The Effects of Ethno-cultural Origin–Destination Interactions on Immigrants' Longevity

David J. Roelfs[1] · Eran Shor[2]

Abstract

A large body of research has documented an immigrant mortality advantage. However, we still do not know enough about how interactions between the characteristics of origin and destinations countries shape variabilities in immigrants' experiences and health. In this paper, we examine the effects of ethno-cultural similarities and differences between the country of origin and the country of destination on immigrants' longevity. We use meta-regression methods to examine data on 78 origin and 16 destination countries (1092 risk estimates from 69 studies). In contrast to expectations from approaches that focus on immigration/acculturation stress, we found that a shared official linguistic family, moving to a country where one is not likely to be considered a visible minority, and more integrative immigration policies actually *reduce* or even eliminate the immigrant mortality advantage. We discuss potential explanations for these findings and argue that selection mechanisms provide a better account.

Keywords Immigration · Mortality · Health · Culture · Ethnicity

Introduction

Research over the last few decades has found compelling evidence that immigrants tend to be healthier and experience lower mortality rates than comparative native-born people [1–6]. However, some studies have reported that this initial immigrant health advantage diminishes with time, until it is eventually lost altogether [7–11]. In the current paper, we explore important moderating factors in the immigrant health advantage phenomenon, seeking to assess how the characteristics of immigrants' origin country interact with those of their destination country to shape variabilities in immigrants' health.

We follow the work of van Tubergen and Kalmijn [12], who emphasized the interaction between the properties of origin and destination countries in shaping immigrants'

experiences and outcomes (see also [1, 13, 14]). According to van Tubergen and Kalmijn, in studying various features of immigrants, including education, language acquisition, and social integration, we must consider three groups of contextual effects: "origin effects" (the characteristics of the origin country), "destination effects" (the characteristics of the country where immigrants settle), and "setting effects" (the combination of origin and destination characteristics). While van Tubergen and Kalmijn's analysis focused on language acquisition, in this paper we extend their theoretical framework to look at health and mortality. We focus on a number of ethno-cultural setting effects, including language, a shared colonial/post-colonial tradition, and similarities or differences in race/ethnicity. In addition, we examine destination effects (integrative policies and prevalence of immigrants), as well as some individual characteristics of the immigrants themselves, such as gender and age.

A cross-national investigation of both origin and destination countries, as well as the interactions between them, requires collecting data on multiple immigrant groups residing in multiple locations. In the present study, we utilize meta-regression methods to examine data on 78 origin and 16 destination countries, resulting in 169 combinations of origin and destination.

✉ Eran Shor
ershor@gmail.com

David J. Roelfs
david.roelfs@louisville.edu

[1] Department of Sociology, University of Louisville, Louisville, KY, USA

[2] Department of Sociology, McGill University, 855 Sherbrooke Street West, Montreal, QC H3A2T7, Canada

Setting (Interaction) Effects

Shared Language

One major feature of the interaction between origin country and destination country is whether they share a language. Multiple studies have shown that knowledge of the common language in the destination country is relevant to immigrants' health. Language proficiency facilitates communication with healthcare providers, both in and out of hospitals, and also facilitates understanding of written instructions [8, 15–17]. These elements may be especially relevant for vulnerable groups of immigrants, including ethnic minorities, refugees, and women. For ethnic minorities, language barriers have been linked with a lower quality of healthcare and healthcare utilization, including diagnostic errors, excessive or unnecessary tests, prolonged hospital stays, and inappropriate or inefficient use of emergency services [18–20]. Morris et al. [19] further note that language barriers affect all stages of healthcare access, from making an appointment to filling a prescription. Studies have found that language difficulties were a significant barrier for cancer screening among immigrant women from various parts of the world [21–23], with low literacy levels being a particular issue [24, 25]. This body of work suggests that immigrants from countries that do not share a language with the destination country might suffer from worse health and a shorter lifespan.

Language familiarity may also have an indirect role on health by affecting entry into employment [26] and social assimilation [27]. Research has found higher rates of employment and higher earnings for both immigrants [28] and refugees [29] who already know or more rapidly acquire the local language when compared with those who do not. Research has also found faster assimilation with the native-born population for immigrants with better facility with the local language [12, 30]. The connection between employment and health has been well documented, with employed persons enjoying a significant health advantage [31]. Likewise, higher social integration is associated with better health outcomes [32, 33].

Previous Colony Status

Another factor that might account for both language proficiency and other cultural assimilation factors is a pre-migration relationship with the destination country. Several destination countries in our analysis are former colonial powers, and in most of their colonies natives were assimilated, at least to some extent, to the culture and language of the occupying country [12]. Such cultural

familiarity may later on serve to ease immigrant assimilation into their destination countries, improve their utilization of the local healthcare system, and consequently affect their health and wellbeing. Immigrants who have a better understanding of the local norms and daily habits, and subscribe to at least some of the same cultural practices, may have an easier time communicating with healthcare professionals, seeking and receiving healthcare services, and adopting common notions about best healthcare practices. However, immigrants from a former colony may be marginalized in the destination country because of the historical status hierarchy that granted dominance to the colonizer over the colonized.

Visible Racial/Ethnic Minority Status

Depending on both the racial/ethnic mixture in their origin country and the majority ethnicity in their destination country, immigrants often constitute a racial/ethnic minority group in their new home. Previous literature suggests that this status might have deleterious health effects. For example, research shows that immigrants to Canada from non-European countries, particularly those coming from Asian countries, are more likely to report declining health than those coming from European countries [34]. These disparities could be due to a variety of reasons. Studies report that racialized groups (including some immigrants) suffer from worse access to healthcare services, have more unmet needs, and are more likely to resist important health-maintenance practices [35, 36]. For example, a large body of research shows that minority women are less likely to participate in cancer screening, leading to an increase in cancer rates after immigration [37–41].

Some of the negative health effects for immigrants are also directly related to racism, which affects both physical and mental health, as well as risky health behaviors [42–44]. Racism might affect health directly by increasing physiological stress responses [45–47]. It may also indirectly affect health by decreasing economic, housing, and employment opportunities; increasing exposure to hazardous substances; and introducing barriers to healthcare utilization [9, 48].

Destination Effects

Migrant Integration Policies

Migrant integration policies include both the degree of legal inclusiveness toward individual immigrants and the accommodation of cultural group differences [49]. Several well-known policy indices exist, such as the Migrant Integration Policy Index [50] that examines policies toward immigrants on labor market participation, education, voting, residency and citizenship, family reunion, health care,

anti-discrimination initiatives. Policies vary widely in form, from laws governing general behaviors (e.g., anti-discrimination laws) to more direct forms of assistance (e.g., resettlement services). Policies also vary considerably among receiving countries and may have an effect on immigrants' ability to acclimate and acculturate in their new environment, find employment, and feel a sense of comfort and well-being in their new home. Previous research has found only a modest effect for integration policies on the adoption and retention of the host culture [51]. Still, these factors could make a difference in immigrants' comfort level with the local culture, and consequently help with the utilization of healthcare and other services. More integrative and accommodating policies may also help in reducing some of the negative effects of racialization and othering on health, which we discussed above.

Immigrant Support Networks

Shortly following immigration, migrants may establish residence in an immigrant enclave, which potentially offers greater social support, mutual protection, and more opportunities to participate in communal activities [52–55]. These features of enclaves have all been posited as pathways connecting immigration to health outcomes (see [54, 56]). However, not all immigrants gravitate to immigrant enclaves or stay in them long-term. Research has shown that enclaves are more likely to form when the prevalence of immigrants is high [57] and when immigrants are slow to move away, whether by choice [57] or by circumstance [58]. It is also worth noting that enclaves can inhibit economic adjustment by reducing the incentive for language acquisition and cultural assimilation.

Selection effects

The expected effects for the variables described above are based on a stress perspective. In this perspective, cultural dissimilarities between immigrants and the native-born population inhibit social and economic integration. Barriers to assimilation may negatively affect access to healthcare. In addition, immigration may be directly detrimental to health because it may be associated with a culture shock and with greater physical distance from family and friend support networks [59, 60], which may be only partially alleviated if an immigrant resides in an enclave.

However, the literature also emphasizes the possibility of selection effects. Selection can occur both as self-selection (individual level) and as destination country selection [61]. At the individual level, scholars have suggested that individuals who are healthy and can withstand the journey are more likely to migrate [5, 62, 63]. Individuals with more economic and cultural capital are also better-positioned to

migrate in the first place. As for destination country (i.e., state-level) selection, most wealthy receiving countries impose selective admission policies for immigrant. Such policies generally favor individuals who already speak the local language, have higher education and skills, and are in good health [8, 64, 65].
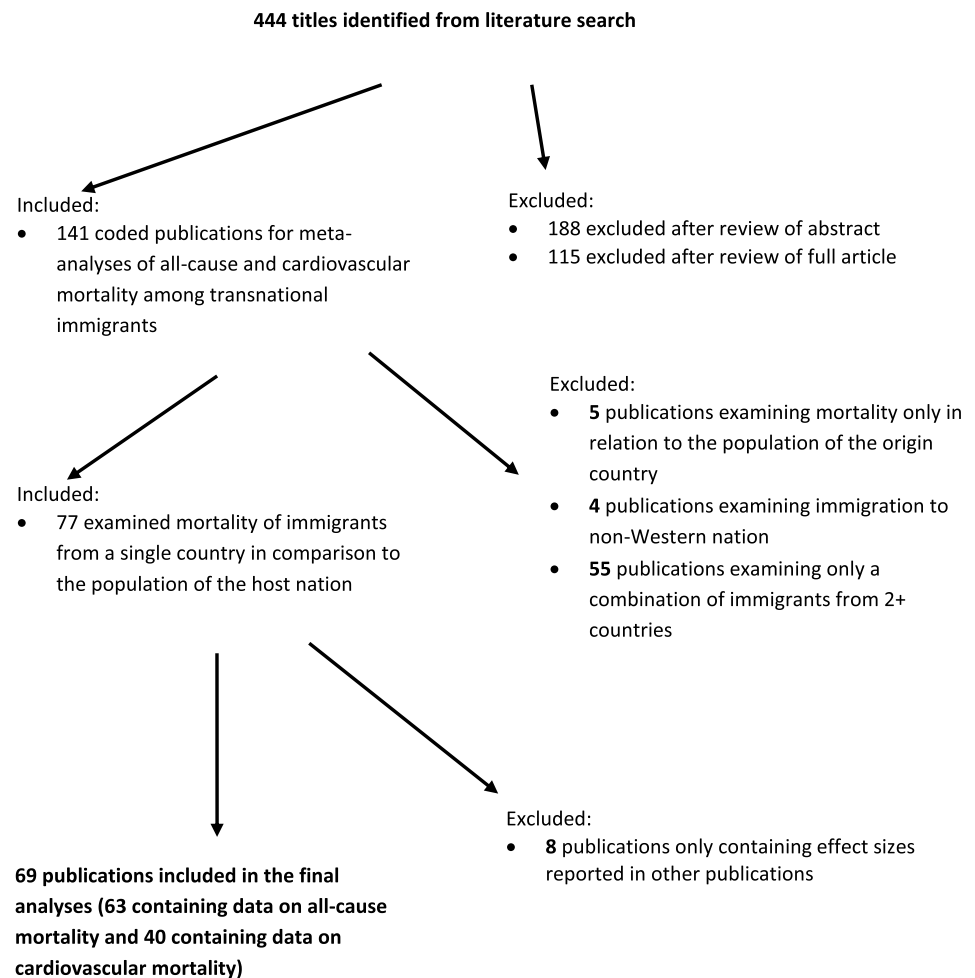
If one adopts a selection perspective, at least some of the factors discussed above may produce seemingly unexpected results. If self-selection and/or state-level selection are high, incoming immigrants are more likely to be healthier than the average person in their country of origin. Conversely, if selection is low, the health profile of immigrants is likely to be on par with that of the average person in their country of origin. Thus, when selection is higher, a statistical artifact may emerge that makes immigration appear to produce good health. For example, immigrants from origin countries that were former colonies of the destination country may be given preferential consideration for immigration (e.g., residents of Algeria may be given preferential admission into France). If so, stress might be reduced but so might health selection. If that is the case, immigrants might not show a health advantage relative to the native-born population. That said, the degree to which stress and selection effects are altered depends upon other factors in the complex relationship between former colonies and colonizers.

