immigrants from Andorra, Equatorial Guinea, the Philippines, and Portugal are few). Immigrants from North America represent 1% of those from non-special-status countries. Most naturalized immigrants come from America (65%), followed by Europeans (18%) and Africans (13%). One-third of non-naturalized immigrants are American, another third are European, and one-fifth are African.

Table 2 describes the sample included in the estimation of the effect of naturalization on health, composed of immigrants with less than 10 years of residence in Spain. The average level of health is very similar for all types of immigrants and slightly above the “good health” level. Three percent of immigrants declare to have bad or very bad health. Immigrants from special-status countries are slightly more likely to have bad or very bad health than those from non-special-status countries. Moreover, naturalized immigrants are one percentage point more likely to have bad or very bad health than non-naturalized ones.

Slightly less than 13% of immigrants have Spanish citizenship (23% for special-status countries and 4% for non-special-status countries). Almost half of the sample comes from a special-status country. The proportion reaches 84% for Spanish citizens and 42% for non-Spanish citizens. The average immigrant with less than 10 years of residence in Spain has been in Spain for slightly less than 5 years and a half. The average naturalized immigrant has been in Spain 1 year more than the average non-naturalized immigrant, while the average number of years since migration is the same for immigrants from special-status and non-special-status countries.

Slightly less than 42% of immigrants are males. Males represent a higher share of non-naturalized immigrants (more than three percentage points higher than naturalized immigrants) and non-special-status immigrants (11% points more than special-status immigrants). All types of immigrants are around 36 years old. One in two individuals is married in the subsamples of Spanish and non-Spanish citizens. However, immigrants from non-special-status countries are 15% points more likely to be married than those from special-status countries.

The majority of immigrants in my sample are American (51%), followed by Europeans (26%), Africans (18%), and Asians (6%). Immigrants from the European Union represent 24% of my sample. The majority of EU immigrants in my sample are Romanian (54% of EU immigrants), followed by Italian (9%), German (6.2%), French (6%), and Portuguese (5.8%). Americans represent the vast majority of immigrants from special-status countries (96%), while Europeans are the majority of immigrants from non-special-status countries (51%), followed by Africans (36%). 84% of naturalized immigrants are American, 8% are Europeans and 7% are Africans. Among non-naturalized immigrants, slightly less than half are American, slightly less than one-third are European, and slightly below one-fifth are Africans.

In my identification strategy, I exploit exogenous variation arising from the interaction of years since migration and country status (special vs. non-special). Figure 5 represents the distributions of years since migration for immigrants from special-status and non-special-status countries separately. Both types of immigrants concentrate at the right half of the distribution. The two distributions are very comparable. If anything, immigrants from special-status countries are slightly more likely to be at the extremes of the distribution.

**TABLE 2** Descriptive statistics: Only immigrants sample.

Variable	All	Special status	No special status	Citizenship	No citizenship
Overall health	4.082 (0.763)	4.061 (0.776)	4.101 (0.752)	4.088 (0.804)	4.081 (0.757)
Bad health	0.029 (0.168)	0.033 (0.180)	0.025 (0.156)	0.038 (0.192)	0.028 (0.164)
Citizenship	0.129 (0.336)	0.229 (0.42)	0.039 (0.193)	1 (0)	0 (0)
Special-status country	0.478 (0.5)	1 (0)	0 (0)	0.844 (0.363)	0.423 (0.494)
Years since migration	5.459 (2.58)	5.435 (2.664)	5.48 (2.503)	6.403 (2.498)	5.318 (2.563)
Male	0.417 (0.493)	0.357 (0.479)	0.471 (0.499)	0.388 (0.488)	0.421 (0.494)
Age	36.159 (13.043)	35.393 (12.697)	36.855 (13.317)	35.576 (14.264)	36.246 (12.852)
Married	0.518 (0.5)	0.441 (0.497)	0.588 (0.492)	0.497 (0.501)	0.521 (0.5)
Europe	0.261 (0.439)	0.030 (0.171)	0.512 (0.500)	0.080 (0.272)	0.290 (0.454)
Africa	0.175 (0.380)	0.002 (0.049)	0.364 (0.481)	0.068 (0.253)	0.193 (0.395)
America	0.506 (0.50)	0.960 (0.196)	0.010 (0.102)	0.840 (0.367)	0.452 (0.498)
Asia	0.057 (0.231)	0.007 (0.084)	0.110 (0.314)	0.009 (0.094)	0.064 (0.245)
Oceania	0.001 (0.035)	0.000 (0.000)	0.003 (0.051)	0.003 (0.054)	0.001 (0.031)
European Union	0.241 (0.428)	0.029 (0.169)	0.434 (0.496)	0.068 (0.252)	0.267 (0.442)
North America	0.038 (0.190)	0.073 (0.259)	0.006 (0.076)	0.074 (0.261)	0.032 (0.177)
<i>N.</i> Observations	2628	1255	1373	2288	340

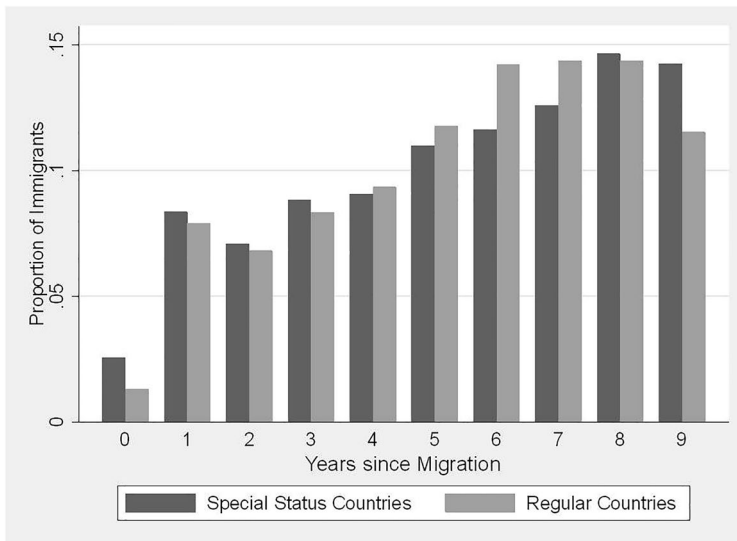
*Note:* Data is from the Spanish National Health Survey (2011 and 2017) and the European Health Survey (2014 and 2020). Health is a one-to-five index indicating whether the individual declares to be in very bad, bad, regular, good, or very good health. Bad health is an indicator equal to one if the individual declares to have bad or very bad health. The sample is composed of foreign-born individuals. For each variable, the numbers in the first row represent mean values, and the numbers in parentheses in the second row represent standard deviations.

