

# Self-rated health, time of residence and social determinants of health in immigrant populations: A complex relationship in groups of different origins in a Southern European region

Antía Domínguez-Rodríguez<sup>a</sup>, Yolanda González-Rábago<sup>b,\*</sup>

<sup>a</sup> Department of Sociology and Communication Sciences, University of A Coruña, A Coruña, Spain

<sup>b</sup> Department of Sociology and Social Work, University of the Basque Country, Leioa, Spain

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## ABSTRACT

Health of immigrant population changes with time of residence and under the effect of social determinants of health. This study analyses the health status of the immigrant population in the Basque Country according to groups of origin assessing the effect of time of residence on health in the different origin groups considering social and migration-related determinants of health. A cross-sectional study of the immigrant population in the Basque Country using the Foreign Origin Population Survey was conducted. A descriptive analysis is performed of each group of origin and Poisson models are applied. The main variable is self-rated health, and the independent variables are divided into three groups: demographic, socioeconomic and migration-related. For the study, immigrants are divided into six origin groups. Results show that the health and the effects of socioeconomic and migratory variables on health vary according to origin. Immigrants with greater economic difficulties present poorer health, though to different extents and the effects on health of educational level and perception of discrimination differ according to origin. Finally, the relation between time of residence and self-rated health varies according to origin: Colombian, Ecuadorian, Peruvian, Eastern EU and sub-Saharan immigrants living in Spain for 10 or more years report poorer health even when controlling for socioeconomic and migration-related variables, while people from the Maghreb and Asia do not. Therefore, the effects on health of time of residence, living conditions and the migratory experience differ according to migrant group, leading to the importance of analysing the health of immigrants as a heterogeneous group.

## Introduction

Studies conducted in different geographical contexts and focusing on different types of migration have highlighted the existence of a Healthy Immigrant Effect (HIE); that is, that the health of the immigrant population is usually better than that of the native population in the early stages of the migratory process, although it later converges towards similar, or worse, levels of health over time in the destination country. There is abundant evidence for this initial effect in a diversity of destination countries (Mercè et al., 2015; Moniz et al., 2020; Helgesson et al., 2019; Gimeno-Feliu et al., 2019; Parra-Casado et al., 2017; Kennedy et al., 2015; Vang et al., 2017), but the reasons are not entirely clear (Malmusi et al., 2010; Viruell-Fuentes, 2007). To some extent, it seems to be explained by factors prior to migration, such as positive health selection among those who finally migrate. Later on, the worsening of

migrants' health in the destinations seems to be related to their poor living conditions, their exposure to health risks, and the development of poor health-related behaviors (Domnich et al., 2012; Farré, 2016; Abraído-Lanza et al., 2005). However, some studies in Europe in specific immigrant groups have not reported the HIE (Nielsen and Krasnik, 2010; Moullan and Jusot, 2014).

The flows of immigrants to Spain in the early 2000s led to an unprecedented increase in the resident foreign-born population. Spain became established as a destination for immigrants rather later than other European countries, and the phenomenon occurred suddenly, with a rise in foreign-born individuals registered in the municipal censuses from 1.5 million in 2000 to 6 million in 2008, and then to 7.2 million in 2020. The arrival of migrants in the region of the Basque Country followed the same trend in later years, albeit with lower numbers, with foreign-born residents representing 1.7 % of the total in 2000 and 10.9

\* Corresponding author at: Facultad de Ciencias Sociales y de la Comunicación, Barrio Sarriena S/N, 48940 Leioa, Spain.  
E-mail address: [yolanda.gonzalezr@ehu.eus](mailto:yolanda.gonzalezr@ehu.eus) (Y. González-Rábago).

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% in 2020 (compared with 15.2 % in Spain overall) (Spanish National Statistics Institute, n.d.). The ethnic origin of immigrant population in the Basque Country is diverse, with a majority of Latin Americans (51.1 %), a large group from Europe (20 %), mainly from Rumania, and then Africans, especially from the Maghreb (14.0 %) (Ikuspegi - Observatorio Vasco de Inmigración., 2020). The intense influx during the first half of the 2000s has been followed by a continuous migration flow until the present. This situation allows us to analyse the potential accumulated effects on immigrants' health of their living and working conditions and of other factors related to the migratory process, such as their experiences of discrimination or their precarious legal status.

