

Trends and Disparities in Mortality Among Spanish-Born and Foreign-Born Populations Residing in Spain, 1999–2008

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Abstract Spain's immigrant population has increased 380 % in the last decade, accounting for 13.1 % of the total population. This fact has led her to become during 2009 the eighth recipient country of international immigrants in the world. The aim of this article is to describe the evolution of mortality and the main causes of death among the Spanish-born and foreign-born populations residing in Spain between 1999 and 2008. Age-standardised mortality rates (ASRs), average age and comparative mortality ratios among foreign-born and Spanish-born populations residing in Spain were computed for every year and sub-period by

sex, cause of death and place of birth as well as by the ASR percentage change. During 1999–2008 the ASR showed a progressive decrease in the risk of death in the Spanish-born population (−17.8 % for men and −16.6 % for women) as well as in the foreign-born one (−45.9 % for men and −35.7 % for women). ASR also showed a progressive decrease for practically all the causes of death, in both populations. It has been observed that the risk of death due to neoplasms and respiratory diseases among immigrants is lower than that of their Spanish-born counterparts, but risk due to external causes is higher. Places of birth with the greater decreases are Northern Europe, Eastern Europe, Western Europe, Southern Europe, and Latin America and the Caribbean. The research shows the differences in the reduction of death risk between Spanish-born and immigrant inhabitants between 1999 and 2008. These results could contribute to the ability of central and local governments to create effective health policy. Further research is necessary to examine changes in mortality trends among immigrant populations as a consequence of the economic crisis and the reforms in the Spanish health system. Spanish data sources should incorporate into their records information that enables them to find out the immigrant duration of permanence and the possible impact of this on mortality indicators.

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Introduction

Migrations have always been part of human history, but globalisation has added speed and complexity to its magnitude and effects and consequently to its analysis.

Migratory flows, eased by the postmodern world time-space compression [1] are of greater magnitude than ever, reflected as much by the number of displaced people as by the distances and routes covered [2].

Immigration has therefore undergone a huge increase during the last decade. In 2000, the number of immigrants was 150 million in the whole world while in 2010 it grew to 214. Despite the increase in restrictive mobility norms the United Nations High Commissioner for Refugees (UNHCR) paradoxically previews that “the twenty-first will be the century of peoples in motion” [3], and deems that emigration will continue its increase until reaching 405 million in 2050 [4].

Spain’s immigration history is short. From the sixteenth century until the 1970s of the twentieth century it has been characterised by being an emigrant exporting country [5]. Nevertheless, since the mid 1990s immigration into Spain has steadily increased. That is, Spain’s immigrant population has increased 380 % in the last decade, accounting for 13.1 % of the total population. This fact has led her to become during 2009 the eighth recipient country of international immigrants in the world. [6]. A remarkable consequence of this is the 14.8 % increase of the total population between 1999 and 2008 in contrast with 3.9 % in the Euro zone [7]. Furthermore, immigrants’ average age has reduced progressively from 39.2 to 35.5 years of age for the same period, while that of Spanish natives has increased slightly from 39.6 to 41.6 [8].

This has implied a change, not only in population size and structure, because of immigration, but also in other demographic phenomena such as birth and death rates.

Mortality has traditionally been used as an indirect measure of a population’s state of health. During the last century and the current one, Spain has progressively improved its health state overall measured by different mortality indicators. Nevertheless, its short immigration history and its new inhabitants’ diversity of origins render it difficult to discern if this improvement is due to an effective advance in indigenous health or to the immigrants’ contribution to overall health, or rather to the occurrence of both factors.

Several studies, conducted in countries with a long immigration history have revealed the existence of mortality differences among the native and immigrant populations the magnitude of which varies according to age group, sex, cause of death and country of origin of the immigrant [9–13]. However, studies as such are still scarce in Spain and even more so in relation to the evaluation of these mortality patterns over all of the Spanish territory. While some reports [5, 14–19] have tackled mortality analysis in this population group, trend and size analysis over time, in a moment of huge changes in the immigration pattern in Spain, continues to be unknown. The aim of this

article is to describe the evolution of general mortality and the main causes of death among the Spanish-born and foreign-born populations residing in Spain between 1999 and 2008.

Data and Methods

Research Design and Data Sources

This is an ecological study of trends. Our study population was Spanish-born and foreign-born inhabitants in Spain during the period 1999–2008. The status of immigrants was established taking into account their country of birth. Population data was provided by the National Institute of Statistics (INE) and based on the Population Register. The Population Register is the administrative register in which all residents in a given town are registered. Its creation, maintenance, review and custody depends on the city council of every town and every 1st of January a Review of the Population Register, which includes its updates, is published. Every person who lives in Spain has to register in the Population Register of the city in which he or she lives. Registering in the Population Register includes, among other, the following items: name and surnames, sex, address, nationality, place of birth (town, province or country). Under Spanish law, city councils have to send monthly updates to the INE so that the institute can carry out checks, find possible mistakes and publish the information as official.

