Migration and Urban Graveyards

Comparing Mortality Risks between Urban In-Migrants and Natives in a Western European Port City: The Case of Antwerp, 1846-1920

Paul Puschmann[1], Robyn Donrovich, Graziela Dekeyser & Koen Matthijs
Family and Population Studies
Centre for Sociological Research
KU Leuven, Belgium

Paper to be Presented at the XXVII IUSSP International Population Conference, Busan, Republic of Korea, 26-31 August 2013

Very preliminary results. Please do not quote without permission of the authors

[1] PhD fellow at Research Foundation Flanders (FWO).

1. The urban graveyard debate

In 1662, John Graunt concluded in the book *Natural and political observations made upon the bills of mortality* that London's seventeenth century population growth was the result of a steady influx of rural-to-urban migrants (Graunt 1662/1973). His conclusion was based on the finding that although burials had outstripped christenings, London's population was booming. In the English countryside, by contrast, natural population growth occurred, as births exceeded deaths in these areas. According to Graunt, natural population decrease in London was fully compensated by urban in-migration. Graunt's conclusions lie on the basis of the so-called *urban graveyard theory*, which states that pre-twentieth century European cities were only able to maintain their numbers and realize population growth, through the influx of country dwellers (Galley 1995; Woods 2003). As a consequence of unhealthy living conditions in cities (especially crowding, which stimulates the spread of epidemic diseases), mortality was higher and fertility was lower than in the countryside. Sir William Petty, Thomas Malthus (1798/1960) and Johann Peter Süssmilch (1775-1776) underlined the urban graveyard thesis for several other European cities and in the following centuries, no (historical) demographer really doubted the idea that pre-twentieth century urban population growth was fully dependent on the influx of rural migrants. Still in 1969, Wrigley stated in his *Population and history* that 'without a steady stream of immigrants many, perhaps most, towns before the 19th century would have lost population' (Wrigley 1969, p 136-137.)

However, in 1978, more than three centuries after its birth, Allan Sharlin turned the whole urban graveyard theory upside down, when he claimed on the basis of empirical findings for the German city of Frankfurt am Main that the migrants themselves were responsible for the observed natural population decrease in pre-twentieth century cities. According to Sharlin, 'permanent residents, consisting of natives and some migrants' were able to reproduce themselves; 'temporary migrants', by contrast, were not (Sharlin 1978, p. 127). Temporary migrants usually moved into the cities as young, single servants and journeymen. They hardly managed to marry and start a family as they were usually unable to meet the economic requirements for marriage set by the time. Consequently, temporary migrants' fertility was very low, but they contributed substantially to mortality as part of them died in the cities they entered.

Allan Sharlin's provocative thesis has led to a lively discussion on the roots of pre-twentieth century urban population growth (De Vries, 1984; Galley 1995; Woods 2003; Keyfitz 1980; Keyfitz & Phillipov 1981). With regard to mortality this debate has inspired

scholars to dig deeper into differences in mortality risks between migrants and natives. In the next section we will present theories and empirical evidence from existing studies on this topic. Next, we will argue that mortality can serve as a proxy of processes of social inclusion and exclusion among migrants. Subsequently, we present the state of the art regarding processes of social inclusion and exclusion nineteenth and early twentieth century cities. Then, we will turn to the empirical part of this paper: a comparison of adult mortality (ages 30+) among migrants and natives in the Belgian port city of Antwerp. We will carry out an event history analysis (Gompertz model) on a subsample of the Antwerp COR* database. This is one of the few historical demographic databases in the world which allows to track migrants and natives through time and space, an ideal point of departure for longitudinal historical research on mortality differences between migrants and natives.