The intensification and diversification of the migratory flows poses a major challenge to the attempts to assess the state of health of the immigrant population, their healthcare needs, and the healthcare they receive. The majority of the studies performed to date refer to the immigrant population as a whole, at most defining it as coming from low-income countries, or distinguishing between Western and non-Western populations (Helgesson et al., 2019; Malmusi et al., 2010), but without actually analysing the differences between groups of origin. Furthermore, most studies have used health surveys not specifically directed at immigrant populations, and the small sample sizes do not allow a breakdown into groups of origin (Mercè et al., 2015; Rivera et al., 2013; Malmusi and Ortiz-Barreda, 2014); as a result, the distinctive characteristics that may modify the effect on health in different immigrant groups remain invisible. The processes of immigration and integration in the destination societies may vary widely and are likely to affect the social determinants of health (and therefore the health status) of immigrant populations in different ways. In fact, although some studies report poorer health in some immigrant groups than in others (Villarreal and Artazcoz, 2012; Rodríguez-Álvarez et al., 2017), at present it is not known whether the differences in health according to time of residence are related to a distinct effect of social determinants on the health of different groups of origin. Therefore, the objective of this study is to analyse the health status of the immigrant population in the Basque Country according to origin, as well as the effect of time of residence controlling for socioeconomic and migration-related variables.

## Material and methods

### Study design and data source

Descriptive, cross-sectional study of the foreign-born immigrant population aged 16 and over residing in the Basque Country (Spain) in 2018. Data from the *Encuesta de la Población de Origen Extranjero* (Foreign Origin Population Survey- Spanish acronym: EPOE-) for 2018 were used.

The EPOE is a high quality survey of the foreign-born immigrant population residing in the Basque Country, carried out every four years by the Basque government. It compiles information on the entire foreign-born immigrant population residing in the Basque Country, regardless of their legal situation, in order to study and evaluate their living conditions. It seeks the widest possible representation of the immigrant population from different countries and regions residing in the Basque Country. It has two questionnaires, one that gathers information on all members of the household and the other focusing on selected individuals. The present study uses variables from both questionnaires, although household questionnaire was only used for individual characterization. Population from some regions of origin were selected considering the largest immigrant groups in the Basque Country and their specific living conditions. More detail can be found in section 2.3. The EPOE's sample comprised 5755 people (of which 1023 were excluded due to non-migratory origin). Finally, after a selection of regions of origin of interest and the exclusion of people aged less than 16 years old, 2522 were included in the study.

### Variables

The outcome variable was self-rated health (SRH), registered through the question "How is your health in general?". Respondents classified their health as very good, good, fair, poor and very poor. For the analysis, SRH was recoded into two categories: good health (very good and good) and poor health (fair, poor and very poor).

To analyse the effect on health of socioeconomic and migration-related variables, three groups of independent variables were considered: 1) demographic variables (age and sex); 2) socioeconomic variables (economic difficulties, level of education and employment status); and 3) variables related to the migratory process (perceived discrimination, legal status and time of residence in Spain). In the second group, economic difficulties were recorded as follows: no difficulties; difficulties covering unforeseen expenses; and difficulties covering basic daily needs (housing, food, clothes). Educational level was recoded into three categories: primary school; secondary school; and higher education. Employment status was also defined in three categories: employed (working or on sick leave); inactive (students, disabled, retired or housework); and unemployed.

As for migration-related variables, time of residence in Spain, measured in years, was recoded into two categories of less than 10 years or 10 and more years. Legal status was recoded into three categories: naturalized (Spanish or respondents and/or their family members held other EU nationality); legally resident (in possession of a permanent residence permit, temporary residence permit with a work permit, or student permit); and unstable (irregular, temporary residence permit without a work permit or refugee). For the association analysis, only two categories were used: stable (naturalized and legally resident) and unstable. Finally, perceived discrimination was recorded through the question "In the last year, have you suffered problems of social rejection due to your social or geographical origin, race, ethnic, culture, language, religion or foreign status?" The possible answers were "Yes, serious"; "yes, but not serious"; "no". For the analysis, the answers were recoded into two categories, yes vs. no.

### Groups of origin

In order to establish the origin of migrant populations, recent literature tends to use "place of birth". However, our data source, the EPOE, records information on the country of origin at the time of arrival in the Basque Country. The variable collected can be anyway considered equivalent to the variable country of birth, as the vast majority of the immigrant population in our context were born in the country from which they then migrated.