Mortality data was also provided by the INE and based on the Death Statistic Bulletin and was arranged by year, sex, age, place of birth and twenty-one main causes of death according to the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision (ICD-10). Mortality was considered for all causes and was then broken down into the five principal causes of death: Neoplasms (C00-D48), Diseases of the circulatory system (I00-I99), Diseases of the respiratory system (J00-J99), Diseases of the digestive system (K00-K93) and External causes (V01-Y98). Handling and analysis of this data is carried out by the INE and it includes the exhaustive registering of deaths in our country. Birth and deaths are communicated by the INE to every city council in order to be registered in the Population Register. All information is passed on to the INE Central Services where the data analysis continues until its official publication.

Countries were clustered by macro-geographical regions and sub-regions according to the United Nations Organisation: Africa, Asia, Eastern Europe, Latin America and Caribbean, North America, Northern Europe, Southern Europe, Western Europe and Oceania [20]. The data relating to those born in Oceania was taken into account for

the overall analysis of all immigrants, but it was not included in the breakdown by regions and sub-regions given the scarcity of resources. Mortality and population data provided by the INE was anonymised after a formal request submitted by the research group.

Analysis Methods

In order to analyse the overall mortality, gross annual and specific rates were calculated by age group, sex and place of birth (Spanish-born and foreign-born inhabitants for each of regions and the European sub-regions considered). To facilitate comparability, age-standardised mortality rates (ASR) were calculated by directly using the European population as the standard population. The age intervals considered were 0, 1–4, 5–9, ...85 and over.

Trend graphics were compiled broken down by population groups according to regions and sub-regions in order to assess the overall evolution of the mortality indicator. To analyse the evolution of the standardised rates by place of birth, sex and cause of death and with the aim of providing them with a greater stability, three sub-periods were considered: 1999–2002, 2003–2005 and 2006–2008.

Age-standardised mortality rates were calculated in each of the three sub-periods, as were the percentages relating to

the changes between the first and the last period. Indicators were differentiated by sex in relation to the ICD-10 and by each of the country groups considered. In addition, the comparative mortality ratio (CMR) [21] and its corresponding confidence intervals at 95 % between the Spanish-born and foreign-born populations was calculated for each of the sub-periods and according to every corresponding differentiation.

Results

During the period 1999–2008 a total of 3,723,780 deaths took place, 110,779 (3.0 %) of which corresponded to immigrants. The population increased from 40,202,156 in 1999 to 46,154,057 in 2008, of which 1,259,054 (3.1 %) and 6,044,528 (13.1 %) corresponded to the immigrant population respectively. This growth in immigrant population showed considerable differences regarding place of birth (Fig. 1). Immigrant communities that experienced a bigger relative growth were those from Latin America and the Caribbean (+622.7 %), Eastern Europe (+5,580.9 %), Asia (+415.7 %) and Africa (+275.2 %).

The evolution of annual ASR over this period showed a progressive and significant decrease in the risk of death in