2. Migration and mortality: theory and empirical evidence

2.1 Selection effects

Research on the mortality of migrant populations leads frequently to surprising results The so-called 'Hispanic Paradox' is a good example. Although first generations Mexican immigrants (and most other first generation immigrant groups) in the United States have a lower socioeconomic profile and are lower educated that the non-Hispanic White American population, they register lower over-all mortality risks (Markides & Eschbach 2005). Apart from the possible under-reporting of deaths among the migrant population, scholars have mainly tried to explain this counter-intuitive situation by pointing at selection effects in the migration processes. The basic two selection effects put forward in the literature are known as 'the healthy migrant effect' and the 'salmon-bias effect'(Khlat & Darmon 2003).

The *healthy migrant hypothesis* departs from the idea that migration acts as a sort of natural selection. More specifically, people who leave to a city or a foreign country are on average healthier compared to their neighbors who stay in their place of origin. People who are young and in good health are more likely to move to a foreign place in order to study, work or marry, compared to the elderly and sick. As a consequence only the healthiest people arrive in a city or country. There they enjoy lower mortality risks than the native population, even if mortality rates in the country/ place of origin are higher than at destination (Alter & Oris 2005).

With regard to nineteenth century Belgium, Michel Oris and George Alter (2001) have found strong evidence for such a healthy migrant effect. For the Ardennes village of Sart, they

observed that individuals from families which experience death among their members were less likely to leave the village. This underlines the idea that healthy people were more likely to move to a city or foreign country. The idea that stayers and leavers have different health profiles has been reported time and again in studies on contemporary societies (Wallace & Kulu 2013)

The *salmon-bias effect* suggests that low mortality among migrant populations is observed because migrants return to their country of origin, once they retire or become diseased. If migrants indeed go home before they die, their deaths do no contribute to the national death statistics in the country of destination. This would lead to a situation in which migrants become 'statistically immortal' and their death rates are artificially lowered (Abraido-Lanza, Dohrenwend, Ng-Mak & Turner 1999). Few studies find evidence for a (strong) Salmon-bias effect.

2.2 Differences in susceptibility and exposure to infectious diseases

Several studies put forward that migrants are at an increased risk of getting diseased from epidemic diseases, like smallpox. This is especially true for historical research on places where the epidemiological transition is still in it its first phase, implying that infectious diseases are still the main causes of death. Scholars have stretched that migrants might have been more susceptible to all kind of epidemic diseases, which were more frequent at destination compared to their place of origin (Alter & Oris 2005). It is usually argued that this disadvantages wanes over time, as migrants who survive one or more epidemics upon arrival might become immune to (some of) these infectious diseases.

While migrants might have lacked defenses against all kind of epidemic diseases, they might have been also more exposed to epidemic diseases, as they lived in overcrowded and unsanitary diseases. According to Sharlin (1978) this was one of the reasons why temporary migrants in Frankfurt am Main experienced higher mortality rates compared to the native population. This is also one of the main arguments of Meckel (1985), who found that immigration in Boston strongly heightened mortality during the nineteenth century. He reasons that on the one had immigration heightened population density through which epidemics could spread more rapidly; on the other hand he suggests that the influx of large numbers of immigrants went hand in hand with the import of infectious diseases into overcrowded migrant neighborhoods. The following quote is illustrative:

> *It has long been axiomatic among urban historians that the explosive, immigrant-fueled growth of mid-nineteenth-century urban populations severely strained existing housing supplies and sanitary facilities and led to overcrowding, squalor, and consequent high rates of mortality, especially among the immigrants and their children. Arriving slightly before the creation of the modern segregated city, many mid-century immigrants crowded into the urban core, attracted there by its cheap if terribly sub-standard housing and by its proximity to the sources of day labor. Packed into teaming back-alley tenements or hastily converted commercial structures, immigrants found themselves inhabiting an environment where unsanitary conditions were the rule, where disease festered and was rife, and where death held powerful sway. Little wonder, then, that historians generally regard immigration as severely traumatic to the public health of nineteenth-century American cities. For not only did the high death rates experienced by the immigrants increase the general level of mortality in the cities that they entered but the diseases which incubated in their ghettos often spread (Meckel 1985).*

The latter argument of Meckel is important, as it makes assumable to think that under certain conditions the immunity argument could be reversed, i.e migrants brought in new diseases, for which the native population lacked defenses. The most extreme example of such a situation is what happened to the native American population, after the arrival of European settlers from the end of the 15th century on: Millions native American died because they lacked immunity against diseases which were brought by European settlers (Thornton 1987).