To carry out the analysis, immigrants from the largest groups living in the Basque Country were selected and were theoretically classified according to, on the one hand, their migratory trajectories, that is, similar history of migration and length of residence in destination country; and on the other hand, the living conditions in terms of labour situation, access to legal status and discrimination. We thus created six groups of origin: 1) Eastern EU countries (mainly Rumania); 2) Colombia, Ecuador and Peru; 3) Bolivia and Paraguay; 4) the Maghreb (Morocco, Algeria and Tunisia); 5) sub-Saharan Africa (mainly Senegal); and 6) Asia (mainly China). We did not include in the analysis population from the EU-15 countries, nor from North America, Oceania or the more developed countries of South America, such as Chile or Argentina. Their migratory characteristics and health status exceeded the focus of the analysis.

### Analysis

Descriptive analyses for the selected characteristics were calculated according to region of origin. Then, prevalence estimates for SRH were calculated according to the different characteristics analysed for each group studied. Chi-square statistics were used to test significant

differences in each variable. For the analysis of the association between length of residence and SRH, we used prevalence ratios (PR) and their 95 % confidence intervals (95 %CI), calculated through Poisson regression models with robust variance. Three regression models were created. Model 1 (M1) is an unadjusted model (controlling for age and sex); model 2 (M2) includes the socioeconomic variables (economic difficulties, level of education and employment status); and model 3 (M3) includes migration-related variables (legal status and perceived discrimination). Pearson’s contingency coefficient, calculated for all variables to study possible multicollinearity problems, gave values below 0.7 in all cases.

Data management procedures were carried out using SPSS 23.0 and Stata-12. The sample sizes displayed in Table 1 were unweighted, but all other estimates (proportions, PR and 95 %CI) were weighted.

**Results**

Descriptive analysis is presented in Table 1. In general, the immigrant population presents a good SRH, albeit with some differences according to group of origin. In the Maghrebi population, 18.7 % reported poor health, compared with 14 % of people from Bolivia and Paraguay and from Eastern EU, 11.3 % of sub-Saharan Africans, and only 8.1 % of those from Colombia, Ecuador and Peru, and from Asia. The majority of the population are aged between 30 and 49 years old; the 65 years and over age group is the smallest. The two Latin American groups have a preponderance of women (68.5 % and 58.1 %), while men predominate in the African groups (61.4 % and 59.2 %). Regarding their economic situation, a lower proportion of immigrants from Asia and from Eastern EU countries report difficulties, while a higher proportion of people from Maghreb and sub-Saharan African countries report daily economic difficulties and problems dealing with unforeseen expenses. As regards education, most people from Africa and Asia report primary school studies (61 %) while more than 50 % of Latin Americans and Eastern Europeans completed secondary school. More than 60 % of

people from Latin America, Asia and Eastern EU are employed, but only 35.2 % of Maghrebis and 45.1 % of sub-Saharan Africans.

Around 70 % of the population have lived in Spain for 10 or more years. Two out of 10 sub-Saharan Africans have perceived discrimination, but only one in 10 of the Maghrebis, and even lower proportions in the rest of origin groups. Eighty per cent of people born in Colombia, Ecuador and Peru have European nationality and 51 % of the people from Bolivia and Paraguay, compared with only 10.4 % of Asians. Irregular legal status is most common among the Africans.

Table 2 shows the prevalences of poor SRH of immigrants from each group of origin according to socioeconomic and migration-related variables. Despite the good health level of the immigrant population, some notable differences are found between the groups of origin with regard to the social determinants of health. The older population (65 and more) have poor health in all origin groups (except in Bolivia and Paraguay due to low sample size at this age), especially in Eastern EU (54.8 %) and Maghreb (65.4 %). Women in all groups (except Eastern Europeans) report poor health, especially those of Maghreb (27.4 %) and Bolivia and Paraguay (20.9 %). A higher prevalence of poor health was found among those reporting economic difficulties, especially by those with difficulties covering basic daily basic needs (almost one in three in the groups from Bolivia and Paraguay, the Maghreb and Eastern Europe). Regarding education, the results do not follow the same pattern in all groups: poorer health is associated with a lower level of education (primary or secondary studies) in immigrants from the Maghreb, Eastern Europe and Colombia/Ecuador/Peru, but with a higher level of education in those from Bolivia and Paraguay (27.1 %) and with little difference across educational levels in the sub-Saharan and Asian groups. Employed immigrants have better health in all groups, and the unemployed immigrants from the Maghreb and Eastern Europe countries present high self-rated poor health (28.2 % and 31.8 % respectively).