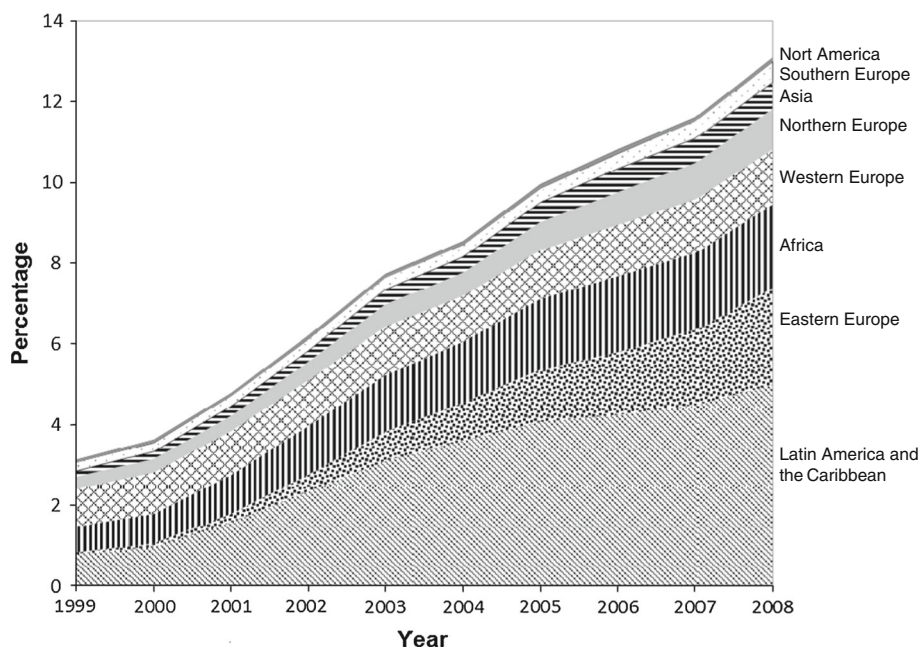
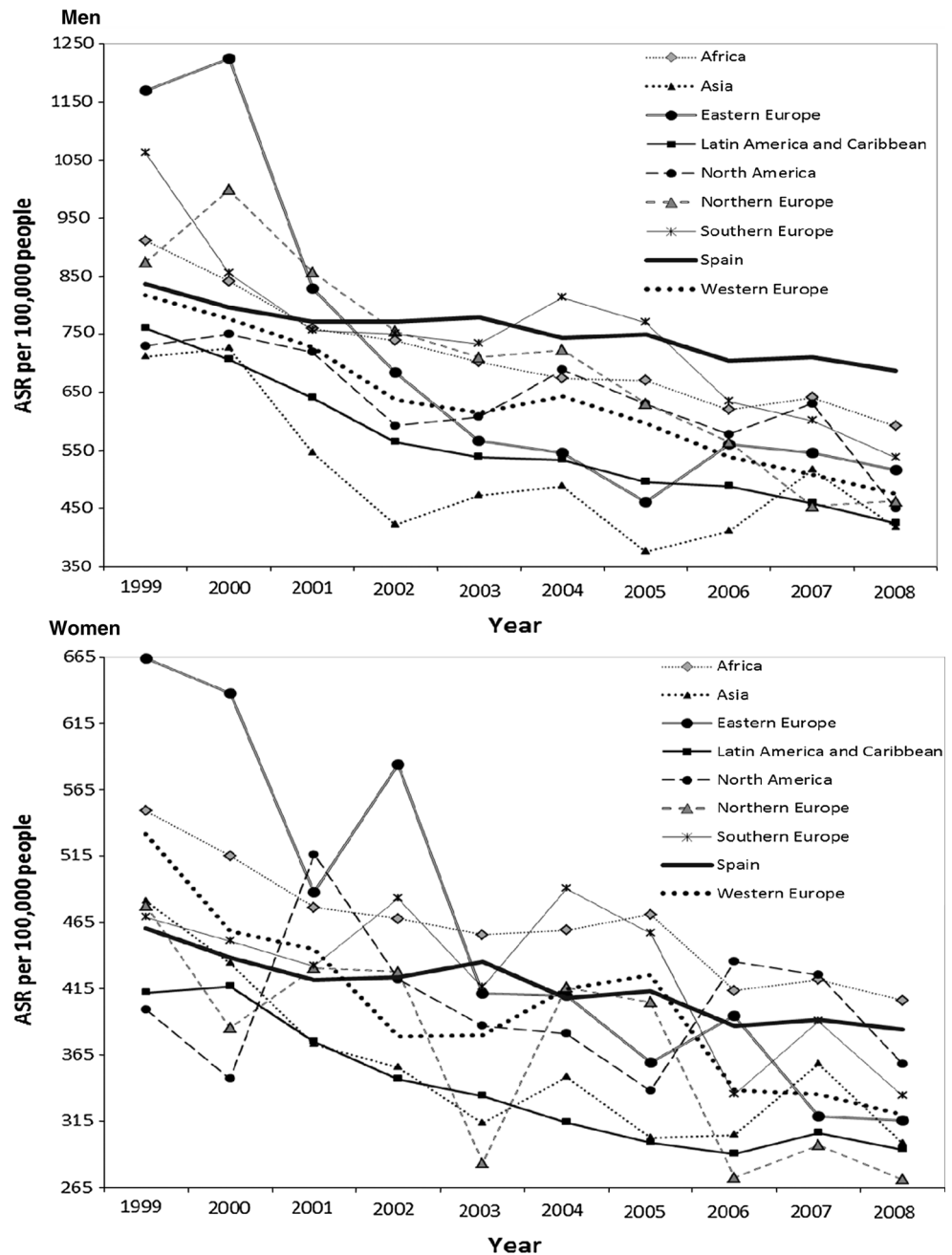


Fig. 1 Evolution of foreign-born population (both sexes) in Spain, 1999–2008. Eastern Europe (Belarus, Bulgaria, Czech Republic, Hungary, Poland, Republic of Moldova, Romania, Russian Federation, Slovakia, Ukraine), Northern Europe (Aland Islands, Channel Islands, Denmark, Estonia, Faeroe Islands, Finland, Guernsey, Iceland, Ireland, Isle of Man, Jersey, Latvia, Lithuania, Norway, Svalbard and Jan Mayen Islands, Sweden, United Kingdom of Great

Britain Northern Ireland), Southern Europe (Albania, Andorra, Bosnia and Herzegovina, Croatia, Gibraltar, Greece, Holy See, Italy, Malta, Montenegro, Portugal, San Marino, Serbia, Slovenia, The former Yugoslav Republic of Macedonia), Western Europe (Austria, Belgium, France, Germany, Liechtenstein, Luxembourg, Monaco, Netherlands, Switzerland)