In the nineteenth century, it can be argued that the native population from large port cities might have been at an increased risk of suffering all kind of epidemic diseases, as people from all over the world entered those cities and brought new infectious diseases with them. High mobility of traders, journeymen, and over-sea travelers increased the risk of exposure to germs (Lee & Lawton). It is for good reason that migrants who crossed the Atlantic had to go through a thorough medical check on Ellis Island before they could enter US mainland. The US public health service feared that immigrants would bring in infectious diseases, and they were of the opinion that epidemics spread easier among those groups, because of their low socio-economic profile, the fact that they clustered in unhealthy overcrowded urban areas, but also because immigrants were thought to have taken less care of

hygiene. The public health services officials thought that infectious diseases, trachoma in particular were newly imported by immigrants (Yew 1980).

2.3 Long-term positive effects for migrants

Some studies suggest that migrants experience long term positive effects if they move from low to high mortality regimes, compared to the native population in the high mortality regime. The argument goes that, because such migrants experienced on average less diseases (because they lived in a healthier environment, i.e. countryside or because they were positively selected) than the native population, they might enjoy long term positive effects, mainly in terms of longevity. Indeed the literature suggests strong links between early child conditions and later life mortality (Alter and Oris, 2005; Bengsston and Mineau, 2009; Smith et al, 2009). The so-called *life course trajectory model* proposes that early life circumstances are linked to later life outcomes through accumulated experiences during one's life course (Goldman, 2001). From this perspective, nutrition, vaccination, household composition and household resources might affect later life morbidity and mortality. For 19th century Belgium Alter & Oris (2005) found that rural migrants experienced lower post-reproductive mortality rates, even if their move to the city had taken place more than ten years earlier.

2.4 Long-term negative effects for migrants

Several studies report that the longer migrants stay at their destination, the more the positive healthy migrant effect disappears and mortality patterns between migrants and natives converge. This has been observed for first generation migrants in the United States today, but also in historical case studies. In the case of the US, researchers have shown that the acculturation of Latino migrants goes hand in hand with increased mortality risks. Acculturation turns out to be linked to a higher likelihood of massive alcohol consumption, smoking behavior and a higher body mass index (BMI) (Abraido-Lanza, Chao, Flórez 2005). Long-term negative effects for migrants have been also identified in a historical context. Kestzenbaum & Rosenthal (2010) found that rural-to-urban migrants in late 19th century France experienced lower mortality risks upon arrival in a city, which they explain in terms of the healthy migrant effect.. However, rural-to-urban migrants paid a price for moving to a city, as their health advantage faded away after having lived some years in a city. They

explain this by referring to bad living conditions in 19th century cities, and they refer especially to the bad sanitation in the urban world.

Robert Lee (1999) studied mortality differences between migrants and natives in the nineteenth-century German city of Bremen. He identified excess mortality among urban in-migrants in the age-category 24-32, while infant mortality was consequently higher among the native born population. A further analysis showed that excess mortality among young adult migrants can be ascribed to violence and accidents, as migrants died more often because of these specific causes of death. Lee's interpretation is that this specific type of excess mortality among migrants was caused by the fact that migrants ended up in the most dangerous and unhealthy jobs, especially port labor, construction and small workshops. This suggests that this specific group of migrants was badly integrated in the labor-market and in general that excess mortality, might have been a consequence of problems related to adaptation. However, migrants died less due lung diseases and infectious diseases. This is against the expectations, as migrants are believed to have lived in overcrowded and unsanitary housing conditions, which would have increased the risk of dying due to epidemic diseases. Also, surprising is the fact that migrants died less from liver disease and alcoholism. After all, the adherents of the Chicago School of sociology have stated that due to problems of adaptation, 19th century migrants were amongst other things, at an increased risk of alcoholism.