Notable differences are also found according to determinants of health related to the migratory process (Table 2). Immigrants who have lived longer in Spain (i.e., 10 years or more) report worse health, with

**Table 1**  
Characteristics of participants in the sample according to groups of origin.

		Eastern EU countries (mainly Rumania)		Colombia, Ecuador and Peru		Bolivia and Paraguay		Maghreb (Morocco, Algeria and Tunisia)		Sub-Saharan Africa (mainly Senegal)		Asia (mainly China)		P-value
		n	%	n	%	n	%	n	%	n	%	n	%	
Self-rated health (SRH)	Poor	48	(13.7)	34	(8.1)	63	(14.0)	77	(18.7)	47	(11.3)	38	(8.1)	<0.001
	Good	303	(86.3)	386	(91.9)	388	(86.0)	335	(81.3)	370	(88.7)	433	(91.9)	
Age	16–29	78	(22.2)	119	(28.3)	133	(29.5)	118	(28.6)	89	(21.3)	115	(24.4)	<0.001
	30–49	217	(61.8)	196	(46.7)	265	(58.8)	226	(54.9)	281	(67.4)	282	(59.9)	
	50–64	50	(14.3)	90	(21.4)	51	(11.3)	55	(13.4)	43	(10.3)	64	(13.6)	
	65 and more	6	(1.7)	15	(3.6)	2	(0.5)	13	(3.2)	4	(1.0)	10	(2.1)	
Sex	Male	159	(45.3)	176	(41.9)	142	(31.5)	244	(59.2)	256	(61.4)	245	(52.0)	<0.001
	Female	192	(54.7)	244	(58.1)	309	(68.5)	168	(40.8)	161	(38.6)	226	(48.0)	
Economic difficulties	Without difficulties	234	(66.7)	211	(50.2)	183	(40.6)	88	(21.4)	76	(18.2)	318	(67.5)	<0.001
	Difficulties covering unforeseen expenses	70	(19.9)	127	(30.2)	142	(31.5)	151	(36.7)	168	(40.3)	96	(20.4)	
	Difficulties to face the daily and basic needs (housing, food, clothes)	47	(13.4)	82	(19.5)	126	(27.9)	173	(42.0)	173	(41.5)	57	(12.1)	
Educational level	Higher education	49	(14.0)	55	(13.1)	39	(8.7)	30	(7.3)	24	(5.8)	37	(7.9)	<0.001
	Secondary school	204	(58.1)	246	(58.6)	234	(51.9)	128	(31.1)	135	(32.4)	165	(35.0)	
	Primary school	98	(27.9)	119	(28.3)	178	(39.5)	254	(61.7)	258	(61.9)	269	(57.1)	
Employment status	Employed (working or on sick leave)	221	(63.0)	282	(67.1)	283	(62.8)	145	(35.2)	188	(45.1)	318	(67.5)	<0.001
	Inactive (students, disabled, retired or housework)	80	(22.8)	73	(17.4)	99	(22.0)	157	(38.1)	95	(22.8)	115	(24.4)	
	Unemployed	50	(14.3)	65	(15.5)	69	(15.3)	110	(26.7)	134	(32.1)	38	(8.1)	
Residence time in Spain*	<10 years	59	(29.2)	53	(22.8)	55	(18.8)	72	(27.1)	78	(26.1)	120	(38.3)	<0.001
	>= 10 years	143	(70.8)	180	(77.3)	237	(81.2)	194	(72.9)	221	(73.9)	193	(61.7)	
Perceived discrimination	No	330	(94.0)	372	(88.6)	416	(92.2)	367	(89.1)	333	(79.9)	441	(93.6)	<0.001
	Yes	21	(6.0)	48	(11.4)	35	(7.8)	45	(10.9)	84	(20.1)	30	(6.4)	
Legal status	Naturalized	351	(100)	338	(80.5)	230	(51)	128	(31.1)	87	(20.9)	49	(10.4)	<0.001
	Unstable	0	(0)	12	(2.9)	39	(8.7)	42	(10.2)	60	(14.4)	22	(4.7)	
	Legally resident	0	(0)	70	(16.7)	182	(40.4)	242	(58.7)	270	(64.8)	400	(84.9)	

\* Time of residence has 1300 missing cases.

**Table 2**  
Prevalence of poor self-rated health among immigrants from each group of origin according to socioeconomic and migratory variables.