Fig. 2 Age-standardised mortality rates by sex and place of birth 1999–2008



both Spanish-born and immigrant populations and for the different sexes. Nevertheless, the decrease was greater among the immigrant population. While in the Spanish-born population the relative decrease was -17.8% for men and -16.6% for women, in the immigrant population this decrease was -45.9% and -35.7% . Reductions were observed for all causes in all of the regions and sub-regions under consideration, both in the case of men and of women. In men, these reductions oscillated between -35.1% for Africans and -55.9% for those from Eastern Europe, whilst in the case of women it was between -10.8% for North Africans and -52.4% for Eastern Europeans.

Significant reductions were also observed in the mortality rates of men from Southern Europe (-49.4%) and Northern Europe (-47.1%) and in women from Northern Europe (-39.8%) and Western Europe (-39.8%).

Immigrants from Eastern Europe, Southern Europe, Northern Europe and Africa, in the case of men, started at the beginning of the period with a greater risk of death than natives. However, at the end of the period the immigrants from all of the regions under consideration showed lower risks of death. In the case of women, immigrants from all regions other than Latin America and the Caribbean and the North of Europe started with a higher risk of death than

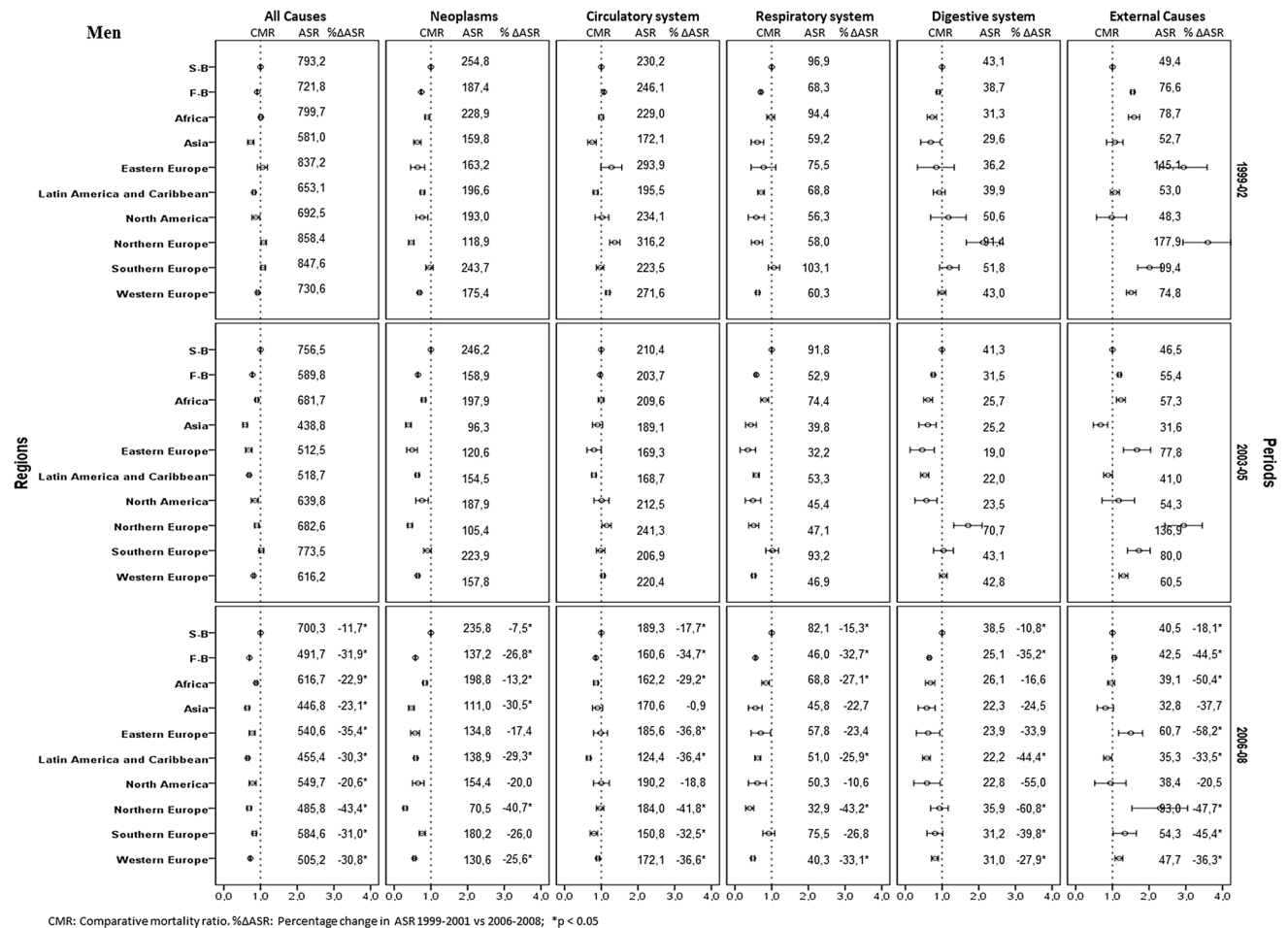


Fig. 3 Age-standardised rates per 100,000 people and CMRs among foreign-born (F-B) and Spanish-born (S-B) population for men by cause of death and place of birth

natives. At the end of the period, only the African women still had a higher risk than natives (Fig. 2).