3. Mortality as an indicator of social inclusion and exclusion among migrants

In the previous review of the literature it has been several times suggested that there might have been a link between differences in mortality between natives and migrants, and the degree to which the latter group was adapted to the urban environment. Some authors suggested that bad adaptation could have led to a situation in which migrants ended up in the most crowded and unhealthiest part of the city (Meckel 1985). Moreover, in the case of rural-to-urban migrants, not having been used to live in such an environment could have increased the risk of becoming the victim of an epidemic, as those migrants might have lacked defenses against infectious diseases, i.e. they had not been exposed to it before (Alter & Oris 2005). Another argument about how adaptation could have been related to higher mortality among migrants, was provided by Lee (1999), who showed that migrants died more often because of accidents and violence. The latter argument suggests that migrants were badly integrated in the labor market. Moreover, although Lee himself is silence about this argument, higher risks

of dying because of violence, could have meant, that migrants were sometimes the victim of anti-immigrant brute force.

It seems to us that due to the healthy migrant effect, lower mortality risks among the migrant population was the normal state of affairs in nineteenth-century Western European cities, while, excess mortality among migrants was an atypical situation, which asks for explanations. We hypothesize that if excess-mortality existed among migrants, it was a consequence of problems related to the social exclusion of migrants, especially on the labor and housing market. If migrants, were marginalized in those domains of life this could have led to excess mortality among migrants. More specifically, excess mortality among migrants might have been a result of discrimination, limited societal openness (for example as a result of high competition for jobs and housing) and reduced human capital. All these factors raise inequality between natives and newcomers. It might have led to situations in which migrants had to take up more dangerous and less well-paid jobs. This increased their risk of dying from accidents, but also put themselves and their families at a higher risk of getting diseased. After all, limited economic resources could have forced migrants to dwell in over-crowded parts of cities with poor sanitation. Less financial means might also have meant that there was less food and that nutrition was of poorer quality, through which their resistance against all kind of diseases might have been lower. Limited financial means might have also reduced possibilities to heat the dwelling, through which migrants might have been at an increased risk of getting diseases related to hypothermia during winter, especially also among infants (Derosas 2009).Last, but not least, anti-immigrant sentiments might have led to violence against newcomers.

4. Social inclusion and exclusion in nineteenth-century cities

The literature on the fate of nineteenth-century urban in-migrants can roughly been divided into two parts. On the one hand there is a tradition of largely qualitative studies, dominated by scholars of the Chicago School of Sociology, which picture the social inclusion of migrants as a dramatic and complicated process (Park 1928; Park & Burghess 1925; Thomas & Znaniecki 1918; Thomas, Park & Miller 1921/1971; Wirth 1928). Robert Park (1928) depicted the migrant as a ‘marginal man’. He reasoned that migrants were torn between two worlds, or more specifically two cultural groups, which caused inner-conflict, as they no longer belonged to the one group, and not yet fully belonged to the other. Migration caused also a change of personality and a kind of permanent personal crisis:

> " There are no doubt periods of transition and crisis in the lives of most of us that are comparable with those which the immigrant experiences when he leaves home to seek his fortunes in a strange country. But in the case of the marginal man the period of crisis is relatively permanent." (Park 1928:893).

With such a picture of migrants in mind, it is not strange, that the scholars of the Chicago School of Sociology, of which Park was one of the leading and most prominent exponents, reached the conclusion that the adaptation of urban in-migrants in nineteenth and early twentieth century American cities caused a lot of trouble. Upon their arrival in a faceless urban environment, the uprooted peasants, who lacked the skills, schooling and social networks necessary to adapt and thrive in a city, found themselves in a struggle for survival and often ended up in ghetto's or poor suburbs. Their marginal position in urban society inclined them to commit crime, and to perform other forms of deviant behavior like prostitution and heavy drinking. In a nutshell, social exclusion was the rule and consequently migrants ended up at the edge of urban society. Some studies on nineteenth-century European cities suffuse the same kind of a picture on the fate of urban in-migrants. The sociological study on Dutch port city of Rotterdam, by Bouman & Bouman (1955) is good example.