	Eastern EU (mainly Rumania)		Colombia, Ecuador and Peru		Bolivia and Paraguay		Maghreb (Morocco, Algeria and Tunisia)		Sub-Saharan Africa (mainly Senegal)		Asia (mainly China)																																																																																																																																																																																																																																																																																																																																																																
	Prevalence	P	Prevalence	P	Prevalence	P	Prevalence	P	Prevalence	P	Prevalence	P																																																																																																																																																																																																																																																																																																																																																															
Age													16-29	2.8	<0.001	1.8	<0.001	12.5	<0.001	4.9	<0.001	0.4	<0.001	6.8	<0.001	30-49	15.0		8.2		19.3		19.6		11.8		7.7		50-64	16.8		16.6		22.7		41.2		41.9		13.7		65 and more	54.8		39.7		0.0		65.4		39.5		39.9		Sex													Male	18.4	<0.001	8.0	<0.001	11.4	<0.001	17.8	<0.001	11.4	<0.001	8.1	<0.001	Female	11.4		12.0		20.9		27.4		17.4		10.2		Economic difficulties													Without difficulties	7.6	<0.001	6.6	<0.001	7.6	<0.001	16.6	<0.001	8.6	<0.001	6.3	<0.001	Difficulties covering unforeseen expenses	23.6		15.3		14.1		13.8		10.8		12.0		Difficulties covering basic daily needs (housing, food, clothes)	30.3		13.0		32.2		30.4		18.7		16.3		Educational level													Higher education	4.5	<0.001	5.3	<0.001	27.1	<0.001	6.1	<0.001	15.2	<0.001	10.7	<0.001	Secondary school	15.7		11.0		17.6		20.2		11.2		6.8		Primary school	16.3		12.9		17.8		23.0		15.6		10.1		Employment status													Employed (working or on sick leave)	9.5	<0.001	7.8	<0.001	17.3	<0.001	11.4	<0.001	9.7	<0.001	5.2	<0.001	Inactive (students, disabled, retired or housework)	16.3		20.3		20.3		26.8		16.2		16.4		Unemployed	31.8		13.4		21.0		28.2		17.3		20.8		Time of residence in Spain													<10 years	5.0	<0.001	2.1	<0.001	11.8	<0.001	16.5	<0.001	6.9	<0.001	9.7	ns	>= 10 years	17.5		13.4		19.6		22.3		16.4		8.6		Perceived discrimination	13.6	<0.001	9.2	<0.001	17.4	<0.001	20.4	<0.001	14.3	<0.001	9.6	<0.001	Yes	21.8		17.8		28.2		24.5		12.8		3.9		Legal status													Naturalized and legally resident	14.1	-	10.9	<0.001	18.0	<0.001	20.6	<0.001	13.7	ns	8.6	<0.001	Unstable			0.0		24.6		24.2		14.5		16.8	
16-29	2.8	<0.001	1.8	<0.001	12.5	<0.001	4.9	<0.001	0.4	<0.001	6.8	<0.001																																																																																																																																																																																																																																																																																																																																																															
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Male	18.4	<0.001	8.0	<0.001	11.4	<0.001	17.8	<0.001	11.4	<0.001	8.1	<0.001																																																																																																																																																																																																																																																																																																																																																															
Female	11.4		12.0		20.9		27.4		17.4		10.2																																																																																																																																																																																																																																																																																																																																																																
Economic difficulties													Without difficulties	7.6	<0.001	6.6	<0.001	7.6	<0.001	16.6	<0.001	8.6	<0.001	6.3	<0.001	Difficulties covering unforeseen expenses	23.6		15.3		14.1		13.8		10.8		12.0		Difficulties covering basic daily needs (housing, food, clothes)	30.3		13.0		32.2		30.4		18.7		16.3		Educational level													Higher education	4.5	<0.001	5.3	<0.001	27.1	<0.001	6.1	<0.001	15.2	<0.001	10.7	<0.001	Secondary school	15.7		11.0		17.6		20.2		11.2		6.8		Primary school	16.3		12.9		17.8		23.0		15.6		10.1		Employment status													Employed (working or on sick leave)	9.5	<0.001	7.8	<0.001	17.3	<0.001	11.4	<0.001	9.7	<0.001	5.2	<0.001	Inactive (students, disabled, retired or housework)	16.3		20.3		20.3		26.8		16.2		16.4		Unemployed	31.8		13.4		21.0		28.2		17.3		20.8		Time of residence in Spain													<10 years	5.0	<0.001	2.1	<0.001	11.8	<0.001	16.5	<0.001	6.9	<0.001	9.7	ns	>= 10 years	17.5		13.4		19.6		22.3		16.4		8.6		Perceived discrimination	13.6	<0.001	9.2	<0.001	17.4	<0.001	20.4	<0.001	14.3	<0.001	9.6	<0.001	Yes	21.8		17.8		28.2		24.5		12.8		3.9		Legal status													Naturalized and legally resident	14.1	-	10.9	<0.001	18.0	<0.001	20.6	<0.001	13.7	ns	8.6	<0.001	Unstable			0.0		24.6		24.2		14.5		16.8																																																																																																									
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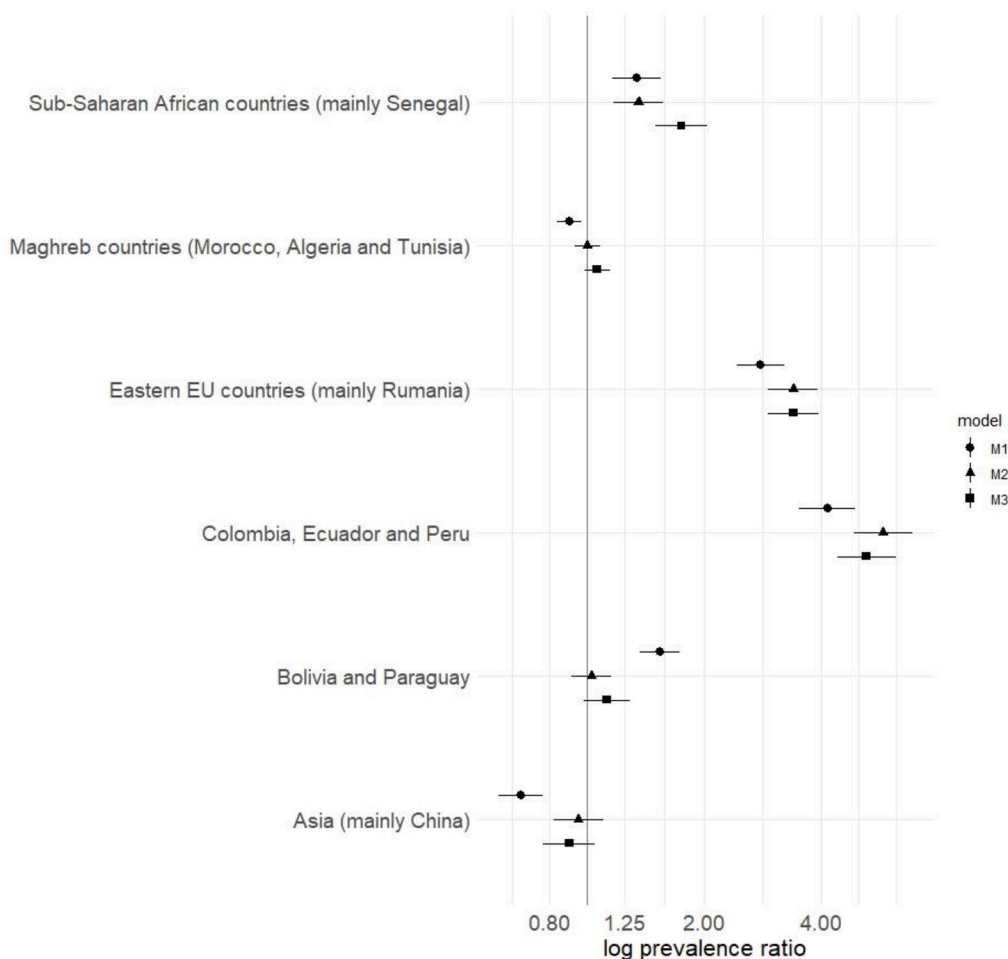
the exception of those from Asian countries who do not show statistically significant differences. The difference in the proportion of reporting poor health according to length of residence is greater in the Latin Americans, Eastern Europeans and sub-Saharan. For its part, perceived discrimination seems to have a different effect on health in the groups, with a higher prevalence of poor health among those who have felt discriminated in the Maghrebi, Latin American, and Eastern European groups, but not among the immigrants from Asia and sub-Saharan Africa. Besides, immigrants from Bolivia and Paraguay, the Maghreb and Asian countries with unstable legal status (irregular, no residence or work permits, refugees) report poor health more frequently than those in more favourable legal situations, but no significant differences are found in the case of the sub-Saharan group.