The analysis for the sub-periods 1999–2002, 2003–2005 and 2006–2008 produce similar results in mortality from all causes to those obtained in the annual series, although the magnitude of the reductions detected was smoother. For natives, the reductions in the risk of death between the first and the last period were -11.7% for men and -11.1% in women, whereas for immigrants the reductions were -31.9% and -23.5% respectively (see column 1 in Figs. 3, 4). Depending upon provenance, men from all regions experienced significant reductions that oscillated between -20.6% for North America and -43.4% for the North of Europe. In the case of women all of the reductions were significant except for those from North Africa (-4.4%), with the greatest reductions being observed in those from Eastern Europe (-41.1%) and the North of Europe (-36.1%).

The CMR for all causes in men (Fig. 3) showed in the period 1999–2002 a slight but significantly lower risk of death for immigrants as a whole compared to natives,

although there were differences in the magnitude and even in the sense of the differences depending upon the geographical region. Immigrants from Asia, Latin America and the Caribbean, North America and Western Europe presented significantly lower risks than natives, whereas immigrants from Northern Europe and Southern Europe started with significantly higher risks of death. During the period, 2003–2005 immigrants from all regions experienced risks of death significantly lower than natives than they had in the first period except for those from Southern Europe. The above trend is confirmed in the last period, with risks for immigrants being significantly lower than that for natives for all regions considered.

In the case of women (Fig. 4), the CMR for all causes in the period 1999–2002 did not show significant changes between natives and immigrants as a whole. However, there were significant risk excesses in women from Africa and Eastern Europe compared to natives and significantly lower risks in the case of those from Latin America and the Caribbean. In the period 2003–2005 immigrants as a whole