On the other hand, there are more quantitative studies, which underline the selectivity of the migration process. The latter studies are inspired by the *Annales School*, and draw a rather rosy picture about the adaptation process of migrants. Good examples are William Sewell's (1985) 'Structure and Mobility' on Marseille, James Jackson's investigations on the German Ruhr area (Jackson 1982; 1997) and studies on Rotterdam by Leo Lucassen (2002; 2004). These studies and other comparable scholarly work, challenge the negative findings of the scholars of the Chicago School. They reveal that urban in-migrants were by no means marginal city dwellers. Scholars who stretch that migration was a selective process put forward that migrants were rather the best educated, most dynamic and most enterprising urban inhabitants. These urban newcomers did not move to (urban) areas where they had no friends or relatives. In fact, thanks to their social and human capital these migrants adapted relatively easily in the host city. Equally most of the urban in-migrants did not lose their social network of friends and family in the countryside. After all, a majority of rural-to-urban migrants were born in the city's direct rural hinterland. This allowed them to stay in touch with people in their home village. Moreover, geographical proximity suggested that cultural differences between the village of birth and the city of settlement might have been rather small (Sewell 1985). Also, labor market adaptation was a relatively smooth process if we may

believe these scholars. Leo Lucassen (2002) found, for example, that urban in-migrants in Rotterdam had even higher chances for social upward mobility than native urban dwellers. For Marseille, Sewell (1985) reached the conclusion that migrants made more use of new opportunities change brought about and thus enjoyed higher chances of climbing up the social ladder.

5. Research questions and hypotheses

By analyzing mortality differences between migrants and natives in Antwerp, we hope to get more insight into processes of social inclusion and exclusion. Existing studies (Lis 1969; Puschmann, Grönberg, Schumacher & Matthijs 2013) suggest, that the social inclusion of migrants in the Belgian port city was hampered to a certain degree. This is already illustrated by the high migration turnover. Many migrants left the city shortly after arrival, which suggests that it was not easy for newcomers to find a stable employment (Winter 2009; De Munck, Greefs & Winter 2010). For migrants it was also more difficult to marry and start a family, which most likely was also amongst other things related to limited employment opportunites, but also to difficulties in finding a marriage partners. Especially for international migrants it was hard to marry and start a family, which suggests that cultural barriers might have been at work. Also migrants who arrived at later ages had a harder time to get incorporated into mainstream society (Puschmann, et al. 2013). It is obvious that (certain groups of) migrants experienced inequalities in life compared to the native Antwerp population. We want to know if these inequalities, were so large that they translated themselves into inequalities in health and death. Against this background, we formulated the following research questions:

1. To what extent differed mortality risks among natives and migrants in the Antwerp metropolitan area, and how can we explain those differences?

2. To which degree did migrants experience a healthy migrant effect?

3. Did mortality difference between migrants and converge or diverge during the life course? How can we explain these trends?

4. Can we explain differences in mortality risks in terms of sex, social class, birth cohort, region of birth, age at arrival, rural/urban origin, duration of stay, etc?

5.Did certain groups of migrants experience excess, mortality. And if so, how can explain that?

We formulated the following hypotheses:

H1: Migrants were not responsible for the high death trap in 19th century urban centers, as has been suggested by Sharlin (1978). Excess mortality among natives was a normal state of affairs, because of the natural selection processes favoring the health profile of the migrant population. Accordingly, we expect to find evidence of a healthy migrant effect.

H2: We expect to find a converging trend of migrants and natives during the life course. The longer migrants stayed in the city, the longer they experienced the same negative health consequences of city life. However, a certain advantage might have persisted, because of natural selection, but also because of better early life conditions, favoring longevity.