### 3 | METHODOLOGY

I first estimate the healthy immigrant effect in my sample of all natives and immigrants included in the 2011, 2014, 2017, and 2020 waves of SHS and EHS. To this, I regress health on the interactions of a dummy for immigrant and years since migration measured in 5-year intervals and a set of controls as in the following equation:

$$\begin{aligned}
 Health_{i,t} = & \beta_0 + \beta_1 Imm_{i,t} YSM < 5_{i,t} + \beta_2 Imm_{i,t} YSM 5to10_{i,t} + \beta_3 Imm_{i,t} YSM 10to15_{i,t} + \\
 & + \beta_4 Imm_{i,t} YSM > 15_{i,t} + \beta_5 Controls_{i,t} + \beta_6 Country_{i,t} + \beta_7 Wave_t + u_{i,t}
 \end{aligned}
 \quad (1)$$

where *Health* is one of the health outcomes for immigrant *i* surveyed at time *t*, *Imm* is a dummy equal to one if the individual was born abroad. *YSM < 5*, *YSM 5to10*, *YSM 10to15*, and *YSM > 15* are binary indicators for less than five, five to 10, ten to fifteen, and



**FIGURE 5** Years since migration by country of origin's status. Data is from the Spanish National Health Survey (2011 and 2017) and the European Health Survey (2014 and 2020). The sample includes all individuals born outside of Spain and residing in Spain for less than 10 years. Special-status countries are Latin American countries, Andorra, the Philippines, Equatorial Guinea, and Portugal.

more than fifteen years since migration, respectively. *Controls* is a vector of individual characteristics, *Country* denotes a vector of dummies for country of birth, *Wave* stands for a vector of survey year fixed effects, and *u* is the error term. Standard errors are clustered at the birth country level. Estimates are consistent with the healthy immigrant effect if  $\beta_1 > 0$  and  $\beta_1 > \beta_2 > \beta_3 > \beta_4$ .

I then study the impact of gaining Spanish citizenship on health in a sample of individuals born outside Spain and residing in Spain. I estimate a regression of health on a dummy for being a Spanish citizen and several controls. The resulting equation is as follows:

$$Health_{i,t} = \gamma_0 + \gamma_1 Citizenship_{i,t} + \gamma_2 Controls_{i,t} + \gamma_3 Country_{i,t} * Region_{i,t} + \gamma_4 Wave_t + v_{i,t} \quad (2)$$

where *Citizenship* is a dummy equal to one if the immigrant gained Spanish citizenship, *Region* is a vector of the region (autonomous community) of residence indicators, and *v* is the error term clustered at the birth country level. The country of birth by region fixed effects account for differences in the availability of support to apply for citizenship by region and country of birth (social networks, foreign language proficient lawyers, immigrant associations, etc.). Observations are weighted by the ratio of the number of immigrants from a specific country of birth living in a specific region in the sample and the number of immigrants from that country of birth in that region in the population according to the Spanish Census. Hence, these weights measure how many individuals in the population are represented by a given individual in the sample.

I cannot interpret the coefficient  $\gamma_1$  as a causal effect in the context of Equation (2). First, healthier individuals may be more able to prepare the paperwork required to gain citizenship. Second, unobserved individual characteristics like satisfaction with life in the host country and socioeconomic status can simultaneously affect health and the probability of acquiring citizenship. For this reason, I estimate Equation (2) using an instrumental variable approach based on eligibility rules for citizenship. I instrument *Citizenship* by the interaction of a dummy equal to one if the individual has been living in Spain for longer than 4 years and an indicator for coming from a special-status country. As immigrants' health may change with years of residence in the host country, I include years of residence dummies in my regression. In practice, I perform estimation in two steps. In the first step, I estimate citizenship as a function of the citizenship eligibility dummy, years of residence fixed effects, birth country by region of residence fixed effects, and individual controls:

$$Citizenship_{i,t} = \alpha_0 + \alpha_1 YSM > 4 * SSC_{i,t} + \alpha_2 D(YSM)_{i,t} + \alpha_3 Controls_{i,t} + \gamma_4 Country_{i,t} * Region_{i,t} + \gamma_5 Wave_t + w_{i,t} \quad (3)$$

where *SSC* is a binary indicator for special-status country and *D(YSM)* are years since migration fixed effects. In the second step, I use the predicted values of *Citizenship* calculated from Equation (3) to estimate Equation (2). I then interpret the estimated value of  $\gamma_1$  as the causal effect of citizenship on health.

## 4 | RESULTS

I first test whether the healthy immigrant effect is present in my data. Table 3 shows the result of estimating the evolution of the immigrant-native health gap over years since migration as in Equation (1). The outcome of interest is the one-to-five health index.<sup>9</sup> In columns 1 and 4, *immigrant* is a dummy equal to one if the individual is foreign-born. In columns 2 and



TABLE 3 The healthy immigrant effect: The evolution of health over years since migration.

	All (1)	SS (2)	NSS (3)	All (4)	SS (5)	NSS (6)
Immigrant	-0.135 (0.025)***	-0.166 (0.027)***	-0.113 (0.026)***			
Immi*YSM <5				0.078 (0.028)***	0.071 (0.039)*	0.09 (0.039)**
Immi*YSM 5–10				-0.051 (0.02)**	-0.093 (0.029)***	-0.008 (0.028)
Immi*YSM 10–15				-0.077 (0.018)***	-0.100 (0.025)***	-0.051 (0.024)**
Immi*YSM >15				-0.031 (0.015)**	-0.070 (0.023)***	0.005 (0.02)
Obs.	88863	88863	88863	88863	88863	88863
R <sup>2</sup>	0.19	0.19	0.19	0.188	0.188	0.188

Note: Data is from the Spanish National Health Survey (2011 and 2017) and the European Health Survey (2014 and 2020). Health is a one-to-five index indicating whether the individual declares to be in very bad, bad, regular, good, or very good health. Regressions include dummies for gender, age, marital status, region of residence, survey year, and years since migration. In columns 1 and 4, *immigrant* is a dummy equal to one if the individual is foreign-born. In columns 2 and 5, *immigrant* equals one if the individual is from a special-status country. In columns 3 and 6, *immigrant* is an indicator for non-special-status immigrants. The numbers in parentheses represent standard errors, which are clustered at the birth country level.