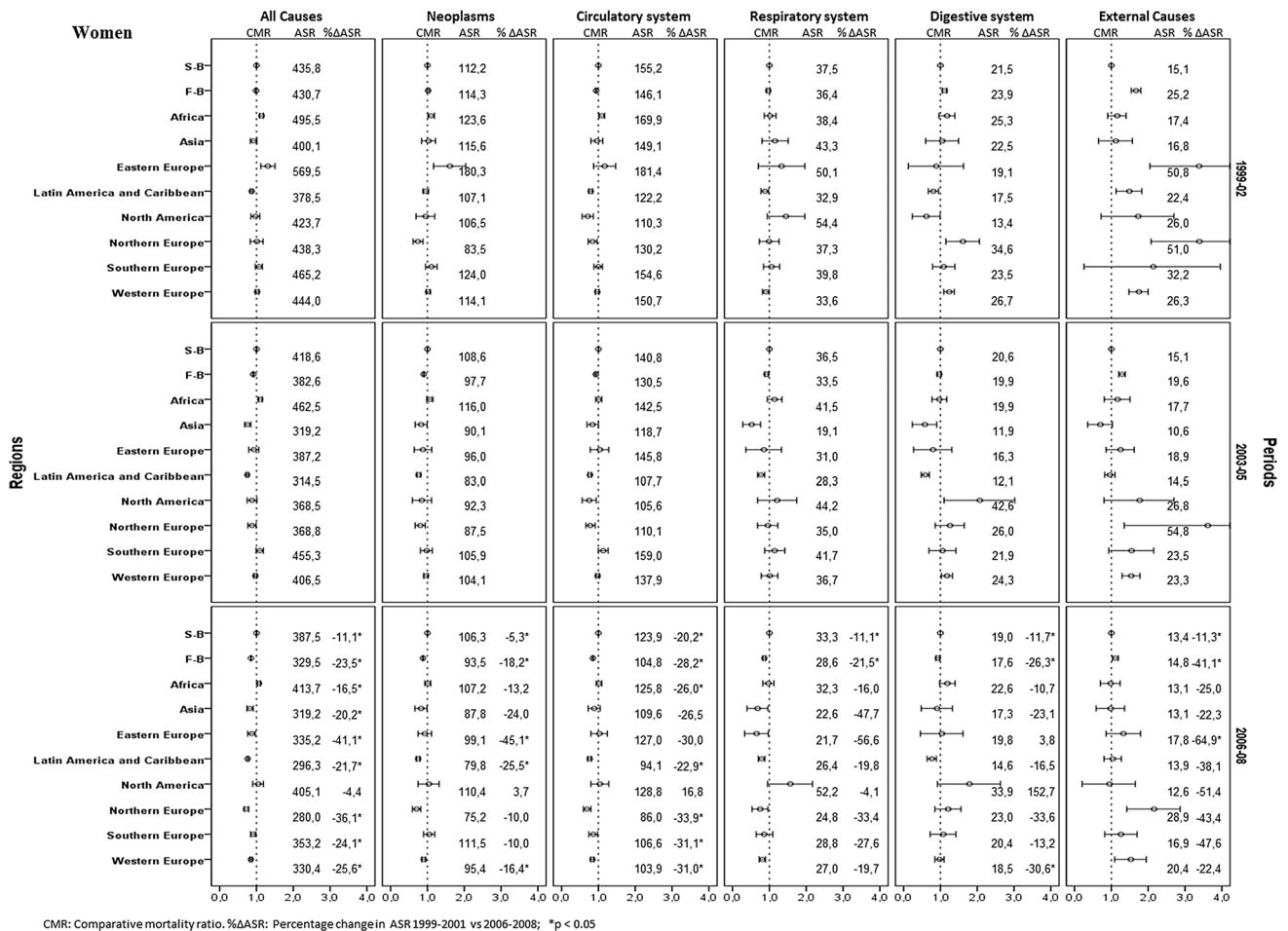


Fig. 4 Age-standardised rates per 100,000 people and CMRs among foreign-born (F-B) and Spanish-born (S-B) population for women by cause of death and place of birth

already presented a significantly lower risk of death than natives. By regions, apart from those from Latin America and the Caribbean, immigrants from Asia presented significantly lower risks of death than natives, whereas the Africans showed a significantly higher risk. In the last period, immigrants from all of the geographic regions presented mortality risks from all causes significantly lower than that of natives—except for African women, in whom the risk was significantly higher.

Even though the main causes of death match in both population groups on the whole, in men as well as women, some important differences were observed regarding scale and order of importance. The main causes of death were neoplasms, diseases of the circulatory system, diseases of the respiratory system, diseases of the digestive system and external causes of morbidity and mortality. Mortality by external causes is noteworthy as it stands as the third and fourth cause of death for immigrants as a whole among immigrant men and women respectively (see Figs. 3, 4, columns 2–6).

The ASR by causes of death revealed a progressive and significant reduction over the period in reference for each of the principal causes of death in both populations, native and immigrant, although to a greater degree in the latter. Furthermore, important differences associated with different causes in the risk of death were found among the Spanish-born and foreign-born populations and in both men and women.

In men (Fig. 3), the deaths that experienced a significantly greater reduction in the Spanish-born population were due to external causes (−18.1 %) and those of the circulatory system (−17.7 %), whereas in the immigrant population the most significant reductions were observed in deaths due to external causes (−44.5 %) and those of the digestive system (−35.2 %). In native women, the greatest reductions in mortality were noted in illnesses of the circulatory system (−20.2 %) and those of the digestive system (−11.7 %) whilst in the case of immigrant women the greatest reductions were noted in external causes (−41.1 %) and those of the circulatory system (−28.2 %).

The analysis of immigrant CMRs versus native CMRs for each of the causes of death are shown in Figs. 3 and 4 (columns 2–6). In men (Fig. 3), during the first period it is noteworthy that the greatest risks of death (significant) for immigrants as a whole is a result of external causes (CMR = 1.55) and illnesses of the circulatory system (CMR = 1.07). For the remainder of causes considered the risk is significantly lower in immigrants. In the last period only the risk of death by external causes remains significantly higher (CMR = 1.05), although with an excess that is much lower than that in the first period, whereas for the remainder of causes there is evidence of a significantly lower risk for immigrants. However, the analysis by regions of birth enables us to see that the regions with an excess of risk of death due to external causes in the final period corresponded to Europe, whilst Latin America and the Caribbean presented a risk that was significantly lower. For the remainder of causes, the majority of regions presented risks of death that were significantly lower to that of natives in the last period.

In the case of women (Fig. 4), in the first period we detected excess risks of death for immigrants as a whole compared with natives due to illnesses of the digestive system (CMR = 1.11) and external causes (CMR = 1.67), whilst for illnesses of the circulatory system the risk is lower (CMR = 0.94). In the last period we noted lower risks of death resulting from neoplasms (CMR = 0.88), illnesses of the circulatory system (CMR = 0.85) and illnesses of the respiratory system (CMR = 0.86), but significantly higher for external causes (CMR = 1.10). By regions of birth, only those immigrants from Northern Europe and Western Europe presented risks of death due to external causes significantly higher to that of natives in the last period. The case of immigrant women from Latin America and the Caribbean is notable in that, during the last period, they presented a significantly lower risk than native women for all of the causes considered except for external causes, where the risks were similar.