Data and Methods

Search Strategy and Inclusion Criteria

We reported the search methods used for the parent database from which the present study was derived in a previous paper [66]. To summarize, we conducted a search for studies of mortality among immigrants using keyword searches of bibliographic databases, complimented by (for all identified articles) title searches in the bibliographies, lists of citing publications, and lists of "similar" publications (from Web of Science and Google Scholar). We performed searches iteratively until the point where we could no longer identify additional publications. We also conducted additional searches for unpublished dissertations and other unpublished work. We completed the literature search in 2020. At the end of the search process, we identified 444 candidate publications (see Fig. 1).

Of these 444 candidate publications, we deemed 141 as relevant to the present study of all-cause or cardiovascular mortality among transnational immigrants. We coded these 141 publications and then further examined them to determine final eligibility for inclusion (see again Fig. 1). 69 publications were deemed eligible for inclusion in the current study. We included a publication if it (1) clearly compared a group of international immigrants from a *single* country of

Fig. 1 Search strategy and yield

444 titles identified from literature search

Included:
- 141 coded publications for meta-analyses of all-cause and cardiovascular mortality among transnational immigrants

Excluded:
- 188 excluded after review of abstract
- 115 excluded after review of full article

Included:
- 77 examined mortality of immigrants from a single country in comparison to the population of the host nation

Excluded:
- **5** publications examining mortality only in relation to the population of the origin country
- **4** publications examining immigration to non-Western nation
- **55** publications examining only a combination of immigrants from 2+ countries

69 publications included in the final analyses (63 containing data on all-cause mortality and 40 containing data on cardiovascular mortality)

Excluded:
- **8** publications only containing effect sizes reported in other publications

origin to a control group in an OECD destination country; (2) had all-cause mortality or cardiovascular mortality as the outcome of interest; (3) reported a measure of statistical significance (see below for additional details); (4) reported an effect size in the form of a rate ratio (or provided information sufficient to convert the results to rate ratio format); and (5) reported effect estimates not already reported by another study. The 69 publications in the final dataset provided a total of 803 all-cause mortality risk estimates (from 63 of the studies) and 289 cardiovascular mortality risk estimates (from 40 of the studies) for the analysis (see the statistical methods section below for a description of how we accounted for multiple observations for a single study).

It is important to note that many studies were excluded from the present, highly-focused analysis, since it was common for a study to combine data from multiple countries of origin. The present analysis, as described above, sought to isolate single countries of origin. The primary reason for this was to allow the use of country-level cross-national data on political, economic, geographic, and social conditions in both origin and destination countries. Studies that included immigrants from multiple origin countries into a single analysis would therefore only be eligible for inclusion if they reported results nested by country within the model (we encountered no such instances, however). In total, we examined data from 78 origin countries and 16 destination countries (see Table 4 in the Appendix for a full list). In Table 1 we provide a full listing and brief description of the studies included in our analysis (see Fig. 6 in the Appendix for a graphic illustrating the breadth of both origin countries and destination countries covered by the analysis). As Table 1 demonstrates, the present analysis covers a substantial portion of the globe in terms of countries of origin and a substantial portion of the developed nations in terms of destination countries. As our analyses rely entirely on previously published data, we were not required to obtain approval from university ethics review boards.

Statistical Methods

We conducted two random-effects meta-regressions, one for all-cause mortality and one for cardiovascular mortality. Both meta-regression models were weighted by the inverse of the effect estimate's variance, to examine the mortality

Table 1 Studies included in the analyses

Author (year)	Origin countries	Destination country	Data source	N effect estimates	Years
Albin et al. (2005) [82]	Denmark, Finland, Germany, Poland	Sweden	1970 Swedish Census	8	1970–1999
Balarajan (1991) [83]	South Africa, United States	UK	1981 UK Census	4	1981–1983
Balarajan (1996) [84]	Bangladesh, India, Pakistan, Sri Lanka	UK	1981 and 1991 UK Censuses	60	1981–1983; 1991–1992
Balarajan and Bulusu (1990) [85]	Australia, Canada, France, Germany, Italy, New Zealand, Poland, South Africa, Former Soviet Union, United States	UK	1981 UK Census	160	1981–1983
Balarajan and Raleigh (1997) [86]	Bangladesh	UK	1991 UK Census and 1988–1992 Register Data	4	1988–1992
Bodewes et al. (2019) [87]	Indonesia	Netherlands	2000 Death and Municipality Registry	4	2000–2013
Boulogne et al. (2012) [88]	Algeria, Morocco, Tunisia, Turkey	France	2006 National French Census and Inserm-CepiDc (death certificates)	26	2004–2007
Bradshaw and Frisbie (1992) [89]	Mexico	US	1980 US Census	2	1980–1985
Brodov et al. (2002) [90]	Former Soviet Union	Israel	Bezafibrate Infraction Prevention Study	3	1990–1999
Byberg et al. (2016) [91]	Afghanistan, Somalia	Denmark	Danish National Patient Registry	4	1994–2011
Das Varma (1980) [92]	Germany, Italy, Netherlands, Poland	Australia	1971 Australian Census	16	1971–1972
DeBoosere and Gadeyne (2005) [93]	France, Italy, Morocco, Netherlands, Spain, Turkey	Belgium	1991 Belgian Census	24	1991–1996
Fenelon (2013) [94]	Mexico	US	National Health Interview Survey	2	1990–2004
Fischbacher et al. (2007) [95]	China, Hong Kong	UK	2001 UK Census	4	2001–2003
Gibberd et al. (1984) [96]	Germany, Greece, Italy, Malta, Netherlands, New Zealand, Poland	Australia	1971 and 1976 Australian Censuses	28	1971–1973; 1976–1978
Hedlund et al. (2008) [97]	Finalnd	Sweden	Original data	2	1985–2005
Hermalin et al. (2009) [98]	China	Taiwan	Survey of Health and Living Status of the Elderly in Taiwan	4	1989–2003
Ho et al. (2007) [99]	Indonesia	Netherlands	1995–2000 Netherlands Census	4	1995–2000
Ikram et al. (2015) [100]	Morocco, Turkey	Denmark, France, Netherlands	MEHO Project	30	1992–2001; 1996–2006; 2005–2007
Iribarren et al. (2009) [101]	Mexico	US	Kaiser Permanente Oakland and San Francisco medical centers	2	1964–1973
Juárez et al. (2018) [10]	Finland	Sweden	Swedish Work and Mortality Data (HSIA)	4	1980–2008
King and Locke (1987) [102]	China	US	1970 US Census	4	1970–1971
Klinthall and Lindstrom (2011) [103]	Chile, Czechoslovakia, Denmark, Finland, Germany, Greece, Italy, Norway, United States	Sweden	Swedish Longitudinal Immigrant Database (SLI)	36	1980–2001
Kohls (2010) [104]	Afghanistan, Belgium, Iraq, Kazakhstan, Morocco, Thailand	Germany	German Federal Statistical Office	10	2003–2006

Table 1 (continued)

Author (year)	Origin countries	Destination country	Data source	N effect estimates	Years
Kono et al. (1987) [105]	China, Korea, United States	Japan	1975 and 1980 Japanese Censuses	18	1975–1982
Kouris-Blazos and Itsiopoulos (2014) [106]	China, Croatia, Germany, Greece, India, Italy, Lebanon, Malaysia, Netherlands, New Zealand, Philippines, Poland, South Africa, Vietnam	Australia	Australia Health (AIHW) National Mortality Database	28	2001–2001
Lariscy et al. (2015) [107]	Mexico	US	National Health Interview Survey (NHIS) Linked Mortality Files	14	1986–2006
Linton et al. (2020) [108]	Bhutan, Moldova, Myanmar, Russia, Somalia, Former Soviet Union	US	Wordwide Refugee Admissions Processing System (WRAPS)	6	2006–2006
Mackenbach et al. (2005) [109]	Afghanistan, Ghana, Iran, Iraq, Somalia, Vietnam	Netherlands	1995–2000 Netherlands Census	6	1995–2000
Makarova et al. (2016) [110]	Turkey	Germany	German Federal Health Monitoring System	2	2004–2010
Marmot et al. (1984) [111]	Italy, Poland	UK	1971 UK Census	8	1971–1972
Maxwell and Harding (1998) [112]	Ireland	UK	1991 UK Census	2	1991–1993
Mehta et al. (2016) [4]	Canada	US	Social Security and Medicare Records	2	1990–2009
Nair et al. (1990) [113]	Australia, China, Japan, United States	Canada	1971 and 1986 Canadian Censuses	28	1971–1973; 1986–1988
Nasseri (2008) [114]	Former Soviet Union	US	California Department of Health Services Death Certificate Files	2	1998–1999
Nasseri and Moulton (2011) [115]	Armenia, Israel, Turkey	US	California Department of Health Services Death Certificate Files	6	1997–2004
Norredam et al. (2012) [116]	Iraq	Denmark	Danish Immigration Services Statistics Department	7	1994–2008
Omariba et al. (2015) [117]	China, Philippines	Canada	1991 Canadian Census Cohort; Canadian Mortality Database	3	1991–2006
Omariba et al. (2014) [118]	China, India, Philippines, United Kingdom	Canada	1991 Canadian Census Cohort; Canadian Mortality Database	13	1991–2006
Palloni and Arias (2004) [5]	Cuba, Mexico	US	National Health Interview Survey	4	1989–1997
Patel et al. (2018) [119]	Russia	Finland	Statistics Finland	1	2000–2014
Raftery et al. (1990) [120]	Ireland	UK	Office of Censuses and Surveys (OPCS) Longitudinal Study (LS)	8	1971–1981
Razum et al. (1998) [121]	Turkey	Germany	Registry Data	8	1981–1994
Reus-Pons et al. (2016) [122]	France, Germany, Morocco, Netherlands, Turkey	Belgium	2001 Belgian Census	20	2001–2009
Riosmena et al. (2014) [123]	Cuba	US	National Health Interview Survey (Linked); National Death Index	1	1998–2006

Table 1 (continued)

