

From Arrival to Aging: Migrant Mortality and Duration of Stay in Belgium, 1991–2021

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BACKGROUND

Migrant mortality and duration of stay

Migrants are often found to have lower mortality rates than native populations. However, this pattern primarily applies to migrants from non-Western regions relocating to Western countries (1). In Belgium, this trend holds: migrants generally exhibit lower mortality than the native population (2,3). Notably, individuals of Moroccan and Turkish origin show a pronounced mortality advantage, whereas European migrants may experience higher mortality rates than Belgians (4,5).

One of the most widely accepted explanations is health selection, often referred to as the "healthy migrant effect." The strength of health selection varies by migration motive—it tends to be strongest among labour migrants and international students, and weaker or absent among those migrating for family reunification (6). Migrants have lower mortality despite their often worse socio-economic position, and adjusting mortality estimates for socioeconomic status tends to strengthen the migrant mortality advantage (5,7,8).

Some studies suggest that the MMA diminishes with increasing duration of stay. This has been observed in countries such as Norway (8,9), France (10), and among immigrants from Indian subcontinent to England and Wales (11).

In Canada the decline in the migrant mortality advantage is also observed but it takes a long time (12). Research from the Netherlands (13), and Finland (14) found no consistent relationship between mortality and duration of stay. In Belgium, some studies indicate that the migrant mortality advantage fades over time (15,16) although this may not apply to all origin groups (4).

This paper examines the impact of duration of stay on the mortality of migrants from various origins. Belgium offers a valuable context for this analysis due to its diverse and sizeable migrant population. The use of data from the national register on the whole population enables detailed investigation of migrant mortality. Belgium's long history of migration also allows for comparisons across different "waves" of migrants, shedding light on whether changes in immigration and naturalisation laws have influenced the role of duration of stay in shaping mortality outcomes.

The overarching aim of this research is to assess how duration of stay affects the mortality of migrants from different origins in Belgium, from 1991 to the present.

History of international migration to Belgium

Belgium has long been a country of immigration, with significant migrant flows beginning after World War II. To rebuild its economy, Belgium recruited foreign labour, starting with Italians in 1946 and later expanding to workers from Spain, Greece, Morocco, Turkey, Tunisia, Algeria, and Yugoslavia (17). Turkish and Moroccan migrants became the largest groups, and although the migration was initially temporary, many settled permanently. Alongside labour migration, Belgium also attracted white-collar professionals, especially as Brussels became the de facto capital of the European Union. Migration from former colonies like Congo and Rwanda-Burundi grew gradually after independence (18).

In the late 1960s, economic recession led Belgium to adopt stricter immigration policies, culminating in a 1974 limit on labour migration. This shift brought two major changes: family reunification became a dominant migration pathway, increasing the number of female migrants, and the diversity of origin countries expanded due to the absence of new bilateral agreements (19). In the early 2000s, migration

patterns shifted again, with more arrivals from new EU member states and West Asia, and fewer from older EU-15 countries, Türkiye, and Morocco (20).

Today, Belgium’s migrant population is diverse and reflects both historical and recent migration trends. Migrants from neighbouring countries remain a stable presence, while migration from Eastern Europe surged after the EU’s 2004 enlargement. Long-established communities from Morocco and Turkey continue to play a key role, despite fewer new arrivals. Additionally, Belgium has seen a rise in refugees from West Asia, including Syria, Iraq, and Afghanistan, contributing to the evolving migration landscape.

DATA

This study is based on data covering the entire Belgian population, drawn from national censuses and the national register. Migrants are defined as individuals born outside of Belgium. We focus specifically on those who immigrated at age 18 or older, as those who arrived as children represent a distinct group with different characteristics. Asylum seekers listed in the waiting register are excluded, but individuals who have acquired refugee status are included.

The analysis uses three Belgian censuses—1991, 2001, and 2011—linked to mortality follow-up data extending to 2021. The study population is semi-closed: individuals may emigrate, but no new migrants are added between census waves. Each census serves as a starting point for follow-up. To track individuals’ presence during the follow-up period, we used annual register stock files, which list all residents of Belgium as of January 1 each year. If an individual was absent in the following year, we assumed they emigrated on July 1 of the previous year. If a person reappeared after a period of absence, we considered them to have re-immigrated on July 1 of the year prior to their reappearance.

By combining census data on year of immigration with register stock data, we are able to calculate the exact uninterrupted duration of stay for each individual. To account for potential administrative issues with registration, a one-year absence from the register does not interrupt the duration of stay. This decision is based on the assumption that a brief absence may reflect a registration error rather than actual emigration. Moreover, even if the absence represents a real departure, a short interruption is unlikely to significantly affect the processes of acculturation and assimilation that typically evolve with increasing duration of stay.

The origin of migrants was categorized by country of birth, which was grouped into eight broad origin categories.

ORIGIN GROUP	COUNTRIES
Belgium	Belgium
Türkiye	Türkiye
Southern Europe old EU countries	Greece, Italy, Portugal, Spain
Western Europe	Austria, France, Germany, Liechtenstein, Luxembourg, Monaco, Netherlands, Switzerland
Other Europe	All other countries of Europe
Northern Africa	Algeria, Egypt, Libya, Morocco, Sudan, Tunisia, Western Sahara
Sub-Saharan Africa	All other countries of Africa
Other	All other countries

Using census data as baseline populations allows us to incorporate a range of socioeconomic characteristics. In this study, we include attributes that are comparable across all three censuses:

- Employment status
- Housing ownership

- Housing quality indicators: presence of a bathroom, period of the construction, presence of central heating, number of dwellings in a building
- Civil status and household size

All variables are fixed for the period between censuses, except for civil status and household size, which are updated annually as time-varying variables.

The analysis is stratified by Belgian region—Flanders, Wallonia, and Brussels—to account for regional variation.

Each census includes over 8 million individuals, with migrants comprising more than 9% of the population. The total follow-up period spans 30 years, from 1991 to 2021.

	Census 1991	Census 2001	Census 2011
Population count (18+)	8,681,443	9,032,918	9,676,454
Percentage of foreign-born	9%	11.1%	15.1%

METHODS

Age-standardized death rates (ASDRs) were calculated using the 2013 European standard population. Hazard ratios were estimated using Cox proportional hazards models.

In the Cox regression, individuals entered the study population on the respective census dates. However, the time origin for each participant was set to their date of birth, which automatically adjusts for age in the analysis. After establishing the time origin, we applied three models with increasing levels of adjustment:

- Model A: Adjusted for origin group only.
- Model B: Adjusted for origin group and duration of stay.
- Model C: Adjusted for origin group, duration of stay, and socio-economic characteristics.

EXPECTED FINDINGS

Based on the analysis of 2011-2019 we found that

- The relationship between duration of stay and migrant mortality is non-uniform.
- The expected convergence of migrant mortality with that of the host population over time is not observed when using SDRs or HR.
- However, after adjustment for SES convergence appears for all origins.
- When separating the analysis by region the picture stays more or less the same with similar pattern across the country.

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