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

5, *immigrant* equals one if the individual is from a special-status country. In columns 3 and 6, *immigrant* is an indicator for non-special-status immigrants. Columns 1–3 show that the conditional native-immigrant gap is positive for all immigrant groups.

The estimated coefficients in column 4 corroborate that immigrants are healthier upon arrival. However, their health worsens as their time of residence increases, reaching health levels below those of natives. Immigrants declare an average health index 0.08 point (7%) higher than natives' during their first 5 years of residence. Their level of health worsens after that and becomes worse than natives' by a magnitude between  $-0.03$  and  $-0.08$  (3%–7%). Columns 5 and 6 show that the healthy immigrant effect is also present for immigrants from special-status and non-special-status countries. The coefficients of non-special-status immigrants are higher than those of special-status immigrants for all years since migration. This difference indicates that non-special-status immigrants present a higher advantage upon arrival, and their health is better than that of special-status immigrants, even if decreasing over years since migration.

Naturalization makes immigrants more similar to natives. Hence, the health assimilation process may differ for naturalized and non-naturalized immigrants. I explore this possibility by adding the interaction of years since migration and a dummy indicating whether the immigrant is a Spanish citizen to Equation (1). Table 4 shows the results of estimating such an extended equation. In line with my main findings on the negative causal effect of naturalization on health, naturalized immigrants have significantly worse health than non-naturalized immigrants. However, the speed of convergence to natives' health becomes lower after naturalization. In particular, non-naturalized immigrants experience a reduction of 0.005 in their one-to-five health index per year of residence in Spain. In contrast, naturalized immigrants' health index is 0.053 lower, but their health decreases by 0.002 points yearly. I illustrate my results in Figure 6, where I represent the average evolution of health over years since migration for an immigrant who gains citizenship after 4 years of residence in Spain and compare it to the average health of a never-naturalized immigrant and a native of the same age. The negative slope of immigrants' health is steeper before naturalization and flatter after the sudden reduction from the fourth to the fifth year of residence.

Table 5 contains the results of estimating Equation (2) by OLS (first two columns) and IV (last two columns). I also check the validity of the IV in the first-stage regression (column 3). The OLS regressions show that naturalization is unrelated to health once I condition on gender, age, marital status, region of residence, survey year, years since migration, and country of birth. The F-statistic of the excluded instrument is 21.72. My causal estimates reveal that gaining Spanish nationality decreases health by 32% (1.7 standard deviations) and increases the probability of bad or very bad health by 47% (1.1 standard deviations) with respect to the baseline levels of non-naturalized immigrants. The magnitude of the effect is equivalent to 62% of the health advantage of EU immigrants with respect to other types of immigrants.

	Health (1)	Bad health (2)	Health (3)	Bad health (4)
YSM*citizenship	0.003 (0.001)***	-0.00008 (0.0004)		
Citizenship	-0.053 (0.029)*	0.003 (0.01)	0.122 (0.078)	-0.033 (0.027)
YSM	-0.005 (0.0007)***	0.0007 (0.0002)***		
YSM <5*citizenship			0.187 (0.105)*	0.022 (0.054)
YSM 5-10*citizenship			0.054 (0.062)	0.063 (0.046)
YSM 10-15*citizenship			0.08 (0.048)*	0.041 (0.044)
YSM <5			0.074 (0.036)**	-0.006 (0.012)
YSM 5-10			-0.045 (0.031)	-0.009 (0.011)
YSM 10-15			-0.081 (0.03)***	0.0007 (0.01)
Obs.	88863	88863	88863	88863
R <sup>2</sup>	0.188	0.069	0.188	0.068

Note: Data is from the Spanish National Health Survey (2011 and 2017) and the European Health Survey (2014 and 2020). Health is a one-to-five index indicating whether the individual is in very bad, bad, regular, good, or very good health. Bad health is a dummy equal to one if the individual declares to have bad or very bad health. Regressions include dummies for gender, age, marital status, region of residence, survey year, and years since migration. The numbers in parentheses represent standard errors, which are clustered at the birth country level.

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

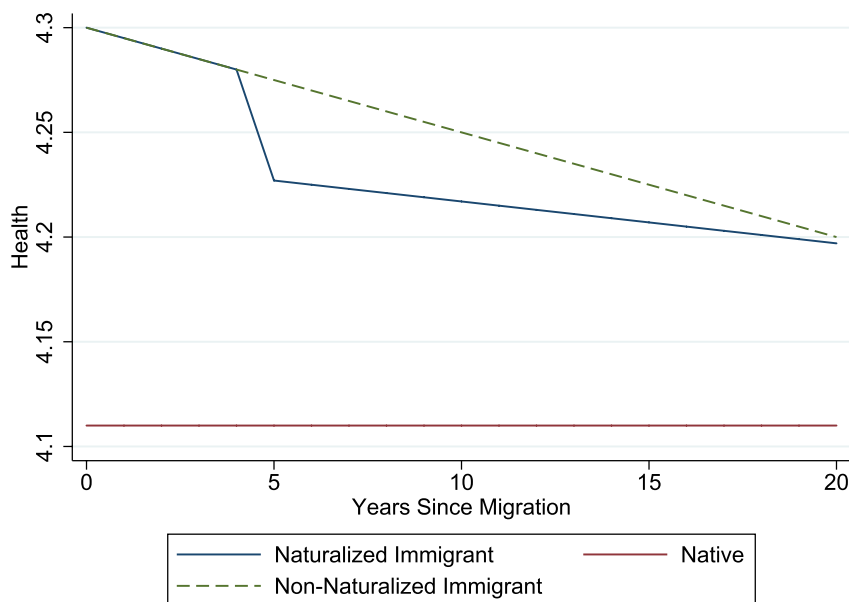


TABLE 4 The healthy immigrant effect before and after naturalization.

FIGURE 6 Healthy immigrant effect and naturalization. Data is from the Spanish National Health Survey (2011 and 2017) and the European Health Survey (2014 and 2020). Health is a one-to-five index indicating whether the individual declares to be in very bad, bad, regular, good, or very good health.