The effect of time of residence on health also differs according to group of origin. Fig. 1 shows the results of stepwise Poisson regression modelling to investigate the relationship between time of residence and SRH, adjusting for social and migratory determinants of health in the six groups of origin. Immigrants from Colombia, Ecuador and Peru with a long time of residence (10 years or more) are four times more likely to report poor health than their counterparts with a shorter length of stay (PR = 4.16, 95 %CI = 3.51-4.92). When socioeconomic variables (economic difficulties, level of education and employment status) are added to the model (M2), the likelihood of poor health in this group increases (PR = 5.79, 95 %CI = 4.87-6.90), falling only slightly (and remaining five times higher) when the additional explanatory variables discrimination and legal status (M3) are added (PR = 5.25, 95 %CI = 4.41-6.24). Long-term immigrants from Eastern Europe are also more likely to have poor health (PR = 2.80, 95 %CI = 2.44-3.22), and indeed the probability increases after adjusting for all the variables (M3) (PR = 3.40, 95 %CI = 2.93-3.95). The same pattern is found in the sub-Saharan sample: long-term immigrants are 30 % more likely to have poor health than more recent arrivals (PR = 1.34, 95 %CI = 1.17-1.55). (M1); the PRs increase after adjusting for all variables, especially when adding the migration-related variables (M3) (PR = 1.75, 95 %CI = 1.50-2.04). In these three groups, then, the probability of reporting poor health after living in the host country for a long time not only remains, but also increases, after controlling for other social determinants of health.