Author (year)	Origin countries	Destination country	Data source	N effect estimates	Years
Rodriguez et al. (2017) [124]	Cuba, Mexico	US	Mortality Multiple Cause of Death Files	4	2003–2012
Ronellenfitsch et al. (2006) [125]	Former Soviet Union	Germany	Original Data	6	1990–2002
Rosenwaike (1987) [126]	Cuba, Mexico	US	1980 US Census	32	1980–1981
Rostila and Fritzell (2014) [127]	Bosnia, Denmark, Finland, Germany, Iran, Iraq, Norway, Poland, Somalia, Thailand, Turkey	Sweden	The Swedish Work and Mortality Data (HSIA); National Swedish Total Population Register	44	1997–2006
Scott and Timaeus (2013) [128]	China, Pakistan	UK	ONS Longitudinal Study (National Health Service Central Register)	2	1991–2005
Singh and Miller (2004) [129]	China, Japan, Philippines	US	1990 US Census	6	1990–1994
Singh et al. (2013) [130]	Mexico	US	Multiple sources	1	1999–2001
Stanaway et al. (2020) [131]	Italy	Australia	Concord Health and Ageing in Men Project (CHAMP)	1	2005–2015
Stellman (1996) [132]	Korea	US	New York City Department of Health, Vital Statistics Summaries	2	1989–1990
Stenhouse and McCall (1970) [133]	Italy, United Kingdom	Australia	1961 and 1966 Australian Censuses; WHO 1963	24	1961–1966
Stribu et al. (2006) [134]	Suriname	Netherlands	1995–2000 Netherlands Census	4	1995–2000
Sundquist and Johansson (1997) [135]	Finland	Sweden	Swedish Annual Level of Living Survey (SALLS)	4	1979–1993
Tarnutzer & Bopp (2012) [136]	Italy	Switzerland	Swiss National Cohort project; 1990 Swiss Census	8	1990–2008
Trovato (2003 [137]	Czechoslovakia, Germany, Greece, Hungary, Ireland, Italy, Japan, Poland, Portugal, Former Soviet Union, Sweden, United Kingdom, United States	Canada	1991 Canadian Census	27	1991–1992
Valkonen et al. (1992) [138]	Denmark, Finland, Norway, Sweden	Canada	1981 Canadian Census	16	1981–1985
Vanthomme and Vandenheede (2019) [6]	France, Italy, Morocco, Netherlands, Spain, Turkey	Belgium	2001 Belgian Census	24	2001–2008
Verropoulou and Tsimbos (2017) [139]	Albania, Armenia, Bangladesh, Bulgaria, China, Cyprus, Egypt, France, Georgia, Germany, India, Iraq, Italy, Moldova, Netherlands, Pakistan, Philippines, Poland, Romania, Russia, Serbia, Former Soviet Union, Syria, Turkey, UK, United States	Greece	2011 Greek Census	52	2011–2012
Wallace and Kulu (2014) [140]	Bangladesh, China, India, Pakistan	UK	The Office for National Statistics Longitudinal Study 1971–2001	8	1971–2001

Table 1 (continued)

Author (year)	Origin countries	Destination country	Data source	N effect estimates	Years
Wallace and Kulu (2015) [141]	Bangladesh, India, Ireland, Jamaica, Pakistan	UK	1971, 1981, 1991, 2001, 2011 UK Censuses	18	1971–2011
Wei et al. (1996) [142]	Mexico	US	San Antonio Heart Study	6	1979–1993
Westerling and Rosen (2002) [143]	Finland, Norway	Sweden	1986 Swedish Census	4	1986–1990
Wild and McKeigue (1997) [144]	Ireland	UK	1991 UK Census	6	1991–1992
Wild et al. (2007) [145]	Bangladesh, India, Ireland, Pakistan	UK	2001 UK Census	40	2001–2003
Woo (2007) [146]	Mexico	US	Health and Retirement Study; Asset and Health Dynamics among the Oldest Old; Children of the Depression Era; War Baby	2	1998–2002
Yang et al. (2010) [147]	Laos	US	California Department of Health Services Death Certificate Files; 2000 US Census	4	1998–2002
Young (1986) [148]	Argentina, Austria, Canada, Chile, China, Cyprus, Czechoslovakia, Denmark, Egypt, Fiji, Finland, France, Germany, Greece, Hong Kong, Hungary, India, Indonesia, Ireland, Israel, Italy, Japan, Lebanon, Malaysia, Malta, Mauritius, Myanmar, Netherlands, New Zealand, Papua New Guinea, Philippines, Poland, Portugal, Romania, Singapore, South Africa, Former Soviet Union, Spain, Sri Lanka, Switzerland, Turkey, United Kingdom, United States, Uruguay, Vietnam	Australia	1981 Australian Census	112	1981–1982
Zhang et al. (1984) [149]	China	Australia	1971 and 1976 Australian Censuses	4	1971–1978

of transnational immigrants relative to the mortality of destination-country populations. We performed all meta-regressions in Stata 15.0 using mixed-effects linear modeling with effects estimates clustered by study. As described in our previous work (see [66]), we used the standard errors reported in the publications to calculate the inverse variance weights. When not reported by the original study, we calculated standard errors using (1) confidence intervals, (2) *t* statistics, (3) χ^2 statistics, (4) exact *p*-values, or (5) the midpoint of the *p*-value range. The type of effect estimate varied between the studies in our sample, necessitating the conversion of odds ratios and hazard ratios into a common metric (rate ratios; abbreviated as RR from this point forward). We converted all non-RR point estimates into RRs (the most frequently-reported type).

Independent Variables and Measurements

We examined five main cultural variables in all analyses: shared language, former colony, visible minority status, migrant integration levels, and the prevalence of immigrants. First, we coded two binary variables for shared language based on the official language(s) spoken in both origin and destination countries. For one of these variables, we defined "shared language" as the presence of any overlap between their official languages. For the other, we defined "shared linguistic family" as instances where two languages are from the same language family (e.g., Spanish and Italian). We obtained data on the official language in both origin and destination countries from the Wikipedia [67] list of official languages by country and territory. Second, we coded a binary variable measuring whether the origin country was a former colony of the destination country. We retrieved information on former colony status for each country pairing from Wikipedia [68].

Third, we coded a binary variable measuring whether most immigrants from an origin country would likely be a visible minority in the destination country (acknowledging that this is an imperfect measure; coding decisions shown in Appendix Table 5). For our analysis, we define minority as a sociological category (that is, associated with power and perceived status differentials), though in virtually all cases a visible minority is also a numeric minority. Ideally, one would be able to consider whether an immigrant is a visible minority based on the resident population of the locality in which they reside (rather than based, as we do here, on the population of the country as a whole). Immigrants who reside in neighborhoods/cities with either a high degree of racial/ethnic diversity or a high number of fellow immigrants (enclave) may feel (and perhaps be) less visible as a minority. However, the exact destination of immigrants within a given country is usually obscured in the studies from which

we obtained data, necessitating the (less accurate) measurement of visible minority status at the country level.

Our coding for this variable was primarily based on subjective judgments of the predominant skin tones and facial features of the majority ethnic/racial group(s) in each of the countries we examined. We first retrieved information on race/ethnicity (from which skin tone can sometimes be determined) from the Demographics Wikipedia pages of each country (e.g., "Demographics of the United States" or "Demographics of Somalia"). For example, according to Wikipedia, more than 80% of the population of Suriname is comprised of "East Indians", "Marrons", "Creoles", and "Mixed" ethnicity individuals. In instances where skin tone was not easy to determine subjectively from race/ethnicity, we referred to the average skin tone scale provided by Hagos [69]. On this 1–36 scale, we considered an immigrant to be a member of a visible minority if the skin tone in the origin country differed by 15 or more points from the skin tone in the destination country. Therefore, we treated immigrants from Suriname to the Netherlands (more than 80% White) as belonging to a visible minority group. Similarly, we treated immigrants from the Former Soviet Union (mostly White) to Finland (also mostly White) as a non-visible minority group. In instances where there was no substantial difference in skin tone, we subjectively considered (based on our knowledge of the local populations) differences in facial features for each origin–destination pairing. For example, while the average skin tone of an individual from Japan is not substantively different from the average skin tone of a native of Denmark, facial features differ in visible ways.

For our fourth cultural variable, migrant integration index, we retrieved data from the Migrant Integration Policy Index [50]. The index calculates a 0–100 score (where higher values mean greater integration) based on 167 policy indicators (as of 2015) in 8 policy areas: labor market mobility, education, political participation, citizenship, family reunion, healthcare, permanent residency, and anti-discrimination. Finally, our fifth cultural variable was the overall prevalence of immigrants in the country of destination. While it is not a direct measure of the presence of immigrant enclaves, immigrant prevalence is correlated with enclave presence [57]. Furthermore, given the aggregate nature of our data, we could not find a more precise measure of immigrant enclaves. We documented the percentage of the destination country population that was foreign born based on the 2019 United Nations Population Division Estimates of the International Migrant Stock [70].

In addition to these cultural variables, we also included in all analyses measures for the following covariates: (1) Whether the country of origin and the country of destination share a border; (2) the distance between origin and destination countries, calculated using Google search results for air distance between the two countries; (3) the difference in

GDP per capita between the origin and the destination countries, based on World Bank data on the average inflation-adjusted GDP per capita in each country over the 40 years preceding the study baseline [71]; (4) the proportion of the sample that was male; (5) categorical measures of the mean age of the sample at baseline; (6) the number of control variables used in the study; and (7) the age of the data used in the study.

The change in economic conditions (GDP) when moving from (typically) a poorer country to (typically) a richer one is an important control because the prospect of improved economic chances is a major motivation for immigration. We calculated the difference in GDP per capita based on the averages of the 40 years prior to the study baseline in order to capture both more- and less-recent immigrants in a given country. This is a way to mitigate against the limitation presented by not having data on immigrant arrival times. The covariates for distance and shared border are also important as they help to capture the physical "ease" of moving from origin to destination. The remaining covariates capture the main sources of demographic and methodological heterogeneity among the studies in our analysis.