H3: We expect men to have had higher mortality risks than women, as females experience under equal living conditions lower over-all mortality.

H4: We expect that mortality risks decreased over time for migrants and natives, along the lines of the demographic transition. Consequently, we expect the later birth cohorts to have had low mortality risks.

H5: Migrants born in the rural environment had lower mortality risks, compared to migrants who grew up in a city, because they grew up in a healthier environment.

H6: Migrants who arrived early in their life experienced higher mortality risks, because they experienced for a longer time, the negative influences of city life.

H5: The lower social classes experienced higher mortality risks than the middle and the higher classes, because of worse living and working circumstances, and because of less means to protect their health.

H6: Among the migrant population stayers experienced lower mortality risk than leavers. Among the leavers, we expect to find the most marginalized migrants. If excess mortality is found, than most likely among this group.

6. Nineteenth and early twentieth century Antwerp: The resurrection of a City

During the middle of the nineteenth century, Antwerp was recovering at in incredible speed from a rather gloomy period in its history. Until the end of the 18th century the Dutch had kept Antwerp's access to the sea closed for some two centuries, through which the international harbor activity which had once brought the city enormous wealth during the 16th century, had disappeared completely (Greefs 2008). As a consequence, Antwerp had been downgraded to a provincial town with a regional market function, with some important low-wage textile industry (Lis 1986; Winter 2009). However, by the beginning of the 19th century the textile industry had become outdated, due to a lack of investments. Consequently Antwerp missed the road towards mechanization and industrialization. In the long run this meant that Antwerp could no longer compete with other national and international textile industries, notably those of Ghent and England. As a consequence, Antwerp's textile industry vanished completely (Lis 1986). This did, however, not lead to a long term crisis. Thanks to the re-opening of the river Scheldt during the reign of Napoleon, Antwerp's port expanded quickly in the course of the nineteenth century. Already in 1840, Antwerp had grown into the twelfth most important port in the world in terms of total tonnage enterering the port (Greefs 2008:85). During the whole nineteenth century Antwerp's port kept on growing and growing. Strong competition with the Dutch port cities of Antwerp and Rotterdam started. The competition was mainly the result of the fact that both port cities shared the same coastline and that Rotterdam and Antwerp even share the same delta in the North Sea and equally served the same hinterland: the German Ruhr area, the Walloon provinces of Belgium and Northern France (Loyen, Van Driel, De Goey & Buyst 2004). Three regions which turned into industrial hot spots during the nineteenth century. Athe same time Antwerp (and Rotterdam as well) served as a main infrastructural hub between continental Europe and the Untied Kingodom and North-America. North-America was Antwerp's most important non-European trading partner. But not only cargo crossed he Atlantic Ocean via Antwerp. Hundreds of thousands of European emigrants took in Antwerp a ship to the New World. Antwerp's Red Starline connection with North-America expanded quickly between the 1870's and 1920 and handled even more passengers than the *Holland America Line* and the *Compagnie Générale Transatlatlantique* (Hoste & Loyen 2002:193).