Long-term immigrants in the other groups, however, do not present poorer health. In the model adjusted for sex and age (M1), Maghrebi immigrants who have lived in Spain for 10 or more years are less likely to have poor health (PR = 0.90, 95 %CI = 0.84-0.97). However, after adjusting for socioeconomic variables (M2) and migration-related variables (M3), the statistical difference disappears. The same pattern is observed in the Asian group. Finally, the PRs in model 1 show a higher risk of poor health among long-term immigrants from Bolivia and Paraguay, but after controlling for all variables the results are not statistically significant (M3) (PR = 1.13, 95 %CI = 0.96-1.29).

## Discussion

Self-rated health shows differences according to social determinants of health and migration-related variables, but not in all groups of origin. Immigrants from Bolivia and Paraguay, the Maghreb and Eastern Europe with economic difficulties have worse health, and unemployment exerts a strong negative impact on health among Asian, Maghrebis and Eastern Europeans. The effect on health of discrimination and legal status seems to differ according to origin, with no significant gap being recorded in the case of sub-Saharan immigrants. Our results show that time of residence is a key factor in the deterioration of SRH, though not in all groups. Colombians, Ecuadorians and Peruvians, Eastern European and sub-Saharan immigrants living in Spain for 10 or more years report poorer health; indeed, in these groups, the likelihood of poor health in the long term is even greater after controlling for social determinants of health and migration-related variables. However, Maghrebis and Asians do not present this trend.



**Fig. 1.** Prevalence ratios of poor health in groups with different times of residence by socioeconomic and migration-related variables, according to group of origin. Reference: <10 years of residence. M1: adjusted for age and sex. M2: adjusted for economic difficulties, level of education and employment status. M3: adjusted for legal status and perceived discrimination

These findings are consistent with other studies which have assessed the differential impact of social determinants on immigrants’ health, even though they did not explore the effect of time of residence (Villaruel and Artazcoz, 2012; Rodríguez-Álvarez et al., 2017). The effect of variables such as sex or educational level on immigrants’ health has been widely studied, in our geographical context as well (Rodríguez-Álvarez et al., 2014); females and less educated immigrants have been shown to have poorer health. However, in our study certain exceptions stand out: women from Eastern Europe have better health, as do immigrants with lower educational levels from Bolivia and Paraguay, sub-Saharan Africa and Asia.

Our results regarding the effect on health of discrimination in certain groups display certain discrepancies with respect to other studies which have found a clear relationship between the two (Borrell et al., 2010; Schunck et al., 2015; Brondolo et al., 2011). According to our data, the perception of discrimination among sub-Saharan immigrants does not seem to have a significant negative impact on health, in contrast to the results of another study carried out in the Basque Country (Rodríguez-Álvarez et al., 2017). A possible explanation of our results is that our sample contained a higher proportion of men in the sub-Saharan group, who are less prone to communicate the feeling of discrimination; this may have led to an underestimation of the population suffering from discrimination in this group and thus a weaker relation with SRH. For their part, Asian immigrants who perceive discrimination report better health, in contrast to a study in the United States which found the relation between discrimination and health in Asians to be at the same

level as in other ethnic groups (Brondolo et al., 2011), but consistent with the results of a previous report in the Basque Country (Rodríguez-Álvarez et al., 2017). Feeling discrimination is a subjective issue, in which different ways of identification or recognition of discriminatory experiences may play a role in its measurement and comparison.