**TABLE 5** The impact of naturalization on immigrants' health.

	OLS		FS	IV	
	Health	Bad health	Citizenship	Health	Bad health
	(1)	(2)	(3)	(4)	(5)
Citizenship	0.03 (0.076)	0.013 (0.012)	0.176 (0.038)***	-1.313 (0.416)***	0.233 (0.088)***
<i>F</i> statistic	.	.	21.72	.	.
Obs.	2625	2625	2625	2625	2625
<i>R</i> <sup>2</sup>	0.316	0.258	0.382	0.117	0.146

*Note:* Data is from the Spanish National Health Survey (2011 and 2017) and the European Health Survey (2014 and 2020). Health is a one-to-five index indicating whether the individual declares to be in very bad, bad, regular, good, or very good health. Bad health is a dummy equal to one if the individual declares to have bad or very bad health. Regressions include dummies for gender, age, marital status, and survey year. They also include years since migration and birth country by region of residence fixed effects. Observations are weighted to match the population distribution of immigrants across regions of residence and countries of birth. The numbers in parentheses represent standard errors, which are clustered at the birth country level.

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

I replicated the first stage using one, two, three, and 5 years since migration as alternative cutoffs. In practice, I substitute the  $YSM > 4$  dummy in Equation (3) by dummies for years since migration above one, two, three, and five. Results in Table A1 in the Appendix confirm that the cutoff used in the main specification is the most effective in generating a difference in the probability of naturalization between special-status and non-special-status immigrants.

I explore which health conditions drive the effects of naturalization on health in Table 6. The displayed coefficients result from estimating Equation (2) by instrumental variables. The outcomes are dummies for whether the respondent suffered from a specific health condition in the last year. I find significant positive effects for cervical problems, lower back pain, bronchitis, cirrhosis, depression, tumor, and osteoporosis. I also find that naturalization decreases the incidence of diabetes. Romano and Wolf's estimates for multiple hypothesis testing confirm the significance levels in the table.

My previous results are based on self-reported measures of health conditions. One may be concerned that they reflect differences in reporting behavior rather than differences in the underlying health status. Information about diagnosed health conditions in the last 12 months could address this concern. Unfortunately, questions about diagnosed health conditions in my data do not refer to a specific time frame. I replicated Table A2 in the Appendix using the interaction between diagnosed health conditions and health conditions in the last 12 months as alternative dependent variables. Although there are some changes in the significance levels, point estimates have the same sign and are similar in magnitude to those obtained with health conditions in the last 12 months.

Changes in dietary habits are one of the potential mechanisms behind the healthy immigrant effect. I explore whether changes in the frequency of consumption of certain types of food can explain my results. Frequency is a discrete variable equal to one if the individual never consumes that food item, two for less than once a week, three for once or twice per week, four for at least three times a week, and five for daily. Table 7 shows a significant effect only for sweets consumption. Naturalization increases by 0.38 the frequency of sweets consumption as measured by a one-to-five index. The causal effect of naturalization on dietary habits may be driven by improvements in purchasing power. I explore this possibility by adding employment as a control in the equation estimating the impact of naturalization on sweets consumption. The new estimated coefficient of naturalization is 18% lower (it becomes 0.325 with a standard deviation of 0.212). Hence, improvements in employment and, thus, purchasing power may be one mechanism behind the positive impact of naturalization on sweets consumption. Unfortunately, Romano-Wolf's estimates turn the coefficient insignificant.

A reduction in medical care search after naturalization could be behind my main effects. For instance, a reduction in health care may happen if individuals' opportunity cost of time increases when they start working. I explore this possibility by estimating the impact of naturalization on time since the last visit to the doctor, a dummy for having been to the doctor in the last year, and the number of visits to the general practitioner and the specialist in the last year. The variable time since the last visit equals one if the individual did not go to the doctor, two for more than a year ago, three for more than a month and less than 1 year ago, and four for less than a month ago. Table 8 shows that naturalization may cause the time since the last visit to the doctor to increase and the probability of having visited the doctor recently (less than a year ago) to decrease, but the coefficients are not precisely estimated. The effects on the number of visits to the general practitioner and the specialist in the last year are null and positive, respectively, but imprecisely estimated.

TABLE 6 The impact of naturalization on health conditions.

	Hypertension (1)	Heart attack (2)	Heart problems (3)	Varicose veins (4)	Osteoarthritis (5)	Cervical (6)	Lower back (7)	Allergy (8)
<b>Panel A</b>								
Citizenship	-0.187 (0.117)	-0.033 (0.039)	-0.029 (0.07)	0.127 (0.16)	-0.071 (0.151)	0.366 (0.22)*	0.38 (0.206)*	0.108 (0.221)
<i>F</i> statistic	22.13	22.21	22.21	22.21	22.25	22.21	22.21	22.14
Obs	2619	2623	2623	2623	2621	2623	2623	2620
<i>R</i> <sup>2</sup>	0.318	0.287	0.329	0.287	0.339	0.109	0.149	0.24
<b>Panel B</b>								
	Asthma (1)	Bronchitis (2)	Diabetes (3)	Sore (4)	Incontinence (5)	Cholesterol (6)	Cataracts (7)	Skin (8)
Citizenship	0.045 (0.085)	0.106 (0.06)*	-0.117 (0.07)*	-0.065 (0.078)	0.03 (0.033)	-0.071 (0.104)	-0.051 (0.042)	0.174 (0.106)
<i>F</i> statistic	22.20	22.22	22.20	22.15	22.72	22.15	21.72	21.72
Obs.	2624	2623	2624	2621	2625	2620	2625	2625
<i>R</i> <sup>2</sup>	0.268	0.277	0.212	0.246	0.311	0.305	0.291	0.184
<b>Panel C</b>								
	Constipation (1)	Cirrhosis (2)	Depression (3)	Anxiety (4)	Mental (5)	Embolism (6)	Migraine (7)	Hemorrhoids (8)
Citizenship	0.185 (0.12)	0.078 (0.04)**	0.198 (0.118)*	0.137 (0.106)	-0.019 (0.046)	0.013 (0.01)	-0.196 (0.246)	0.08 (0.074)
<i>F</i> statistic	21.72	21.72	21.67	21.67	21.72	21.72	21.72	21.73
Obs.	2625	2628	2627	2627	2628	2628	2628	2627
<i>R</i> <sup>2</sup>	0.132	0.295	0.164	0.237	0.435	0.647	0.204	0.217
<b>Panel D</b>								
	Tumor (1)	Osteoporosis (2)	Prostate (4)	Thyroid (3)	Menopause (5)	Accident (6)		
Citizenship	0.047 (0.026)*	0.054 (0.029)*	0.093 (0.059)	-0.049 (0.115)	-0.091 (0.158)	0.002 (0.055)		
<i>F</i> statistic	21.57	20.76	8.06	21.52	6.80	21.72		

TABLE 6 (Continued)

	<b>Tumor (1)</b>	<b>Osteoporosis (2)</b>	<b>Thyroid (3)</b>	<b>Prostate (4)</b>	<b>Menopause (5)</b>	<b>Accident (6)</b>
Obs.	2624	2621	2623	1093	1528	2625
R <sup>2</sup>	0.31	0.36	0.239	0.771	0.346	0.318

Note: Data is from the Spanish National Health Survey (2011 and 2017) and the European Health Survey (2014 and 2020). The outcomes equal one if the individual declares to have suffered from that health condition in the last 12 months. Regressions include dummies for gender, age, marital status, region of residence, and survey year. They also include years since migration and birth country by region of residence fixed effects. Observations are weighted to match the population distribution of immigrants across regions of residence and countries of birth. The numbers in parentheses represent standard errors, which are clustered at the birth country level. \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ .

TABLE 7 Dietary habits mechanism: The impact of naturalization on frequency of food consumption.

	<b>Fruit</b> (1)	<b>Meat</b> (2)	<b>Eggs</b> (3)	<b>Fish</b> (4)	<b>Carbohydrates</b> (5)	<b>Cereals</b> (6)	<b>Vegetables</b> (7)	
Citizenship	0.018 (0.104)	0.007 (0.103)	0.04 (0.108)	0.058 (0.102)	-0.006 (0.041)	0.041 (0.068)	-0.005 (0.039)	
<i>F</i> statistic	21.75	21.64	21.63	21.63	21.63	21.63	21.63	
Obs.	2623	2623	2622	2622	2622	2622	2622	
<i>R</i> <sup>2</sup>	0.153	0.318	0.225	0.212	0.198	0.246	0.197	
	<b>Legumes</b> (1)	<b>Sausages</b> (2)	<b>Dairy</b> (3)	<b>Sweets</b> (4)	<b>Softdrinks</b> (5)	<b>Fastfood</b> (6)	<b>Chips</b> (7)	<b>Juice</b> (8)
Citizenship	-0.053 (0.148)	-0.157 (0.122)	-0.133 (0.09)	0.384 (0.217)*	-0.206 (0.297)	0.061 (0.24)	-0.257 (0.244)	0.118 (0.263)
<i>F</i> statistic	21.43	21.64	21.62	21.64	21.56	21.61	21.68	21.55
Obs.	2618	2614	2619	2621	2618	2617	2620	2620
<i>R</i> <sup>2</sup>	0.257	0.381	0.328	0.153	0.278	0.313	0.258	0.243

Note: Data is from the Spanish National Health Survey (2011 and 2017) and the European Health Survey (2014 and 2020). The outcomes are equal to one if the individual never consumes that food item, two for less than once a week, three for once or twice per week, four for at least three times a week, and five for daily. Regressions include dummies for gender, age, marital status, region of residence, and survey year. They also include years since migration and birth country by region of residence fixed effects. Observations are weighted to match the population distribution of immigrants across regions of residence and countries of birth. The numbers in parentheses represent standard errors, which are clustered at the birth country level.

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

**TABLE 8** Healthcare mechanism: The impact of naturalization on the frequency and number of doctor visits.

	Time since last visit (1)	Last visit <1 year ago (2)	Number visits GP (3)	Number visits specialist (4)
Citizenship	0.163 (0.364)	-0.062 (0.175)	0.033 (0.345)	0.29 (0.251)
<i>F</i> statistic	21.72	21.72	9.76	19.43
Obs.	2625	2625	2625	2625
<i>R</i> <sup>2</sup>	0.283	0.261	0.234	0.163

*Note:* Data is from the Spanish National Health Survey (2011 and 2017) and the European Health Survey (2014 and 2020). The outcome in the first column equals one if the individual never goes to the doctor, two for more than a year ago, three for more than a month and less than 1 year ago, and four for less than a month ago. The second column refers to a dummy equal to one if the individual did not go to the doctor last year. The outcomes in columns 3 and 4 are the number of visits in the last year to the general practitioner and the specialist, respectively. Regressions include dummies for gender, age, marital status, region of residence, and survey year. They also include years since migration and birth country by region of residence fixed effects. Observations are weighted to match the population distribution of immigrants across regions of residence and countries of birth. The numbers in parentheses represent standard errors. Standard errors are clustered at the birth country level.

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

**TABLE 9** Selection mechanism: The impact of naturalization on immigrants' characteristics.

	Male (1)	Age (2)	Married (3)	North (4)	Center (5)	South (6)
Citizenship	-0.561 (0.388)	-3.447 (9.983)	-0.242 (0.324)	0.478 (0.262)*	-0.395 (0.26)	-0.083 (0.198)
<i>F</i> statistic	23.06	26.31	21.72	40.66	40.66	40.66
Obs.	2625	2625	2625	2625	2625	2625
<i>R</i> <sup>2</sup>	0.188	0.365	0.351	0.075	0.087	0.133

*Note:* Data is from the Spanish National Health Survey (2011 and 2017) and the European Health Survey (2014 and 2020). North includes the Basque Country, La Rioja, Navarra, Cantabria, Asturias, Galicia, Castile and León, Aragón, and Catalonia. The Center comprises the Balearic Islands, the Canary Islands, Castilla-La Mancha, the Valencian Community, and the Community of Madrid. South includes Andalusia, Extremadura, Murcia, Ceuta, and Melilla. Regressions include dummies for gender, age, marital status, region of residence, and survey year. They also include years since migration and birth country by region of residence fixed effects. Observations are weighted to match the population distribution of immigrants across regions of residence and countries of birth. The numbers in parentheses represent standard errors, which are clustered at the birth country level.

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

Another potential mechanism behind the estimated effect of naturalization on health is the selection of immigrants. Naturalization may change the composition of the pool of immigrants so that those staying in the country are less healthy. To address this possibility, I re-estimate Equation (2) using immigrants' characteristics as outcomes. Results in Table 9 show that none of the coefficients of citizenship on individual characteristics (male, age, married) is significant, so there is no evidence that the selection of immigrants is behind my results. The positive coefficient for living in the North of Spain may reflect that immigrants move from the South and the Center to the North after naturalization. If better employment opportunities in the richer North reduce immigrants' health, the positive effect of naturalization on the probability of living in the North could partly explain my results.

Employment may influence health through stress, work accidents, and work-related health conditions.<sup>10</sup> I test whether employment can be a mechanism behind the effect of naturalization on health by using it as outcome in Equation (2). The results of this exercise are in Table 10. Naturalization has a sizeable and significant positive effect on employment. Hence, labor market status is a potential mechanism for the effect of interest.