Discussion

This research has revealed important differences between the Spanish-born and immigrant population in overall mortality and according to the different causes of death listed in the ICD-10, the magnitude of which varies according to sex, cause of death and place of birth. Between 1999 and 2008 the overall mortality ASR for the total of inhabitants of both sexes, has experienced a considerable decrease. This trend coincides with that observed in the great majority of countries of the European Union (EU) [22] and other countries such as United States, England and Australia [23–25].

Analysis by place of birth (Spanish-born or born abroad) showed a generalised decrease of mortality rates in both populations over the period, in men as well as in women and relating to all causes of death, nevertheless the rhythm of the decline in the risk of mortality has been higher among the immigrant population than among their Spanish-born counterparts.

Among the reasons that could explain the evolution of the differences found are deep changes in the immigrant socio-demographic profile during this period. While in 1999 the immigrant population coming from Western Europe was 30.0 %, in 2008 it only reached 10 %. In turn, immigrants coming from Eastern Europe, who merely accounted for 1.5 %, reached 18 % by the end of the period, while those born in Latin America and the Caribbean went from 25.0 to 38.0 %, becoming the largest immigrant community in our country. In addition, the average age of the immigrants born in Eastern Europe, Latin America and the Caribbean was roughly 10 years lower than that of those coming from Western Europe, for both men and women, and furthermore, it was between 5 and 7 years less than their Spanish born counterparts and between 13 and 17 years less than those coming from Northern Europe. This situation is similar to that existing in the rest of the EU [26].

The analysis by country of birth showed a protracted reduction of the risks of death for the immigrant population compared to the native one. This was true for nearly all the regions examined. Moreover, those coming from Latin America and the Caribbean and Asia systematically maintained lower risks of death over the whole period. At the same time those coming from Eastern Europe, having started from a worse situation, experienced one of the most significant reductions in the risk of death. These results partially match those found in Switzerland [27], in which lower ASR can be observed among immigrants not from North-eastern Europe (Latin America, Africa, Asia and Southern Europe) and also coincide with other studies that show how Latin American people suffer fewer cardiovascular diseases, all-cause cancers, and colon and prostate cancer [23, 28, 29].

The analysis showed that, even though the main causes of death are similar between Spanish-born and foreign-born populations, there are important differences regarding the scale and speed of decline of these causes of death. Among immigrants, external causes, circulatory system diseases and neoplasms experienced important reductions that match results obtained in the United States [23]. The significant decline in mortality due to motor traffic accidents, drowning, submersion, suffocation, suicide and self-inflicted injuries for immigrants detected in a more detailed analysis, could explain the reduction in mortality resulting from external causes that coincides with the trend already

described in the United States [23]. However, in countries like Israel and the Netherlands an increase in this trend has been observed [30, 31]. In the case of circulatory system diseases, its reduction among immigrants could be attributed to ischaemic heart diseases, heart insufficiency (in men), and to hypertension and cerebrovascular diseases. This is also a situation that coincides with the pattern found in the US and Israel [23, 30]. In countries like England and Wales, a decreasing trend has been described involving coronary diseases and cerebrovascular accidents in some immigrant groups [32]. Additionally, lower mortality risks from cardiovascular diseases among immigrants have been found in Australia, though these tend to escalate in relation to the duration of residence [33].

The ASR of neoplasms has undergone a significant reduction, especially among immigrants, which has kept lower than that of natives over the whole period. Similar developments have been observed in research conducted in the US [23]. The specific causes of this decline are: malignant tumours of the stomach, prostate and trachea in general, and malignant tumours of the bronchial tubes and lungs in men and of the oesophagus, cervix uteri and trachea and bronchial tubes and lungs in women. The overall mortality trend for neoplasms has shown a great variability among immigrants from European countries [22, 34], even regarding different types of neoplasms [35–37]. As in Spain, immigrants in England and Wales have seen significant reductions in their mortality trends for these causes. Lung cancer reductions among men and women are notable, as are those of colon cancer among men and breast cancer among women [38].

The minor risk of death amongst immigrants for the groups of causes considered, other than external causes, could be related to the health profiles and lifestyles of said population. Several studies have shown that immigrants, especially those coming from non-European regions, demonstrate a lower consumption of alcohol and tobacco, considered to be risk factors for many of these principal pathologies, than do their native counterparts. In our country a study carried out in 2007 [28] showed that non-European immigrants declared significantly lower consumption of tobacco and alcohol whilst a significantly greater percentage than natives said that they did physical exercise during their free time. These results coincide partially with those observed from other studies such as those carried out in Canada and United States [39–41] where the foreign-born population presented significantly lower tobacco and alcohol consumption than did the native-born population. Although other studies of mortality carried out in Spain have detected and related a greater risk of illnesses of the circulatory system in immigrants from Eastern Europe, with the alcohol consumption patterns of their countries of origin, our study did not detect significant excesses of risk of circulatory system diseases in this group

during any of the periods analysed although, in the first period, there was a slight but not significant excess risk. This could be due to the fact that the aforementioned study included only people aged between 20 and 64 and is not altogether comparable, although the fact that it is the only group of causes where there is not a significant reduction in immigrants from Eastern Europe would be compatible with this theory.