Results

In Table 2 we present descriptive statistics on our sample. About 30% of the mortality effect estimates in our study examined immigrants whose origin and destination countries shared an official language and for more than 40% of

Table 2 Descriptive statistics for the independent variables in the analysis by cause of death

	All-cause mortality (n = 803)		Cardiovascular Mortality (n = 289)	
	Mean (%)	Range	Mean (%)	Range
Cultural factors				
Shared official language[a]	33.1%		28.0%	
Shared linguistic family[b]	41.8%		42.6%	
Former colony[c]	34.4%		16.3%	
Visible minority[d]	40.3%		33.9%	
Migration Integration Index[e]	60.7	44–78	65.4	44–78
Immigrant prevalence (%)[f]	17.4	2–30	20.9	2–30
Covariates				
Shared border between origin/destination country	16.6%		16.6%	
Distance (in 1000s km)[g]	5.9	0.2–18.3	7.1	0.02–15.2
Change in GDP per capita (in $1000s)[h]	9.9	−33.8 to 38.0	9.1	−17.2 to 32.4
Proportion of sample that was male	0.51	0.00–1.00	0.52	0.00–1.00
Mean age of study respondents				
0 to 19	2.5%		0.0%	
20 to 44	37.2%		36.3%	
45 to 64	44.2%		56.4%	
65 and older	16.2%		7.3%	
Number of control variables used in original study	1.4	0–34	1.6	0–7
Age of the data used in original study	25.9	3–50	29.5	9–53

[a]Binary variable measuring whether the same official language is spoken in both origin and destination countries

[b]Binary variable measuring whether the countries of origin and destination share official languages than belong to the same language family

[c]Binary variable measuring whether the origin country was a former colony of the destination country

[d]Binary variable measuring whether most immigrants from an origin country would be a visible minority in the destination country

[e]From MIPEX data [150]

[f]The percentage of the destination country population that was foreign born

[g]The air distance (in km) between origin and destination countries, divided by 1000

[h]Calculated by subtracting GDP per capita in the origin country from GDP per capita in the destination country, then divided by 1000

the effect estimates the two countries shared a linguistic family. Next, 34.4% of the all-cause mortality (but only 16.3% of cardiovascular mortality) effect estimates examined immigrants from a former colony. About 40% of the all-cause mortality and 34% of cardiovascular mortality effect estimates in our study examined immigrants who likely belonged to a visible minority group. The migration integration index scores for the destination countries ranged from 44 to 78, with a mean of 60.7 for all-cause mortality effect estimates and 65.4 for cardiovascular mortality effect

Table 3 Mixed-effects meta-regression models predicting all-cause and cardiovascular mortality[1]

	All cause[a]		Cardiovascular[b]	
	Model 1	Model 2	Model 3	Model 4
Cultural factors				
Shared language[c]	1.081 (0.109)		1.361 (0.071)	
Shared linguistic family[d]		**1.100 (0.009)**		**1.433 (0.032)**
Former colony[e]	0.981 (0.772)	0.979 (0.701)	1.126 (0.635)	0.973 (0.924)
Visible minority[e]	**0.857 (0.005)**	**0.828 (0.001)**	0.856 (0.244)	0.758 (0.059)
Migrant Integration Index[f]	**1.078 (< 0.001)**	**1.082 (< 0.001)**	1.082 (0.051)	1.075 (0.075)
Immigrant prevalence[g]				
2.0–9.9%	1.118 (0.890)	1.080 (0.924)	**3.097 (0.042)**	2.316 (0.079)
10.0–14.9%	Reference	Reference	Reference	Reference
15.0–19.9%	**0.540 (0.001)**	**0.514 (< 0.001)**	**0.632 (0.009)**	**0.581 (0.003)**
20.0–24.9%	**0.326 (< 0.001)**	**0.305 (< 0.001)**	**0.405 (0.043)**	**0.398 (0.050)**
25.0–30.0%	0.613 (0.065)	**0.605 (0.046)**	**0.437 (0.010)**	**0.440 (0.011)**
Covariates				
Distance (in 1000s km)[h]	0.993 (0.076)	**0.992 (0.046)**	0.989 (0.665)	0.985 (0.547)
Shared border between origin/destination country	**1.115 (0.011)**	**1.160 (< 0.001)**	0.902 (0.564)	0.937 (0.748)
Change in GDP per capita (in $1000s)[i]	1.002 (0.306)	**1.006 (0.025)**	1.000 (0.969)	1.010 (0.092)
Sex of the sample				
Female only	Reference	Reference	Reference	Reference
Male only	1.033 (0.170)	1.033 (0.162)	0.942 (0.358)	0.943 (0.375)
Mixed sex	0.608 (0.083)	0.599 (0.078)	1.184 (0.343)	1.127 (0.482)
Mean age of study respondents				
0 to 19	**1.229 (0.008)**	**1.229 (0.008)**	Omitted	Omitted
20 to 44	Reference	Reference	Reference	Reference
45 to 64	0.777 (0.064)	0.777 (0.063)	**0.871 (< 0.001)**	**0.871 (< 0.001)**
65 and older	0.846 (0.110)	0.847 (0.111)	**0.867 (0.002)**	**0.867 (0.002)**
Number of control variables used in original study[j]	1.035 (0.203)	1.029 (0.080)	1.186 (0.582)	1.184 (0.597)
Age (in decades) of the data used in original study[k]	**1.000 (< 0.001)**	**1.000 (< 0.001)**	**1.120 (< 0.001)**	**1.107 (< 0.001)**
Constant	**0.014 (< 0.001)**	**0.011 (< 0.001)**	0.008 (0.069)	0.012 (0.097)

All models calculated using mixed effects weighted linear regression, with clusters defined by study. The numbers presented above are unstandardized coefficients (p-value in parentheses; coefficients significant at $p \leq 0.05$ in bold)

[a]n = 803 rate ratios for the analysis of all-cause mortality

[b]n = 289 for the analysis of cardiovascular mortality

[c]Binary variable measuring whether the same official language is spoken in both origin and destination countries

[d]Binary variable measuring whether the countries of origin and destination share official languages than belong to the same language family

[e]Binary variable measuring whether the origin country was a former colony of the destination country

[f]Binary variable measuring whether most immigrants from an origin country would be a visible minority in the destination country

[g]From MIPEX data[150]

[h]The percentage of the destination country population that was foreign born; modeled categorically to account for non-linearity

[i]The air distance (in km) between origin and destination countries, divided by 1000

[j]Calculated by subtracting GDP per capita in the origin country from GDP per capita in the destination country, then divided by 1000

[k]Box–Tidwell transformed in models 3 and 4 using a power of − .937939 to correct for nonlinearity

[l]Box–Tidwell transformed in models 1 and 2 using a power of 11.26994 to correct for nonlinearity

estimates. Finally, immigrants made up between 2 and 30% of the entire population of destination countries, with a mean of 17.4 for all-cause mortality effect estimates and 20.9 for cardiovascular mortality effect estimates.

In Table 3, we present the results of our robust meta-regression analyses, examining the various predictors of all-cause and cardiovascular mortality. As we show in model 1 of the table, we did not find a significant all-cause mortality difference between immigrants based on whether their origin and destination countries shared an official language. However, as shown in model 2, we found a smaller immigrant mortality advantage for those who moved between two countries with languages belonging to the same linguistic family. Figure 2 illustrates the results shown in Table 3, presenting predicted mean rate ratios for both all-cause and cardiovascular mortality. The figure shows that, for all-cause mortality, immigrants experienced a 19.58% mortality advantage when the origin and destination country languages were not from the same linguistic family, but only a 11.53% advantage when their languages were from the same linguistic family.

Similarly, Table 3 shows a significant mortality difference in relative cardiovascular mortality between those who moved between two countries with languages belonging to the same linguistic family and those who did not. Model 4 of the table and Fig. 3 show that immigrants whose origin

and destination countries' formal languages did not belong to the same linguistic family experienced a 14.3% immigrant mortality advantage. However, immigrants whose origin and destination countries' formal languages did belong to the same linguistic family had 22.8% mortality disadvantage when compared to the non-immigrant population.

Table 3 (all four models) also shows no significant association for our measure of former colony (see also Fig. 2). We did however find a significant effect for our measure of visible minority in all-cause mortality (models 1 and 2), but this effect was counterintuitive. As we illustrate in Fig. 2, immigrants who were likely to belong to a visible minority group in their country of destination had a 25.2% mortality advantage compared to the non-immigrant population, while immigrants who were not likely a visible minority had only a 9.7% immigrant mortality advantage.

Table 3 also shows a significant association between the level of migrant integration in the destination country and all-cause mortality. As we demonstrate in Fig. 4, immigrants to countries with a low level of integration enjoy a lower relative mortality rate when compared to the non-immigrant population. This relative advantage gradually decreases as integration levels increase, until it finally becomes a disadvantage for those immigrating to countries with a migrant integration index value of over 62.


Fig. 2 Culture shock: mean all-cause mortality rate ratios for immigrants vs. non-immigrants by sharing a linguistic family, coming from a former colony, and having a visible minority status
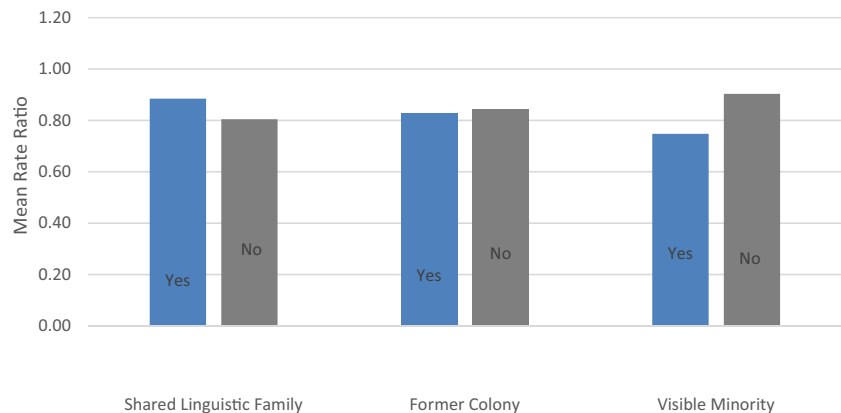
Fig. 3 Culture shock: mean cardiovascular mortality rate ratios for immigrants vs. non-immigrants by sharing a language, coming from a former colony, and having a visible minority status
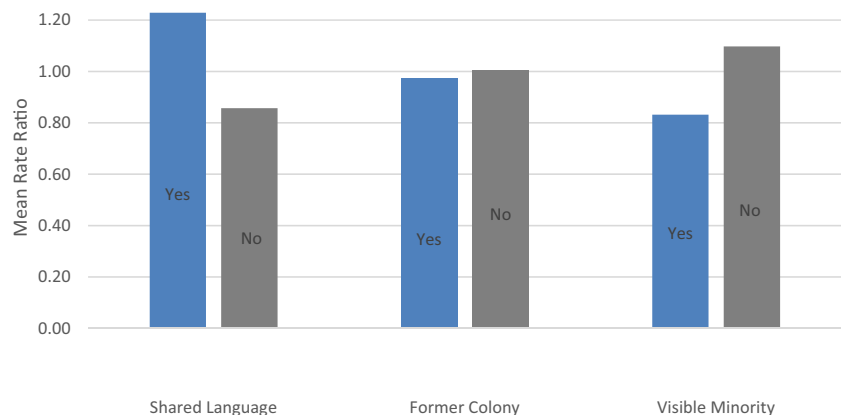
Fig. 4 Migrant integration: mean all-cause and cardiovascular mortality rate ratios for immigrants vs. nonimmigrants by level of integration of immigrants in destination country
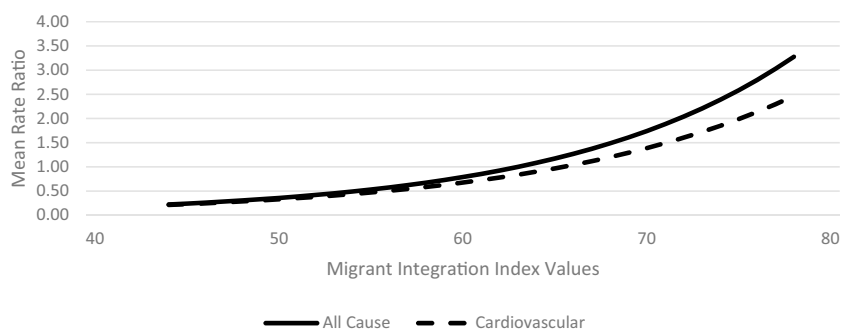
Finally, Table 3 (models 1 through 4) shows a significant non-linear association for our measurement of immigrant prevalence in a destination country. When compared to immigrants in destination countries with an immigrant population of 10%-15%, immigrants to countries with more than a 15% immigrant population enjoy a significantly higher immigrant mortality advantage (both all-cause and cardiovascular). As we show in Fig. 5, for all-cause mortality immigrants to countries with a lower prevalence of other immigrants do not have any mortality advantage, while those who immigrated to countries with a higher prevalence of other immigrants enjoy an advantage that ranges between 26.8 and 63.2%. For cardiovascular mortality we observed a similar trend. Those who immigrated to countries with a lower prevalence of other immigrants showed a significant mortality disadvantage compared to the non-immigrant population while those going to countries with more immigrants had an immigrant mortality advantage (though smaller than for all-cause mortality).