I test the robustness of my main results to the exclusion of each of the continents, the European Union, and North America from the sample. The exclusion of the European Union is particularly interesting because many of the immigrants belonging to the European Union may not naturalize because they are entitled to almost the same rights as Spanish citizens. Unfortunately, I cannot exclude the entire American continent because most of the countries in the special-status group are in that continent.

	OLS	FS	IV
	(1)	(2)	(3)
Citizenship	0.006 (0.041)	0.175 (0.038)***	0.583 (0.322)*
<i>F</i> statistic	.	21.04	.
Obs.	2610	2610	2610
<i>R</i> <sup>2</sup>	0.374	0.383	0.285

Note: Data is from the Spanish National Health Survey (2011 and 2017) and the European Health Survey (2014 and 2020). Employment is a dummy equal to one if the individual has a job. Regressions include dummies for gender, age, marital status, region of residence, and survey year. They also include years since migration and birth country by region of residence fixed effects. Observations are weighted to match the population distribution of immigrants across regions of residence and countries of birth. The numbers in parentheses represent standard errors, which are clustered at the birth country level.

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

TABLE 10 Employment mechanism: The impact of naturalization on immigrants' employment.

Instead, I exclude North America, which includes Canada, Cuba, Groenlandia, Jamaica, Mexico, and the United States. Results of estimating Equation (2) excluding different sets of countries from the sample are in Table 11. The negative effect of naturalization on health is present in all subsamples. The effect is stronger when excluding immigrants from Africa and weaker when excluding immigrants from Europe.

Immigrants from America are more likely to be female, while African immigrants are more likely to be male. As female and male immigrants may differ in terms of culture and other socioeconomic characteristics, I extend my analysis by adding the interaction of citizenship and a female dummy to Equation (2). Results in Table A3 show that the negative effect of naturalization on health may be stronger for females but the estimated difference is imprecise.

As the effect of naturalization on health may be stronger for females, it is possible that part of the reduction in health happens through any female-specific condition. I estimate the impact of citizenship on having been in the hospital to deliver in the last 12 months. This question is present in the 2014, 2017, and 2020 questionnaires. The results in Table A4 in the Appendix show that naturalization increases immigrant women's probability of delivering a child in the last 12 months. Unfortunately, the smaller sample size makes the instrument weak, so I cannot discuss the magnitude of the effect using the IV estimates. I provide reduced form estimates that show that the jump in the probability of naturalization induced by Spanish laws increases the probability of delivering a child in the last 12 months by 0.15.

The Spanish government limited public healthcare access to undocumented immigrants in 2012 and restored it in 2018. Undocumented immigrants are only a subset of non-naturalized immigrants. Nevertheless, I performed separate regressions for the period in which undocumented immigrants had full rights to access the public healthcare system (before 2012 and after 2018) and the period in which they had restricted access (2012–2018). Results in Table A5 show that the negative impact of naturalization on immigrants' health is led by the period in which all immigrants were entitled to healthcare. Hence, differences in access to the public healthcare system between naturalized and non-naturalized immigrants are not behind my main estimates.

## 5 | DISCUSSION

Governments establish the criteria under which immigrants gain access to the host country's citizenship. They also design the public health system, including the immigrants' accessibility criteria and its annual budget (Jiménez-Rubio and Vall Castello (2020)). To do this correctly, policymakers must understand how these citizenship and health system policies interact. This paper shows that immigrant health heavily decreases with years since arrival and that citizenship accelerates the reduction in immigrants' health. An increase in the incidence of cervical problems, lower back pain, bronchitis, cirrhosis, depression, tumor, and osteoporosis explain the reduction in overall health. Increases in employment are potential mechanisms behind these effects. Our results also suggest that sweets' consumption may increase and the frequency of visits to the doctor may decrease due to naturalization, but the coefficients are not precise.

Naturalization improves immigrants' labor force outcomes, human capital, and welfare. Hence, authorities can use it to improve immigrants' well-being. However, it also implies worse health outcomes; hence, authorities must adapt the health system to compensate for naturalization's adverse effects.

My paper also sheds light on the “black box” of immigrants' health convergence to natives'. My results indicate that institutional factors may be behind the reduction in immigrants' health levels over years since migration that eliminates the positive initial immigrant-native health gap.



**TABLE 11** The impact of naturalization on health: Excluding immigrants from different sets of countries.

	OLS		FS	IV	
	Health	Bad health	Citizenship	Health	Bad health
	(1)	(2)	(3)	(4)	(5)
<b>Panel A: Excluding Europe</b>					
Citizenship	0.062 (0.072)	0.008 (0.011)	0.148 (0.036)***	-1.100 (0.696)	0.135 (0.099)
<i>F</i> statistic	.	.	16.99	.	.
Obs.	1787	1787	1787	1787	1787
<i>R</i> <sup>2</sup>	0.344	0.252	0.388	0.142	0.198
<b>Panel B: Excluding Africa</b>					
Citizenship	0.005 (0.07)	0.015 (0.011)	0.183 (0.038)***	-1.390 (0.465)***	0.289 (0.091)***
<i>F</i> statistic	.	.	23.00	.	.
Obs.	2195	2195	2195	2195	2195
<i>R</i> <sup>2</sup>	0.329	0.275	0.394	0.107	0.102
<b>Panel C: Excluding Asia</b>					
Citizenship	0.032 (0.076)	0.011 (0.012)	0.175 (0.04)***	-1.332 (0.399)***	0.244 (0.091)***
<i>F</i> statistic	.	.	19.60	.	.
Obs.	2490	2490	2490	2490	2490
<i>R</i> <sup>2</sup>	0.305	0.254	0.382	0.091	0.13
<b>Panel D: Excluding Oceania</b>					
Citizenship	0.03 (0.076)	0.013 (0.012)	0.176 (0.038)***	-1.313 (0.416)***	0.233 (0.088)***
<i>F</i> statistic	.	.	21.75	.	.
Obs.	2622	2622	2622	2622	2622
<i>R</i> <sup>2</sup>	0.316	0.258	0.382	0.117	0.146
<b>Panel E: Excluding North America</b>					
Citizenship	0.018 (0.081)	0.013 (0.013)	0.193 (0.033)***	-1.257 (0.381)***	0.232 (0.084)***
<i>F</i> statistic	.	.	34.26	.	.
Obs.	2526	2526	2526	2526	2526
<i>R</i> <sup>2</sup>	0.309	0.257	0.386	0.136	0.153
<b>Panel F: Excluding the European Union</b>					
Citizenship	0.081 (0.071)	0.008 (0.011)	0.163 (0.037)***	-0.803 (0.431)*	0.204 (0.1)**
<i>F</i> statistic	.	.	19.11	.	.
Obs.	1993	1993	1993	1993	1993
<i>R</i> <sup>2</sup>	0.334	0.226	0.384	0.226	0.111