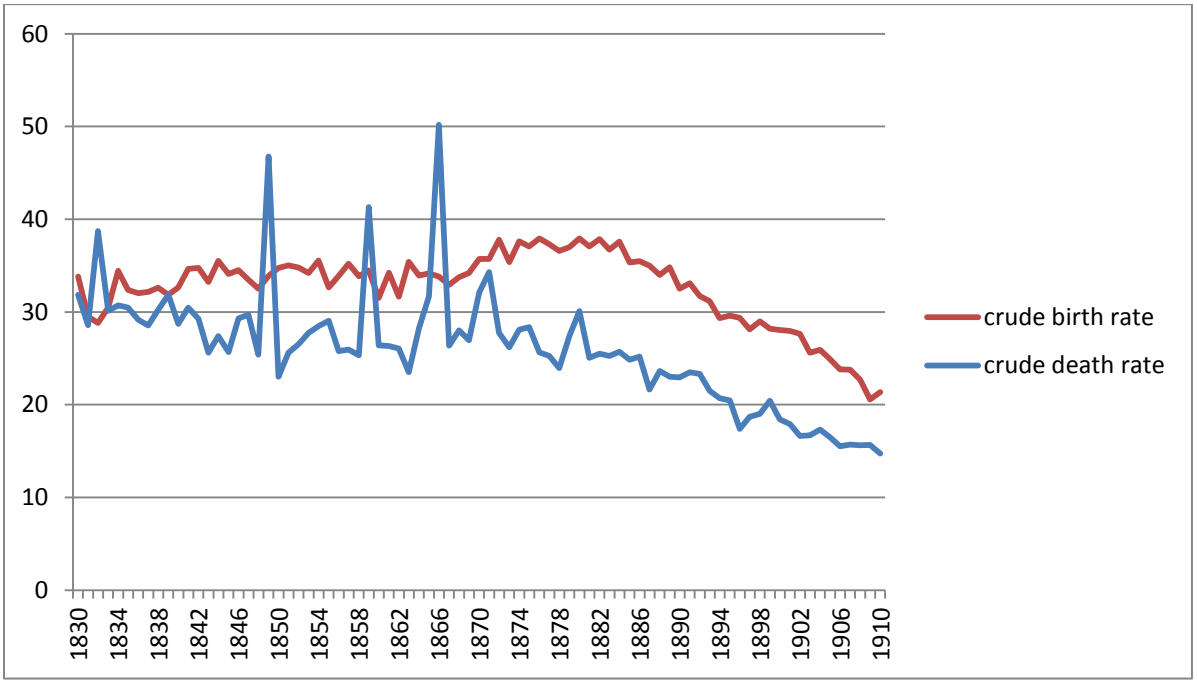
Figure 1: View of Antwerp's port, Kattendijk dock.

In the course of the nineteenth century, Antwerp became the fastest growing city of the newly founded Belgian kingdom. While the city on the Scheldt counted 55,925 inhabitants at the dawn of the nineteenth century, one hundred years later, in 1900, some 272,831 residents (excluding the suburbs) were living in the Belgian port city (Kruithof 1964:509). By this time, Antwerp had grown into the largest city of the country, pushing the capital of Brussels to the second rank. However, during the beginning of the twentieth century, Antwerp's strong population growth came gradually to an end and during the 1920's the city's population stabilized more or less. From then on Antwerp would witness population decrease, which would continue until far into the twentieth century.

Antwerp's 19th century population growth is the result of a combination of natural population growth, and urban in-migration. Natural population incline occurred as the demographic transition proceeded. Until the 1860's epidemics occurred still frequently, due to bad hygienic living conditions, high population pressure (growing housing shortage), the absence of large-scale vaccination programs and the absence of basic hygienic infrastructure in the form of water pipes and sewers (Lis 1986). Some epidemics were severe, especially the cholera outbreaks of 1832, 1848-1849, 1859 and 1866 claimed many lives (see graph 1). Moreover, measles and scarlet fever incidentally heightened child mortality (Kruithof 1964:525).

From 1866 on, large scale epidemic outbreaks became less frequent and a gradual and structural decline in mortality started. Amongst other things, the decline in epidemic outbreaks must be related to the destruction of the ramparts in the period 1860-1865 (De Brabander 1982:302). From that time on, the city's territory could expand further, through which the city became released from growing population density. Moreover, from about 1870 on more attention was paid to the importance of hygiene. In Antwerp, like in other big cities, this translated itself first and foremost in infrastructural work, namely the demolition of slums. However, unlike in other big cities, Lis (1969) claims that this was not accompanied by the construction of new workers neighbourhoods since the rent landlords asked for het new housing facilities was simply impossible to pay by the labourers. Furthermore she observed that spatial segregation increased, as the bourgeoisie managed to create its own residential neigborhoods at places where previously slums has been located. The working poor, by contrast, moved to 'ghettos', where prices were still affordable, but dwellings lacked basic facilities (Lis 1986). This might imply that there was a growing rift in health between laborers and the middle and higher classes in the course of the nineteenth century. It is nevertheless clear, that from the 1860's on there was a general improvement in the health of Antwerp's population.