The results of mortality resulting from external causes coincides with the pattern observed in Andalucía (region in the south of Spain) during 2006–2010, which stated that a great number of deaths due to external causes were the results of traffic accidents and possible work accidents, particularly amongst young immigrant males [42]. In the same line we have the López-Jacob study which has shown that immigrant workers experience a greater incidence of mortality through injuries than do native workers [43]. On the other hand, the excess of mortality due to external causes could also be due to the deterioration of mental health amongst this group due to socio-economic inequalities and to the process that migration itself brings about [44].

Limitations

The available data does not allow the incorporation of information about immigrants' permanence in Spain. However, an examination of the Spanish population by place of birth shows that, apart from those coming from the West and North of Europe, immigrants rarely stay for more than 10 years. This might lessen their effect on mortality. Although some studies have managed to incorporate this kind of information, they have not been able to find any relationship between duration of permanence and mortality, with the sole exception of some groups of immigrants and some specific causes [33, 45, 46].

Several studies have shown that immigrants do not represent a random sample of the population of their respective countries of origin. Nevertheless, in many cases, they report better health indicators than natives [47, 48] and these might worsen or converge with those of the native population in relation to the duration of residence [49]. Other studies conducted in Spain have shown the relation between different patterns of use of health services and country of origin. In those studies, the level of self-perceived health varies according to nationality. In addition, immigrants might have healthier living arrangements than their native counterparts, excluding mental health, and tend to use health care less, apart from the emergency service [28, 29, 50, 51].

Another possible limitation is the use of two different sources of information in order to obtain population and

mortality data and the possibility of a numerator/denominator bias. Regarding this, it is worth mentioning that the same institution, the INE, is the entity in charge of analysing and publishing the official mortality and population data used in this research. Mortality data provided by the INE records all deaths of residents in Spain in an exhaustive manner. As regards population data, every person residing in Spain is obliged to register at the city council population register in the town where he or she lives. Deaths are communicated by the INE to the council of every town so that updating is carried out.

The bias could be produced whenever some immigrants, i.e. the illegal, are not registered. A possible consequence of this could be that the real denominators are bigger than those used in this research and, in that case, we would have slightly overestimated the mortality rates. This would not change the trends observed and the reversion of the risks of death among immigrants and natives would be even greater at the end of the period. Nevertheless, we consider that it would only affect the population data very slightly as illegal immigrants register voluntarily with the Population Register of their town in order to benefit from health care. Other investigations carried out in our country have already discussed this fact [17].

Another possible limitation is the so-called ‘Salmon-bias effect’ that affects the rate numerator (the death is not registered in Spain) as well as the denominator. This is particularly true among EU immigrants for whom the renewal of their residence is not compulsory in Spain [52]. Despite the fact that the conclusion of the study coincided with the beginning of the economic crisis, there was very little evidence of immigrant workers returning to their native countries. Thus the ‘Salmon-bias effect’ seems to have little effect on this study [53].

The use of the municipal register of inhabitants minimizes this effect to a certain extent as non-European immigrants without permanent residency permits should, under Spanish law (14/2003), renew their registration over 2 years, otherwise they are automatically unregistered. This would affect the population register official data published since 2006 [52]. The analysis by place of birth did not show differences in the overall trend of mortality rates between European and non-European immigrants. Moreover, changes in the general trend of the evolution of mortality rates since 2006, described in Fig. 2, are not observed. This suggests a good reliability of the data.

This strengthens the idea that the ‘Salmon-bias effect’ is scarce in Spain. Furthermore, there are no studies or registers describing the case of return caused by disease, as might be likely in the case of those older immigrants of European origin.

The current Spanish sources of information do not have other immigrant health-related variables available (i.e.

those related to socio-economics). The fact that death by external causes is one of the main causes of death for immigrants might indicate a relationship between mortality and the immigrants’ socio-economic status. Although a causal relationship between mortality and socio-economic status cannot be established from the current data, the total number of immigrants working in the agricultural sector has decreased substantially over the period. This is particularly true among the Africans who went from 38.7 to 1.8 %, while the industrial sector rose (particularly in construction).

Conclusions

The research shows the progressive reduction of death risk differences between natives and immigrants in Spain between 1999 and 2008. These results could contribute to the ability of central and local governments to create effective health policy. Further research is necessary to examine changes in mortality trends among immigrant populations as a consequence of the economic crisis and the reforms in the Spanish health system. Spanish data sources should include in their records information that would enable them to find out the immigrant’s duration of permanence and its possible impact on mortality indicators.

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Conflict of interest The authors declare that they have no competing interests.

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