*Note:* Data is from the Spanish National Health Survey (2011 and 2017) and the European Health Survey (2014 and 2020). Health is a one-to-five index indicating whether the individual declares to be in very bad, bad, regular, good, or very good health. Bad health is a dummy equal to one if the individual declares to have bad or very bad health. Regressions include dummies for gender, age, marital status, region of residence, and survey year. They also include years since migration and birth country fixed effects. Observations are weighted to match the population distribution of immigrants across regions of residence and countries of birth. The numbers in parentheses represent standard errors, which are clustered at the birth country level.

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

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## CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the Spanish Statistics Institute. Restrictions apply to the availability of these data, which were used under license for this study. Data are available from [www.ine.es](http://www.ine.es) with the permission of the Spanish Statistics Institute.

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## ENDNOTES

- <sup>1</sup> The publicly available version of the Spanish National Health Survey is downloadable from the Ministry of Health website at <https://www.mscbs.gob.es>. Additionally, I obtained information on the country of birth, which is only available for research purposes. The data from the European Health Survey is publicly available on the National Statistics Institute webpage: <https://www.ine.es>. Data on the country of birth is available for a fee by signing a confidentiality agreement.
- <sup>2</sup> In all cases, immigrants can apply for citizenship after 1 year if they marry a Spanish citizen.
- <sup>3</sup> A Google search of the term “time to obtain Spanish citizenship” in Spanish produces an extensive list of law firms that offer their services as intermediaries in the bureaucratic process. The first twenty firms that provided information on the length of the naturalization process agreed that it takes 2 years from application to the final outcome.
- <sup>4</sup> The higher proportion of naturalized immigrants from special-status countries in the third year can be explained because natives are more likely to marry immigrants from those countries, but differences fade out by the fourth year.
- <sup>5</sup> Throughout the paper, I use the term region to denote Autonomous Communities. This is the lowest level of geographical disaggregation in my data.
- <sup>6</sup> The top countries with more immigrants in 2022 were: Marroco (775,294), Romania (658,005), United Kingdom (313,975), Colombia (297,682), Italy (279,724), Venezuela (208,980), China (197,645), Germany (139,635), Ecuador (126,868), Honduras (123,149), France (121,732), Bulgaria (120,836), Peru (112,042), Ucrania (107,234), and Portugal (106,923).
- <sup>7</sup> “The possession status” protects the individuals who were given Spanish nationality by Spanish authorities “by mistake” because they were not initially entitled to it. After 10 years, if the nationality was used in goodwill (not to commit a crime), the individuals can keep the Spanish nationality.
- <sup>8</sup> The acquisition of Spanish nationality for individuals residing in Spain for 1 year is possible for: (a) persons born in Spanish territory, (b) persons who have not duly exercised their right to acquire Spanish nationality by option, (c) persons who have been legally placed in the custody, guardianship or foster care of a Spanish citizen or institution for two consecutive years, including those still in this situation at the time of application, (d) persons who, at the time of application, have been married to a Spanish national for 1 year, with no legal or de facto separation, (e) the widow(er) of a Spanish national if, at the time of death of the spouse, there is no legal or de facto separation, (f) persons born outside Spain to a father or mother, or grandparent, provided all were originally Spanish.
- <sup>9</sup> Results are consistent with those obtained using the bad health indicator as an outcome.
- <sup>10</sup> The literature on the impact of job security on workers' health finds mixed results. Caroli and Godard (2016) find that job insecurity significantly increases the probability of individuals suffering from skin problems, headaches, and eyestrain. Reichert and Tauchmann (2017) conclude that the fear of job loss, measured by workforce reductions, negatively affects employee psychological health. Finally, Bratberg and Monstad (2015) find that job insecurity reduced municipality workers' sickness absence. Regarding self-employment, Rietveld, van Kippersluis, and Thurik (2015) conclude that engaging in self-employment may be bad for one's health.

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## APPENDIX A

**TABLE A1** Alternative first stages: Different years since migration as cutoffs.

	YSM >1	YSM >2	YSM >3	YSM >4	YSM >5
	(1)	(2)	(3)	(4)	(5)
YSM > x*SSC	0.135 (0.049)***	0.171 (0.041)***	0.148 (0.038)***	0.176 (0.038)***	0.156 (0.038)***
Obs.	2625	2625	2625	2625	2625
R <sup>2</sup>	0.374	0.378	0.378	0.382	0.381

*Note:* Data is from the Spanish National Health Survey (2011 and 2017) and the European Health Survey (2014 and 2020). The dependent variable is a binary indicator for having Spanish citizenship. The regressor of interest is the interaction of residing in Spain for more than  $x$  years and being born in a special status country. Regressions include dummies for gender, age, marital status, region of residence, and survey year. They also include years since migration and birth country by region of residence fixed effects. Observations are weighted to match the population distribution of immigrants across regions of residence and countries of birth. The numbers in parentheses represent standard errors, which are clustered at the birth country level.

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

TABLE A 2 The impact of naturalization on diagnosed health conditions.