Our results provide a novel perspective on the study of the effect of time of residence on immigrants’ health, as they emphasize the differences across countries of origin and the differential impact that living conditions and migratory experiences may have as determinants of health in a heterogeneous immigrant population. Most studies of the HIE in Europe compare migrants with native-born people after a particular period of residence in host countries (Mercè et al., 2015; Moniz et al., 2020; Gimeno-Feliu et al., 2019). These studies tend to identify the HIE but, unlike our study, they do not address the possible differences in immigrants’ health according to their origin. The importance of considering immigrants’ origin in the study of their health has been stressed previously by other studies (Helgesson et al., 2019; Villaruel and Artazcoz, 2012), and our study corroborates its key role in the analysis of the effect of time on health.

Moreover, to our knowledge, this is the first study in our geographical setting to include the perspective of social determinants of health in the assessment of the effects of socioeconomic situation and migration-related variables, such as discrimination or legal status, on the relation between health and time of residence in immigrant groups of different origins. This study shows that among some groups, such as immigrants from Colombia, Ecuador, and Peru, Eastern Europe and sub-Saharan

Africa, social determinants of health increase the risk of poor self-rated health with increasing time of residence. However, they do not increase the likelihood of poor self-rated health in Maghrebis and Asians with 10 or more years of residence, although the differences are not significant. Identifying this differential effect may help to improve our understanding of the health of immigrants and the effect of their time of residence in the destination country.

A number of limitations of our study should be mentioned. First, as it is a cross-sectional study, no temporal relationship can be established between exposure and outcome. Second, we have used measures of self-reported information that may be subject to reporting biases, and may also differ across populations from different countries of origin. To allow comparison, SRH must measure the same construct in all groups: certain studies have shown that the concept may differ across racial/ethnic groups, though mainly when comparing white native-born population and immigrants (Benjamins et al., 2012). However, other studies have found that SRH is valid for cross-group comparisons of adults and young people (Chandola and Jenkinson, 2000; Allen et al., 2016), and it is an indicator that is widely used in health and ethnicity research. Also in terms of the variables used, it is important to mention that there is a great diversity of variables that can have an impact on both health and the effect of residence time on health. Therefore, the selection of variables included in our analysis does not intend to and cannot exhaust the factors that influence the relationship between length of residence and the health of the immigrant population, nor the interaction and relationship that may exist between them. However, this study sought to include those variables that, from the model of the social determinants of health and the previous results of the scientific literature revised, show that they have a greater influence on health. Then, despite being a representative survey of the immigrant population, its institutional nature may have reduced the response rate of population in illegal situation that should be considered to interpret the results. Finally, given the sample size, we could not break the groups of origin down into smaller entities and had to maintain very broad groups such as “Asian” and “sub-Saharan”. However, our source of data, the EPOE, focuses exclusively on the immigrant population and allows a certain level of disaggregation into groups of origin (something that, is not possible in the case of general health population surveys, in which the immigrant populations are much lower). The EPOE is an official statistical survey in the Basque Country, which provides high quality data and a sufficiently large and representative sample of the immigrant population in the region. More methodological details of the survey can be found in the statistical agency responsible for the data ([Encuesta de la Población de Origen Extranjero \(EPOE\) 2023](#)) as well as different publications based on these data (Shershneva, 2022; Moreno, 2018).

## Conclusions

The health of the immigrant population, its evolution and its determinants requires a detailed analysis in disaggregated groups that is sensitive to the diversity of situations that this vulnerable population experiences. The results can help to focus on the needs of the immigrant population, taking into account their differences and bearing in mind that socioeconomic and migration-related factors may not have the same impact on different immigrant populations. A deeper understanding of their situation can contribute to the design of public policies aimed at improving immigrants' health, providing guidance for targeting situations of greater vulnerability for intervention and for reducing social inequalities in health.

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## CRedit authorship contribution statement

**Antía Domínguez-Rodríguez:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. **Yolanda González-Rábago:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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