Discussion

The academic literature on international migration suggests that the ethnic and cultural characteristics of both origin country and destination country interact in determining

immigrants' integration, well-being, and health [11, 12, 38]. In the current paper, we examined the relationship between ethno-cultural factors and migrant mortality, examining data from 78 origin countries and 16 destination countries. Our results can be viewed as counterintuitive if approaches them from a stress or social isolation perspective. Lower levels of linguistic similarity between origin and destination countries was associated with an increased immigrant mortality advantage. Similarly, for all-cause mortality, immigrants who were likely perceived as a visible minority in their destination countries also had an increased immigrant mortality advantage (the results were in the same direction though not significant for cardiovascular mortality). Furthermore, less inclusive migrant integration policies in the destination country were associated with an immigrant mortality advantage. The only result that was in line with a stress approach was that the immigrant mortality advantage was only observed when the prevalence of immigrants in the destination country was relatively high. Below we point to two potential explanations for our findings.

Selection Explanations

The first explanation may be selection effects, both on the part of the destination country and on the part of immigrants themselves (self-selection). In this view,

Fig. 5 Migrant prevalence: mean all-cause and cardiovascular mortality rate ratios for immigrants vs. nonimmigrants by percentage of the population born outside the destination country
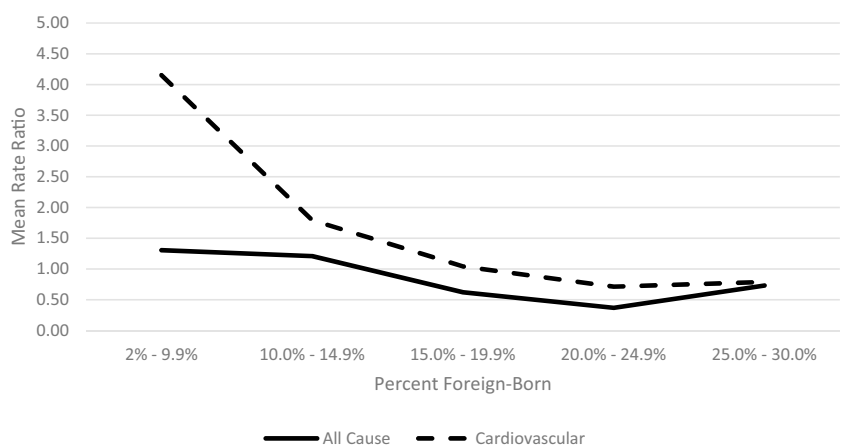
the immigrant mortality advantage is higher where (and because) immigrant selection is more likely. Many destination countries (e.g. the US, Canada, Australia, Germany, Denmark, and France) give preference during immigration and naturalization processes to immigrants who can demonstrate proficiency in the local language. These regulations often result in less-restrictive acceptance criteria for immigrants who come from countries that share the local language or a closely-related language. Consequently, the population of immigrants coming from these countries may be less carefully selected and more likely to include less-educated immigrants or immigrants who are not as healthy.

In terms of self-selection, immigrants are often aware of the difficulties they are likely to encounter in their new country in terms of language, culture, and being an ethnic/racial minority. It is therefore possible that those who choose to emigrate from countries that do not share a language or ethnicity with their destination country are a select group of immigrants who see a greater chance to succeed in this destination country. Reasons for these greater perceived success prospects may include better academic or professional training. For example, those immigrants who choose to move from Vietnam to the United States may be more likely to be better-educated and have a profession that will enhance their chances to succeed in the US.

The results of several covariates further reinforce the selection explanation. For example, we found that, for all-cause mortality, the immigrant mortality advantage increases when the distance between the origin and destination countries is higher. This finding may be the result of self-selection. Since long-distance travel is more difficult and expensive, it is likely that healthier and more well-off individuals would be more likely to immigrate in these cases. This is further illustrated by our "shared border" variable, where immigrants who traveled to a neighboring country had less of an advantage than those who moved to a more distant country. Our findings for age offer further support for selection effects. We found that immigrant children and adolescents did not have an all-cause mortality advantage over native children and adolescents. We interpret this as further support for selection effects, since children, unlike their parents and other older immigrants, are less likely to be the focus of attention when destination country authorities select potential entrants based on criteria such as current health, education, or employability. The immigrant (cardiovascular) mortality advantage increased with age, being strongest at older ages, where an immigrant's current health or skills are most likely to be carefully scrutinized.

Acculturation Explanations

A second potential explanation for the results of this study may be that immigrants who find assimilation and acculturation easier may also adapt more easily to some of the unhealthy behaviors common in wealthier destination countries. A growing body of studies has documented the gradual deterioration of immigrants' health with additional years in their destination country, eventually resulting in a loss of the migrant health advantage [7–9, 11]. One of the major potential reasons for deteriorating health over time may be changes in diet, nutrition, and health behaviors. Many studies, mostly in the US, but also in other countries, have reported a positive relationship between immigrants' duration of residence and body mass index (BMI) or obesity [72–76]. Some of these studies have further shown an association between factors that facilitate integration (including fluency in the language of the country of destination) and significantly higher BMI [77].

Along the same lines, while being part of a visible racial/ethnic minority group comes with documented negative effects for immigrants [35, 36, 38], it may also delay or even halt assimilation and acculturation processes, which are often associated with unhealthy changes in diet and health behaviors. McDonald and Kennedy [11, 78], for example, note that the extent of immigrants acculturation is likely to depend on the concentration and behaviors of people in the same geographic area who are of similar ethnic background, culture, and language. When immigrants reside in areas with high concentrations of immigrants with a similar ethnic/racial background, their acculturation is more likely to be inhibited. Consequently, McDonald and Kennedy [11] found that immigrants' convergence to native-born levels of obesity in Canada varied by the ethnicity of the immigrant, with visible minority immigrants less likely to converge. As being overweight is highly associated with poorer health and shorter longevity, it is certainly possible that these associations are at least partly responsible for our findings. Our findings for both visible minority status and the prevalence of immigrants in the destination country are generally consistent with these observations.

Limitations

The predominate limitation facing any meta-regression is that the aggregate study results used as data mask many important individual-level characteristics. For example, as we alluded to in the methods section, direct data on whether immigrants resided in an enclave were not available for our analyses because this was not reported in the

original studies. We therefore used a proxy measure (immigrant prevalence), which is less precise. The lack of direct data on where immigrants reside also limited the precision with which we could measure visible minority status and immigration distance. Similarly, we could not analyze the effect of time-since-migration, though previous research has indicated its importance (as we note in the introduction). Our choice to examine differences in the 40-year averages for GDP per capita stems from our strategy to mitigate this limitation. However, we could not calculate similar averages for many of our other variables. For example, the migrant integration index only had data from one point in time. Similarly, we could not locate data on immigrant prevalence prior to 1990, necessitating the use of single-year data in the analysis. To the extent that destination country policies have become more accommodating toward immigrants over time (and to the extent that immigrant numbers have increased over time), we might over-estimate the degree to which an immigrant felt welcomed upon their arrival if immigration occurred many years in the past. Many other variables are likewise unreported in the original studies and could not be measured by proxy using only country of origin/destination as a guide. For example, genetic racial resilience has been identified as a potential factor contributing to differences in immigrant mortality [79–81]. However, we know of no reliable data source that measures genetic resilience cross-nationally.

Another limitation common to systematic reviews such as ours is that the literature tends to contain more studies from certain nations (e.g., mainly developed ones) and less (or often none) studies from others (mainly developing nations, particularly within Africa). This is certainly the case here, especially in terms of destination countries. Still, our coverage of immigration between nations is quite broad as we show in Table 4 and Fig. 6 in the Appendix. Because of the nations included in the analysis, our results generalize most readily to immigration to more developed nations. Data is missing on immigration from much of Africa and South America and there is very little data on immigration to developing countries.

A third limitation stems from our subjective judgment of whether an immigrant from a particular origin country would be a visible minority in each specific destination country. We could not locate reliable objective measures of skin tone, facial features, and other visible markers by country, necessitating subjective judgment in the coding of this variable. As a result, the amount of measurement error for this variable is perhaps higher than for others. Still, our results indicate an association between our measure of visible minority status and all-cause mortality.

Conclusions

Overall, we believe that our findings provide greater support for the literature that emphasizes selection explanations for the immigrant mortality advantage than for the literature that focuses on stress-related and acculturation processes. Most of our variables measuring the cultural aspects of immigration provided results that would be counterintuitive from a stress perspective but are fully consistent with selection explanations. Of note, we were able to trace the likely presence of selection effects despite the fact that we only had proxy measures for such effects. Meta-analysis does not allow researchers to directly examine the effects of individual-level factors such as pre-existing health, time since migration, education, or skills. However, even without these direct measures, our findings point to the potential primacy of selection in determining the health profile of immigrants in any destination country.

The results of this study thus illustrate the need to scrutinize more closely selection mechanisms for those immigrant groups that are typically considered to have health advantages in their destination country (relative to other immigrants). To be sure, having familiarity with the language spoken in the destination country, belonging to a racial/ethnic group that is less likely to face discrimination, and going to a place that has more welcoming policies all have important economic benefits and other effects on post-immigration experiences and acculturation. However, the health advantages that stem from reduced stress or attaining a higher socioeconomic status in the destination country must not be mistaken for evidence that immigration itself leads to better health. Future research can further explore the nature of selection processes, including uncovering new selection mechanisms, as well as attempting to weigh the relative balance of self-selection and destination-country selection.

Appendix

See Tables 4 and 5 and Fig. 6.