	Hypertension (1)	Heart attack (2)	Heart problems (3)	Varicose veins (4)	Osteoarthritis (5)	Cervical (6)	Lower back (7)	Allergy (8)
Panel A								
Citizenship	-0.203 (0.118)*	-0.033 (0.039)	-0.014 (0.069)	0.041 (0.14)	-0.115 (0.14)	0.271 (0.193)	0.351 (0.187)*	0.178 (0.194)
<i>F</i> statistic	22.13	21.72	21.72	21.72	21.72	21.72	21.72	21.72
Obs.	2619	2623	2623	2623	2621	2623	2623	2620
<i>R</i> <sup>2</sup>	0.316	0.287	0.347	0.303	0.327	0.143	0.14	0.234
Panel B								
	Asthma (1)	Bronchitis (2)	Diabetes (3)	Sore (4)	Incontinence (5)	Cholesterol (6)	Cataracts (7)	Skin (8)
Citizenship	0.042 (0.084)	0.098 (0.053)*	-0.117 (0.07)*	-0.081 (0.083)	0.036 (0.034)	-0.079 (0.111)	-0.009 (0.031)	0.137 (0.113)
<i>F</i> statistic	21.20	21.72	21.72	21.72	21.72	21.72	21.72	21.72
Obs.	2624	2623	2624	2621	2625	2620	2625	2625
<i>R</i> <sup>2</sup>	0.268	0.263	0.212	0.238	0.271	0.308	0.338	0.209
Panel C								
	Constipation (1)	Cirrhosis (2)	Depression (3)	Anxiety (4)	Mental (5)	Embolism (6)	Migraine (7)	Hemorrhoids (8)
Citizenship	0.141 (0.117)	0.054 (0.044)	0.136 (0.093)	0.111 (0.108)	-0.024 (0.041)	0.013 (0.01)	-0.218 (0.175)	0.074 (0.079)
<i>F</i> statistic	21.72	21.72	21.72	21.72	21.72	21.72	21.72	21.72
Obs.	2625	2628	2627	2627	2628	2628	2628	2627
<i>R</i> <sup>2</sup>	0.168	0.34	0.199	0.26	0.465	0.647	0.19	0.214
Panel D								
	Tumor (1)	Osteoporosis (2)	Prostate (4)	Thyroid (3)	Menopause (5)	Accident (6)		
Citizenship	0.047 (0.026)*	0.038 (0.026)	0.093 (0.059)	-0.060 (0.113)	-0.152 (0.136)	0.054 (0.049)		
<i>F</i> statistic	21.57	21.72	21.72	21.72	21.72	21.72		

TABLE A2 (Continued)

	<b>Tumor (1)</b>	<b>Osteoporosis (2)</b>	<b>Thyroid (3)</b>	<b>Prostate (4)</b>	<b>Menopause (5)</b>	<b>Accident (6)</b>
Obs.	2624	2621	2623	1093	1528	2625
R <sup>2</sup>	0.31	0.408	0.238	0.771	0.277	0.311

Note: Data is from the Spanish National Health Survey (2011 and 2017) and the European Health Survey (2014 and 2020). The outcomes equal one if the individual declares to have suffered from that health condition in the last 12 months and has been ever diagnosed with that health condition by a doctor. Regressions include dummies for gender, age, marital status, region of residence, and survey year. They also include years since migration and birth country by region of residence fixed effects. Observations are weighted to match the population distribution of immigrants across regions of residence and countries of birth. The numbers in parentheses represent standard errors, which are clustered at the birth country level.

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

TABLE A3 The impact of naturalization on health by gender.

	OLS		FS		IV	
	Health (1)	Bad health (2)	Citizenship (3)	Citizenship by female (4)	Health (5)	Bad health (6)
Citizenship	-0.094 (0.114)	0.044 (0.022)**	0.246 (0.023)***	0.003 (0.018)	-1.268 (0.488)***	0.28 (0.076)***
Citizenship by female	0.203 (0.105)*	-0.051 (0.026)**	-0.036 (0.028)	0.215 (0.022)***	-0.086 (0.411)	-0.089 (0.1)
<i>F</i> statistic	.	.	102.60	102.64	.	.
Obs.	2625	2625	2625	2625	2625	2625
<i>R</i> <sup>2</sup>	0.317	0.259	0.176	0.2	0.113	0.154

Note: Data is from the Spanish National Health Survey (2011 and 2017) and the European Health Survey (2014 and 2020). Health is a one-to-five index indicating whether the individual declares to be in very bad, bad, regular, good, or very good health. Bad health is a dummy equal to one if the individual declares to have bad or very bad health. Regressions include dummies for gender, age, marital status, region of residence, and survey year. They also include years since migration and birth country by region of residence fixed effects. Observations are weighted to match the population distribution of immigrants across regions of residence and countries of birth. The numbers in parentheses represent standard errors, which are clustered at the birth country level.

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

TABLE A4 The impact of naturalization on immigrant women's fertility.

	OLS (1)	FS (2)	IV (3)	RF (4)
Citizenship	0.014 (0.037)	0.169 (0.081)**	0.878 (0.466)*	0.148 (0.069)**
<i>F</i> statistic	.	3.87	.	.
Obs.	920	920	920	920
<i>R</i> <sup>2</sup>	0.615	0.498	0.075	0.623

Note: Data is from the Spanish National Health Survey (2011 and 2017) and the European Health Survey (2014 and 2020). The dependent variable is a dummy equal to one if the immigrant woman declares to have been in the hospital to deliver a child in the last 12 months. Regressions include dummies for gender, age, marital status, and survey year. They also include years since migration and birth country by region of residence fixed effects. Observations are weighted to match the population distribution of immigrants across regions of residence and countries of birth. The numbers in parentheses represent standard errors, which are clustered at the birth country level.

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

**TABLE A 5** The impact of naturalization on health by undocumented immigrant access to public health system.

OLS		FS		IV	
Health	Bad health	Citizenship	Health	Health	Bad health
(1)	(2)	(3)	(4)	(4)	(5)
<b>Panel A: With access. Years 2011 and 2020</b>					
Citizenship	0.01 (0.021)	0.15 (0.045)***	-1.909 (0.878)**		0.206 (0.117)*
<i>F</i> statistic	.	11.12	.		.
Obs.	1353	1353	1353		1353
<i>R</i> <sup>2</sup>	0.443	0.479	0.117		0.332
<b>Panel B: Without access. Years 2014 and 2017</b>					
Citizenship	0.015 (0.018)	0.236 (0.059)***	-0.632 (0.602)		0.179 (0.173)
<i>F</i> statistic	.	16.26	.		.
Obs.	1272	1272	1272		1272
<i>R</i> <sup>2</sup>	0.477	0.528	0.43		0.389

*Note:* Data is from the Spanish National Health Survey (2011 and 2017) and the European Health Survey (2014 and 2020). Panel A includes the years 2011 and 2020, and Panel B comprises the years 2014 and 2017. Health is a one-to-five index indicating whether the individual declares to be in very bad, bad, regular, good, or very good health. Bad health is a dummy equal to one if the individual declares to have bad or very bad health. Regressions include dummies for gender, age, marital status, region of residence, and survey year. They also include years since migration and birth country by region of residence fixed effects. Observations are weighted to match the population distribution of immigrants across regions of residence and countries of birth. The numbers in parentheses represent standard errors, which are clustered at the birth country level.

\*\*\**p* < 0.01, \*\**p* < 0.05, \**p* < 0.1.