Table 4 Origin and destination countries in the analyses

Origin countries			Destination countries
Afghanistan	Ghana	Pakistan	Australia
Albania	Greece	Papua New Guinea	Belgium
Algeria	Hong Kong	Philippines	Canada
Argentina	Hungary	Poland	Denmark
Armenia	India	Portugal	Finland
Australia	Indonesia	Romania	France
Austria	Iran	Russia	Germany
Bangladesh	Iraq	Serbia	Greece
Belgium	Ireland	Singapore	Israel
Bhutan	Israel	Somalia	Japan
Bosnia	Italy	South Africa	Netherlands
Bulgaria	Jamaica	South Korea	Sweden
Canada	Japan	Former Soviet Union	Switzerland
Chile	Kazakhstan	Spain	Taiwan
China	Laos	Sri Lanka	United Kingdom
Croatia	Lebanon	Suriname	United States
Cuba	Malaysia	Sweden	
Cyprus	Malta	Switzerland	
Czechoslovakia	Mauritius	Syria	
Denmark	Mexico	Thailand	
Egypt	Moldova	Tunisia	
Fiji	Morocco	Turkey	
Finland	Myanmar	United Kingdom	
France	Netherlands	United States	
Georgia	New Zealand	Uruguay	
Germany	Norway	Vietnam	

Table 5 Coding of visible minority status variable by origin–destination country pairings

Origin country	Destination country	Visible minority	Origin country	Destination country	Visible minority
Afghanistan	Denmark	Yes	Kazakhstan	Germany	Yes
Afghanistan	Germany	Yes	Korea, South	Japan	Yes
Afghanistan	Netherlands	Yes	Korea, South	United States	Yes
Albania	Greece	No	Laos	United States	Yes
Algeria	France	No	Lebanon	Australia	No
Argentina	Australia	No	Malaysia	Australia	Yes
Armenia	Greece	No	Malta	Australia	No
Armenia	United States	No	Mauritius	Australia	Yes
Australia	Canada	No	Mexico	United States	Yes
Australia	United Kingdom	No	Moldova	Greece	No
Austria	Australia	No	Moldova	United States	No
Bangladesh	Greece	Yes	Morocco	Belgium	Yes
Bangladesh	United Kingdom	Yes	Morocco	Denmark	Yes
Belgium	Germany	No	Morocco	France	Yes
Bhutan	United States	Yes	Morocco	Germany	Yes
Bosnia	Sweden	No	Morocco	Netherlands	Yes
Bulgaria	Greece	No	Myanmar (Burma)	Australia	Yes
Canada	Australia	No	Myanmar (Burma)	United States	Yes
Canada	United Kingdom	No	Netherlands	Australia	No
Canada	United States	No	Netherlands	Belgium	No
Chile	Australia	No	Netherlands	Greece	No
Chile	Sweden	No	New Zealand	Australia	No
China	Australia	Yes	New Zealand	United Kingdom	No
China	Canada	Yes	Norway	Canada	No
China	Greece	Yes	Norway	Sweden	No
China	Japan	Yes	Pakistan	Greece	Yes
China	Taiwan	No	Pakistan	United Kingdom	Yes
China	United Kingdom	Yes	Papua New Guinea	Australia	Yes
China	United States	Yes	Philippines	Australia	Yes
Croatia	Australia	No	Philippines	Canada	Yes
Cuba	United States	No	Philippines	Greece	Yes
Cyprus	Australia	No	Philippines	United States	Yes
Cyprus	Greece	No	Poland	Australia	No
Czechoslovakia	Australia	No	Poland	Canada	No
Czechoslovakia	Canada	No	Poland	Greece	No
Czechoslovakia	Sweden	No	Poland	Sweden	No
Denmark	Australia	No	Poland	United Kingdom	No
Denmark	Canada	No	Portugal	Australia	No
Denmark	Sweden	No	Portugal	Canada	No
Egypt	Australia	Yes	Puerto Rico	United States	Yes
Egypt	Greece	Yes	Romania	Australia	No
Fiji	Australia	Yes	Romania	Greece	No
Finland	Australia	No	Russia	Finland	No
Finland	Canada	No	Russia	Greece	No
Finland	Sweden	No	Russia	United States	No
France	Australia	No	Serbia	Greece	No
France	Belgium	No	Singapore	Australia	Yes
France	Greece	No	Somalia	Denmark	Yes

Table 5 (continued)

Origin country	Destination country	Visible minority	Origin country	Destination country	Visible minority
France	United Kingdom	No	Somalia	Netherlands	Yes
Georgia	Greece	No	Somalia	Sweden	Yes
Germany	Australia	No	Somalia	United States	Yes
Germany	Belgium	No	South Africa, Republic	Australia	No
Germany	Canada	No	South Africa, Republic	United Kingdom	No
Germany	Greece	No	Soviet Union (Former)	Australia	No
Germany	Sweden	No	Soviet Union (Former)	Canada	No
Germany	United Kingdom	No	Soviet Union (Former)	Germany	No
Ghana	Netherlands	Yes	Soviet Union (Former)	Greece	No
Greece	Australia	No	Soviet Union (Former)	Israel	No
Greece	Canada	No	Soviet Union (Former)	United Kingdom	No
Greece	Sweden	No	Soviet Union (Former)	United States	No
Hong Kong	Australia	Yes	Spain	Australia	No
Hong Kong	United Kingdom	Yes	Spain	Belgium	No
Hungary	Australia	No	Sri Lanka	Australia	Yes
Hungary	Canada	No	Sri Lanka	United Kingdom	Yes
India	Australia	Yes	Suriname	Netherlands	Yes
India	Canada	Yes	Sweden	Canada	No
India	Greece	Yes	Switzerland	Australia	No
India	United Kingdom	Yes	Syria	Greece	No
Indonesia	Australia	Yes	Thailand	Germany	Yes
Indonesia	Netherlands	Yes	Thailand	Sweden	Yes
Iran	Netherlands	No	Tunisia	France	No
Iran	Sweden	No	Turkey	Australia	Yes
Iraq	Denmark	Yes	Turkey	Belgium	Yes
Iraq	Germany	Yes	Turkey	Denmark	Yes
Iraq	Greece	Yes	Turkey	France	Yes
Iraq	Netherlands	Yes	Turkey	Germany	Yes
Iraq	Sweden	Yes	Turkey	Greece	No
Ireland, Republic	Australia	No	Turkey	Netherlands	Yes
Ireland, Republic	Canada	No	Turkey	Sweden	Yes
Ireland, Republic	United Kingdom	No	Turkey	United States	Yes
Israel	Australia	No	UK (England and Wales)	Australia	No
Israel	United States	No	UK (Scotland)	Australia	No
Italy	Australia	No	United Kingdom	Australia	No
Italy	Belgium	No	United Kingdom	Canada	No
Italy	Canada	No	United Kingdom	Greece	No
Italy	Greece	No	United States	Australia	No
Italy	Sweden	No	United States	Canada	No
Italy	Switzerland	No	United States	Greece	No
Italy	United Kingdom	No	United States	Japan	Yes
Jamaica	United Kingdom	Yes	United States	Sweden	No
Japan	Australia	Yes	United States	United Kingdom	No
Japan	Canada	Yes	Uruguay	Australia	No
Japan	United States	Yes	Vietnam	Australia	Yes
			Vietnam	Netherlands	Yes

Fig. 6 Global map of the origin and destination countries included in the analysis

References
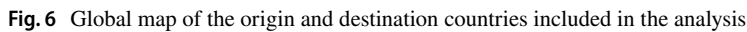
1. Aldridge RW, Nellums LB, Bartlett S, et al. Global patterns of mortality in international migrants: A systematic review and meta-analysis. Lancet. 2018;392:2553–66.

2. Khlat M, Darmon N. Is there a Mediterranean migrants mortality paradox in Europe? Int J Epidemiol. 2003;32(6):1115–8.

3. Klinthall M, Lindstrom M. Migration and health: a study of effects of early life experiences and current socio-economic situation on mortality of immigrants in Sweden. Ethn Health. 2011;16(6):601–23.

4. Mehta NK, Elo IT, Engelman M, et al. Life expectancy among U.S.-born and foreign-born older adults in the United States: estimates from linked social security and medicare data. Demography. 2016;53(4):1109–34.

5. Palloni A, Arias E. Paradox lost: explaining the hispanic adult mortality advantage. Demography. 2004;41(3):385–415.

6. Vanthomme K, Vandenheede H. Trends in Belgian cause-specific mortality by migrant origin between the 1990s and the 2000s. BMC Public Health. 2019;19:410.

7. Beiser M. The health of immigrants and refugess in Canada. Revue Canadienne de Sante Publique. 2005;96:s30–44.

8. Chiswick BR, Liang Lee Y, Miller PW. Immigrant selection systems and immigrant health. Contemp Econ Policy. 2008;26(4):555–78.

9. Hyman I. Setting the stage: reviewing current knowledge on the health of Canadian immigrants: What is the evidence and where are the gaps? Can J Public Health. 2004;95:1–8.

10. Juárez SP, Drefahl S, Dunlavy A, et al. All-cause mortality, age at arrival, and duration of residence among adult migrants in Sweden: a population-based longitudinal study. SSM Population Health. 2018;6:16–25.

11. McDonald J, Kennedy S. Is migration to Canada associated with unhealthy weight gain? Overweight and obesity among Canada's immigrants. Soc Sci Med. 2005;61(12):2469–81.

12. van Tubergen F, Kalmijn M. Destination-language proficiency in cross-national perspective: a study of immigrant groups in nine western countries. Am J Sociol. 2005;110(5):1412–57.

13. Levels M, Dronkers J. Educational performance of native immigrant children from various countries of origin. Ethn Racial Stud. 2008;31(8):1404–25.

14. Honkaniemi H, Bacchus-Hertzman J, Fritzell J, et al. Mortality by country of birth in the Nordic countries—a systematic review of the literature. BMC Public Health. 2017;17(1):511.

15. Reid J, Trompf P. *The Health of Immigrant Australia: A Social Perspective*. Australia: Harcourt Brace Jonanovich; 1990.

16. Lin V, Pearse W. A Workforce at Risk. In: Reid J, Trompf P, editors. The health of immigrant Australia: a social perspective. Australia: Harcourt Brace Jonanovich; 1990. p. 206–49.

17. Powels J, Gifford S. How healthy are Australia's immigrants? In: Reid J, Trompf P, editors. The health of immigrant Australia: a social perspective. Australia: Harcourt Brace Jonanovich; 1990.

18. Gonzales-Espada W, Ochaoa E, Vargas P. Perceptions of differential treatment from the viewpoints of attending physicians, residents and hispanic patients in Arkansas. Hispanic Health Care International. 2006;4(3):157–66.

19. Morris M, Popper S, Rodwell T, et al. Healthcare barriers of refugees post-resettlement. J Community Health. 2009;34:529–38.

20. Leclere F, Jensen L, Biddlecom A. Health care utilization, family context, and adaptation among immigrants to the United States. J Health Soc Behav. 1994;35(4):370–84.

21. Lofters A, Glazier R, Agha M, et al. Inadequacy of cervical cancer screening among urban recent immigrants: a population-based study of physician and laboratory claims in Toronto, Canada. Preventive Medicine. 2007;44(6):536–42.

22. Austin K, Power E, Solarin I, et al. Perceived barriers to flexible sigmoidoscopy screening for colorectal cancer among UK ethnic minority groups: a qualitative study. J Med Screen. 2009;16(4):174–9.

23. Matin M, LeBaron S. Attitudes toward cervical cancer screening among Muslim women: a pilot study. Women Health. 2004;39(3):63–77.

24. Kernohan E. Evaluation of a pilot study for breast and cervical cancer screening with Bradford's minority ethnic women; a community development approach, 1991–93. The British Journal of Cancer. 1996;29:S42–6.

25. Sadler G, Dhanjal S, Shah N, et al. asian indian women: knowledge, attitudes and behaviors toward breast cancer early detection. Public Health Nurs. 2001;18(5):357–63.

26. McHugh M, Challinor AE. Improving immigrants' employment prospects through work-focused language instruction. Washington, DC: Migration Policy Institute; 2011.

27. Bleakley H, Chin A. English proficiency and social assimilation among immigrants: an instrumental-variables approach. The Center for Comparative Immigration Studies 2007; Working Paper 149.

28. Dustmann C, Fabbri F. Language proficiency and labour market performance of immigrants in the UK. Econ J. 2003;113(489):695–717.

29. de Vroome T, van Tubergen F. The employment experience of refugees in the Netherlands. Int Migr Rev. 2010;44(2):376–403.

30. Mesch GS. Between spatial and social segregation among immigrants: the case of immigrants from the FSU in Israel. Int Migr Rev. 2002;36(3):912–34.

31. Roelfs DJ, Shor E, Davidson KW, et al. Losing life and livelihood: a systematic review and meta-analysis of unemployment and all-cause mortality. Soc Sci Med. 2011;72(6):840–54.

32. Shor E, Roelfs DJ. The longevity effects of religious and non-religious participation: a meta-analysis and meta-regression. J Sci Study Relig. 2013;52(1):120–45.

33. Shor E, Roelfs DJ. Social contact frequency and all-cause mortality: a meta-analysis and meta-regression. Soc Sci Med. 2015;128:76–86.

34. Ng E, Wilkins R, Gendron F, et al. Dynamics of immigrants' health in canada: evidence from the National Population Health Survey Catalogue no 82-618-MWE2005002, Statistics Canada. 2005.

35. Fiscella K, Franks P, Doescher M, et al. Disparities in health care by race, ethnicity, and language among the insured: findings from a national sample. Med Care. 2002;40(1):52–9.

36. Napoles A, Santoyo J, Houston K, et al. Patients' perceptions of cultural factors affecting the quality of their medical encounters. Health Expect. 2005;8(1):4–17.

37. Amankwah E, Ngwakongnwi E, Quan H. Why many visible minority women in Canada do not participate in cervical cancer screening. Ethn Health. 2009;14(4):337–49.

38. Crawford J, Ahmad F, Beaton D, et al. Cancer screening behaviours among South Asian immigrants in the UK, US and Canada: a scoping study. Health Soc Care Community. 2016;24(2):123–53.

39. Ahmad F, Mahmood S, Pietkiewicz I, et al. Concept mapping with South Asian immigrant women: barriers to mammography and solutions. J Immigr Minor Health. 2011;14(2):242–50.

40. Ahmad F, Cameron J, Stewart D. A tailored intervention to promote breast cancer screening among SA immigrant women. Soc Sci Med. 2005;60(3):575–86.

41. Asanin J, Wilson K. "I spent nine years looking for a doctor": exploring access to health care among immigrants in Mississauga, Ontario, Canada. Social Science & Medicine. 2008;66(6):1271–83.

42. Paradies Y. A systematic review of empirical research on self-reported racism and health. Int J Epidemiol. 2006;35(4):888–901.

43. Kelaher M, Paul S, Lambert H, et al. Discrimination and Health in an English Study. Soc Sci Med. 2008;66(7):1627–36.

44. Krieger N. Does racism harm health? Did child abuse exist before 1962? On explicit questions, critical science, and current controversies: an ecosocial perspective. Am J Public Health. 2003;93(2):194–9.

45. Williams D, Neighbors H, Jackson J. Racial/ethnic discrimination and health: findings from community studies. Am J Public Health. 2003;93(2):200–8.

46. Harris R, Tobias M, Jeffreys M, et al. Racism and health: the relationship between experience of racial discrimination and health in New Zealand. Soc Sci Med. 2006;63(6):1428–41.

47. Brondolo E, Rieppi R, Kelly K, et al. Perceived racism and blood pressure: a review of the literature and conceptual and methodological critique. Ann Behav Med. 2003;25(1):55–65.

48. Galabuzi G-E. Canada's economic apartheid: the social exclusion of racialized groups in the new century. Toronto: Canadian Scholar's Press; 2006.

49. Koopmans R, Statham P, Giugni M, et al. Contested citizenship: immigration and cultural diversity in Europe. Minneapolis: University of Minnesota Press; 2005.

50. Huddleston T, Bilgili O, Joki A-L, et al. Migrant Integration Policy Index. 2015. (http://www.mipex.eu/). Accessed.

51. Ersanilli E, Koopmans R. Do immigrant integration policies matter? A three-country comparison among Turkish immigrants. West Eur Polit. 2011;34(2):208–34.

52. Halpern D, Nazroo J. The ethnic density effect: results from a national community survey of England and Wales. Int J Soc Psychiatry. 2000;46(1):34–46.

53. Hovey JD. Religion and suicidal ideation in a sample of Latin American immigrants. Psychol Rep. 1999;85:171–7.

54. King H, Locke FB. Health effects of migration: U.S. Chinese in and outside the Chinatown. Int Migration Rev. 1987;21(3):555–76.

55. Nazroo JY. The structuring of ethnic inequalities in health: economic position, racial discrimination, and Racism. Am J Public Health. 2003;93(2):277–84.

56. Singh GK, Siahpush M. Ethnic-immigrant differentials in health behaviors, morbidity, and cause-specific mortality in the United States: an analysis of two national data bases. Hum Biol. 2002;74(1):83–109.

57. Bell B, Machin S. Immigrant enclaves and crime. J Reg Sci. 2012;53(1):118–41.

58. Waters T. Towards a theory of ethnic identity and migration: the formation of ethnic enclaves by migrant Germans in Russia and North America. Int Migr Rev. 1995;29(2):515–44.

59. Guillot M, Gavrilova N, Pudrovska T. Uderstanding the "Russion Mortality Paradox" in Central Asia: evidence from Kyrgyzstan. Demography. 2011;48:1081–104.

60. Popham F, Boyle PJ. Is there a "Scottish effect" for mortality? Prospective observational study of census linkage studies. J Public Health. 2011;33(3):453–8.

61. Shor E, Roelfs D, Vang ZM. The "Hispanic mortality paradox" revisited: meta-analysis and meta-regression of life-course differentials in Latin American and Caribbean immigrants' mortality. Soc Sci Med. 2017;186:20–33.

62. Sorlie P, Backlund E, Johnson N, et al. Mortality by hispanic status in the United States. J Am Med Assoc. 1993;270(20):2464–8.

63. Toilbert KR. Acculturation in context: gender, age at migration, neighborhood ethnicity, and health behaviors. Soc Sci Q. 2009;90(5):1145–66.

64. Gushulak B. Healthier on arrival? further insight into the "healthy immigrant effect." Can Med Assoc J. 2007;176(10):1439–40.

65. Llacer A, Aunaunegui MV, del Amo J, et al. The contribution of gender perspective to the understanding of migrants' health. J Epidemiol Community Health. 2007;61:4–10.

66. Shor E, Roelfs D, Vang Z. The, "Hispanic mortality paradox" revisited: Meta-analysis and meta-regression of life-course differentials in Latin American and Caribbean immigrants' mortality. Soc Sci Med 2017;186:20–33

67. Wikipedia. List of official languages by country and territory. Wikipedia 2018. (https://en.wikipedia.org/wiki/List_of_official_languages_by_country_and_territory). Accessed June 27, 2018.

68. Wikipedia. Category:Former colonies by continent. Wikipedia; 2020. (https://en.wikipedia.org/wiki/Category:Former_colonies_by_continent). (Accessed September 16,2020 2020).

69. Hagos J. Human Displacement Map of the World. 2008. (https://external-preview.redd.it/eMDH0irnZzzsf6Tu3y_lC7IWFjlec7I1822dY9eYrTE.jpg?auto=webp&s=573317b78eafa1ebc2ba5fe5ae26de1c3359e87f). Accessed 23 Sept 2020.

70. United Nations Population Division. International Migrant Stock 2019. United Nations; 2019. (https://www.un.org/en/development/desa/population/migration/data/estimates2/estimates19.asp). (Accessed 15 Sept 2020).

71. World Bank. GDP per capita (current US$). World Bank; 2018. (https://data.worldbank.org/indicator/NY.GDP.PCAP.CD). Accessed 27 June 27 2018.

72. Peralta da Costa L, Ferreira Dias S, Do Rosario Oliveira Martins M. Association between length of residence and overweight among adult immigrants in Portugal: a nationwide cross-sectional study. BNC Public Health. 2017;17:316.

73. Oza-Frank R, Cunningham S. The weight of US residence among immigrants: a systematic review. Obes Rev. 2009;11:271–80.

74. Redstone AI. Dietary assimilation and health among Hispanic immigrants to the United States. J Health Soc Behav. 2007;48:404–17.

75. Antecol H, Bedard K. Unhealthy assimilation: why do immigrants converge to American health status levels? Demography. 2006;43(2):337–60.

76. Kaushal N. Adversities of acculturation? Prevalence of obesity among immigrants. Health Econ. 2008;12:291–303.

77. Himmelgreen D, Perez-Escamilla R, Martinez D, et al. The longer you stay, the bigger you get: length of time and language use in the US are associated with obesity in Puerto Rican women. Am J Phys Anthropol. 2003;125(1):90–6.

78. McDonald J, Kennedy S. Insights into the 'healthy immigrant effect': health status and health service use of immigrants to Canada. Soc Sci Med. 2004;59:1613–27.

79. Abraido-Lanza A, Dohrenwend B, Ng-Mak D, Turner J. The Latino mortality paradox: a test of the "salmon bias" and healthy migrant hypotheses. Am J Public Health 1999;89(10):1543–1548

80. Ruiz J, Steffen P, Smith T. Hispanic mortality paradox: a systematic review and meta-analysis of the longitudinal literature. Am J Public Health 2013;103(3):E52–E60.

81. Voracek M, Loibl LM. Consistency of immigrant and country-of-birth suicide rates: a meta-analysis. Acta Psychiatr Scand 2008;118:259–71.

82. Albin B, Hjelm K, Ekberg J, et al. Mortality among 723 948 Foreign- and Native-born Swedes 1970–1999. Eur J Pub Health. 2005;15(5):511–7.

83. Balarajan R. Ethnic differences in mortality from ischaemic heart disease and cerebrovascular disease in England and Wales. BMJ. 1991;302(6776):560–4.

84. Balarajan R. Ethnicity and variations in mortality from coronary heart disease. Health Trends. 1996;28:45–51.

85. Balarajan R, Bulusu L. Mortality among Immigrants in England and Wales, 1979–83. In: Brittan M, editor. Mortality and geography: a review in the mid-1980's, England and Wales. London: HMSO; 1990. p. 103–21.

86. Balarajan R, Raleigh V. Patterns of mortality among Bangladeshis in England and Wales. Ethniciy and Health. 1997;2(1–2):5–12.

87. Bodewes AJ, Agyemang C, Kunst AE. All-cause mortality among three generations of Moluccans in the Netherlands. Eur J Pub Health. 2019;29(3):463–7.

88. Boulogne R, Jougla E, Breem Y, et al. Mortality differences between the foreign-born and locally-born population in France (2004–2007). Soc Sci Med. 2012;74(8):1213–23.

89. Bradshaw BS, Frisbee WP. Mortality of Mexican American and Mexican immigrants: comparisons with Mexico. In: Weeks JR, Ham-Chande R, editors. Demographic dynamics of the US-Mexico border. El Paso, TX: Western Press; 1992. p. 125–49.

90. Brodov Y, Mandelzweig L, Boyko V, et al. Is Immigration Associated with an increase in risk factors and mortality among coronary artery disease patients? A cohort study of 13,742 patients. Isr Med Assoc J. 2002;4(5):326–30.

91. Byberg S, Agyemang C, Zwisler AD, et al. Cardiovascular disease incidence and survival: are migrants always worse off? Eur J Epidemiol. 2016;31(7):667–77.

92. Das Varma G. Differential Mortality in Australia with special reference to the period 1970–1972. *Doctoral Thesis* 1980; School of Social Sciences, Australian National University, Canberra.

93. Deboosere P, Gadeyne S. Adult migrant mortality advantage in belgium: evidence using census and register data. Population. 2005;60(5–6):765–811.

94. Fenelon A. Revisiting the Hispanis mortality advantage in the United States: the role of smoking. Soc Sci Med. 2013;82:1–9.

95. Fischbacher C, Steiner M, Bhopal R, et al. Variations in all cause and cardiovascular mortality my country of birth in Scotland, 1997–2003. Scott Med J. 2007;52(4):5–10.

96. Gibberd R, Dobson A, duVe FC, et al. Differences in comparative declines in ischemic heart disease mortality among subpopulations in Australia, 1969–1978. Int J Epidemiol. 1984;13(1):25–31.

97. Hedlund E, Pehrsson K, Lange A, et al. Country of birth and survival after a first myocardial infarction in Stockholm, Sweden. Eur J Epidemiol. 2008;23(5):341–7.

98. Hermalin AI, Ofstedal MB, Sun C, et al. Nativity differentials in older age mortality in Taiwan: do they exist and why? Ren Kou Xue Kan. 2009;39:1–58.

99. Ho L, Bos V, Kunst A. Differences in cause-of-death patterns between the native Dutch and persons of Indonesian descent in the Netherlands. Am J Public Health. 2007;97(9):1616–8.

100. Ikram UZ, Malmusi D, Juel K, et al. Association between integration policies and immigrants' mortality: an explorative study across three European countries. PLoS ONE. 2015;10(6):e0129916.

101. Iribarren C, Darbinian J, Fireman B, et al. Birthplace and Mortality among insured Lations: the paradox revisited. Ethnicity & Disease. 2009;19:185–91.

102. King H, Locke FB. Health effects of migration: U.S. Chinese in and outside the Chinatown. Int Migr Rev 1987;21(3):555–76.

103. Klinthall M, Lindstrom M. Migration and health: a study of effects of early life experiences and current socio-economic situation on mortality of immigrants in Sweden. Ethn Health 2011;16(6):601–23.

104. Kohls M. Selection, social status or data artefact—What determines the mortality of migrants in Germany? In: Salzmann T, Edmonston B, Raymer J, editors. Demographic aspects of migration. Germany: Springer; 2010. p. 153–77.

105. Kono S, Isa A, Ogimoto I, et al. Cause-specific mortality among Koreans, Chinese, and Americans in Japan, 1973–1982. Int J Epidemiol. 1987;16(3):415–9.

106. Kouris-Blazos A, Itsiopoulos C. Low all-cause mortality despite high cardiovascular risk in elderly Greek-born Australians: attenuating potential of diet? Asia Pac J Clin Nutr. 2014;23(4):532–44.

107. Lariscy J, Hummer RA, Hayward M. Hispanic older adult-mortality in the United States: new estimates and an assessment of factors shaping the Hispanic paradox. Demography. 2015;52(1):1–14.

108. Linton NM, DeBolt C, Newman LP, et al. Mortality rate and causes of death among refugees resettled in Washington State, 2006–2016. J Immigr Minor Health. 2020;22(1):3–9.

109. Mackenbach JP, Bos V, Garssen MJ, et al. Mortality among non-western migrants in The Netherlands. Ned Tijdschr Geneeskd. 2005;149(17):917–23.

110. Makarova N, Brand T, Brünings-Kuppe C, et al. Comparative analysis of premature mortality among urban immigrants in Bremen, Germany: a retrospective register-based linkage study. BMJ Open. 2016;6:e0007875.

111. Marmot MG, Adelstein AM, Bulusu L. Lessons from the study of immigrant mortality. Lancet. 1984;1(8392):1455–7.

112. Maxwell R, Harding S. Mortality of migrants from outside England and Wales by marital status. Popul Trends. 1998;91(Spring):15–22.

113. Nair C, Nargundkar M, Johansen H, et al. Canadian cardiovascular disease mortality: first generation immigrants versus Canadian born. Health Rep. 1990;2(3):203–28.

114. Nasseri K. Mortality in first generation white immigrants in California, 1989–1999. J Immigr Minor Health. 2008;10(3):197–205.

115. Nasseri K, Moulton LH. Patterns of death in the first and second generation immigrants from selected Middle Eastern countries in California. J Immigr Minor Health. 2011;13(2):361–70.

116. Norredam M, Olsbjerg M, Petersen J, et al. Inequalities in mortality among refugees and immigrants compared to native Danes—a historical prospective cohort study. BMC Public Health. 2012;12:757–65.

117. Omariba D. Immigration, ethnicity, and avoidable mortality in Canada, 1991–2006`. Ethn Health. 2015;20(4):409–36.

118. Omariba D, Ng E, Vissandjee B. Differences between immigrants at various durations of residence and host population in all-cause mortality, Canada 1991–2006. Popul Stud. 2014;68(3):339–57.

119. Patel K, Kouvonen A, Koskinen A, et al. Distinctive role of income in the all-cause mortality among working age migrants and the settled population in Finland: a follow-up study from 2001 to 2014. Scandinavian Journal of Public Health. 2018;46(2):214–20.

120. Raftery J, Jones D, Rosato M. The mortality of first and second generation Irish immigrants in the U.K. *Social Science & Medicine* 1990;31(5):577–84.

121. Razum O, Zeeb H, Gerhardus A. Cardiovascular mortality of Turkish nationals residing in West Germany. Ann Epidemiol. 1998;8(5):334–41.

122. Reus-Pons M, Vandenheede H, Janssen F, et al. Differences in mortality between groups of older migrants and older non-migrants in Belgium, 2001–09. Eur J Pub Health. 2016;26(6):992–1000.

123. Riosmena F, Everett B, Rogers R, et al. Negative acculturation and nothing more? Cumulative disadvantage and mortality during the immigrant adaptation process among Latinos in the US. Int Migr Rev. 2015;49(2):443–78.

124. Rodriguez F, Hastings KG, Hu J, et al. Nativity status and cardiovascular disease mortality among hispanic adults. J Am Heart Assoc. 2017;6:7207.

125. Ronellenfitsch U, Kyobutungi C, Becher H, et al. All-cause and Cardiovascular mortality among ethnic German immigrants from the Former Soviet Union: a cohort study. BMC Public Health. 2006;6:16.

126. Rosenwaike I. Mortality differentials among persons born in Cuba, Mexico, and Puerto Rico residing in the United States, 1979–1981. Am J Public Health. 1987;77(5):603–6.

127. Rostila M, Fritzell J. Mortality differentials by immigrant groups in Sweden: the contribution of socioeconomic position. Am J Public Health. 2014;104(4):686–95.

128. Scott A, Timaeus I. Mortality differentials 1991–2005 by self-reported ethnicity: findings from the ONS Longitudinal Study. J Epidemiol Community Health. 2013;67:743–50.

129. Singh G, Miller B. Health, life expectancy, and mortality patterns among immigrant populations in the United States. Canad Rev Public Health. 2004;95(3):I14-21.

130. Singh G, Rodriguez-Lainz A, Kogan M. immigrant health inequalities in the United States: use of eight major national data systems. Sci World J. 2013. https://doi.org/10.1155/2013/512313.

131. Stanaway FF, Blyth FM, Naganathan V, et al. Mortality paradox of older Italian-born men in Australia: the concord health and ageing in men project. J Immigr Minor Health. 2020;22(1):102–9.

132. Stellman S. Proportional mortality ratios among Korean immigrants to New York City, 1986–1990. Yonsei Med J. 1996;37(1):31–7.

133. Stenhouse N, McCall M. Differential mortality from cardiovascular disease in migrants from England and Wales, Scotland and Italy, and Native-Born Australians. J Chronic Dis. 1970;23(5–6):423–32.

134. Stribu I, Kunst A, Bos V, et al. Differences in avoidable mortality between migrants the native Dutch in the Netherlands. BMC Public Health. 2006;6:78–87.

135. Sundquist J, Johansson SE. The influence of country of birth on mortality from all causes and cardiovascular disease in Sweden 1979–1993. Int J Epidemiol. 1997;26(2):279–87.

136. Tarnutzer S, Bopp M. Healthy migrants but unhealthy offspring? a retrospective cohort study among Italians in Switzerland. BMC Public Health. 2012;12:1104–11.

137. Trovato F. Migration and survival: the mortality experience of immigrants in Canada. Prairie Centre for Research on Immigration and Integration (PCRII); 2003.

138. Valkonen T, Brancker A, Reijo M. Mortality differentials between three populations—residents of Scandinavia, Scandinavian immigrants to Canada, and Canadian-born residents of Canada, 1979–1985. Health Rep. 1992;4(2):137–59.

139. Verropoulou G, Tsimbos C. Estimating mortality levels and patterns among natives, immigrants, and selected ethnic groups in Greece: 2010–2012. Int Migr Rev. 2017;51(3):600–31.

140. Wallace M, Kulu H. Low immigrant mortality in England and Wales: a data artefact. Soc Sci Med. 2014;120:100–9.

141. Wallace M, Kulu H. Mortality among immigrants in England and Wales by major causes of death, 1971–2012: a longitudinal analysis of register-based data. Soc Sci Med. 2015;147:209–21.

142. Wei M, Valdez RA, Mitchell BD, et al. Migration status, socioeconomic status, and mortality rates in Mexican Americans and Non-hispanic Whites: the San Antonio Heart Study. Ann Epidemiol. 1996;6(4):307–13.

143. Westerling R, Rosen M. "Avoidable" mortality among immigrants in Sweden. Eur J Pub Health. 2002;12(4):279–86.

144. Wild S, McKeigue P. Cross sectional analysis of mortality by country of birth in England and Wales, 1970–92. BMJ. 1997;314(7082):705–10.

145. Wild SH, Fischbacher C, Brock A, et al. Mortality from all causes and circulatory disease by country of birth in England and Wales 2001–2003. J Public Health. 2007;29(2):191–8.

146. Woo H-B. Immigrant status, health, and mortality in later life. Austin: University of Texas at Austin; 2007.

147. Yang R, Mills P, Nasseri K. Patterns of mortality in California Hmong, 1988–2002. J Immigr Minor Health. 2010;12(5):754–60.

148. Young C. Selection and Survival. Immigrant Mortality in Australia. Canberra, Australia: Australian Government Publishing Service; 1986.

149. Zhang Y, MacLennan R, Berry G. Mortality of Chinese in New South Wales, 1969–1978. Int J Epidemiol. 1984;13(2):188–92.

150. Migration Policy Group. Migrant Integration Policy Index. MIPEX; 2015. (http://www.mipex.eu/). Accessed 10 Jan 2018.