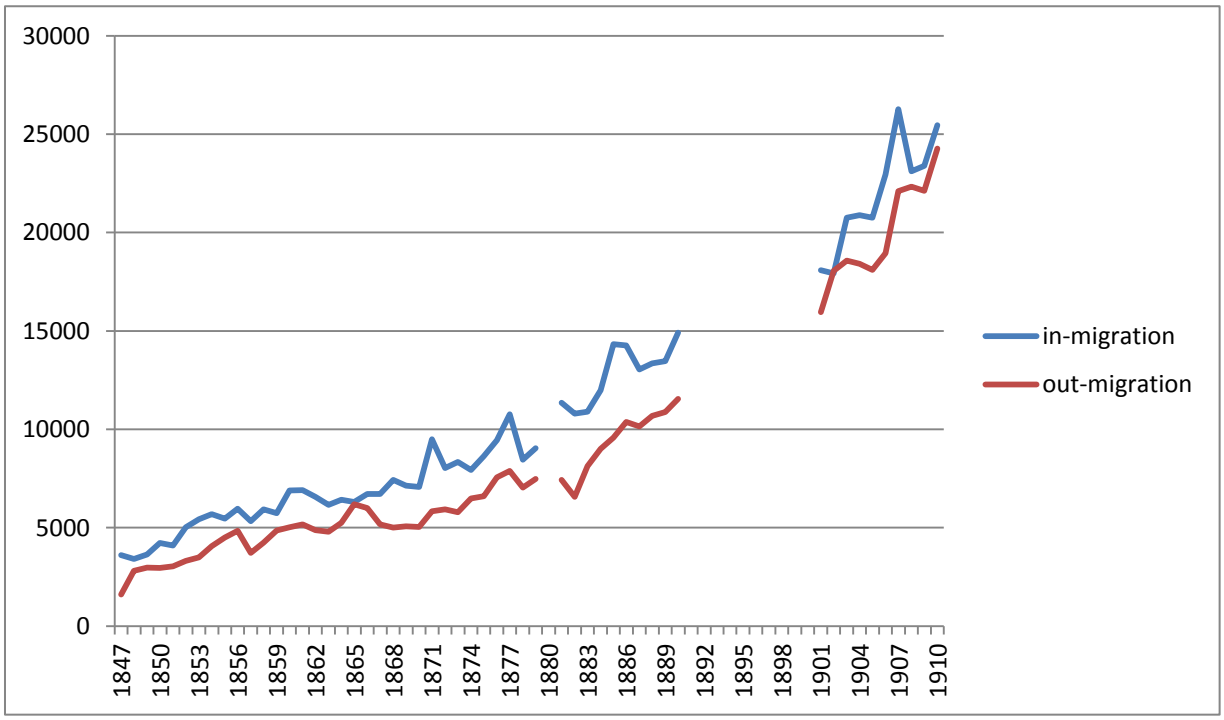
Graph 1: Crude birth and deaht rates for Antwerp,



Source: Kruithof (1964 : 539-543) & Bulletin de la Commission Centrale de Statistique 1910

Fertility was high during the first six decades of the nineteenth century and started even to rise from 1867 on. Since this rise in fertility was accompanied with a decline in mortality, strong natural population growth during the 1860's, 1870's and 1880's was the outcome. However, from 1884 on, a structural decline in fertility started which continued through the whole period of observation. However, since births continued to exceed deaths, natural population grow stayed high during the next decades. Fertility decline, in combination with declining death rates, explains to a considerably degree the ageing of Antwerp's population, which is visible in the population pyramids on page 18 (graph 4 & 5).

Graph 3: In- and out-migration in Antwerp, 1847-1910



Source: Kruithof (1964: 539-543) & Bulletin de la Commission Centrale de Statistique 1910.

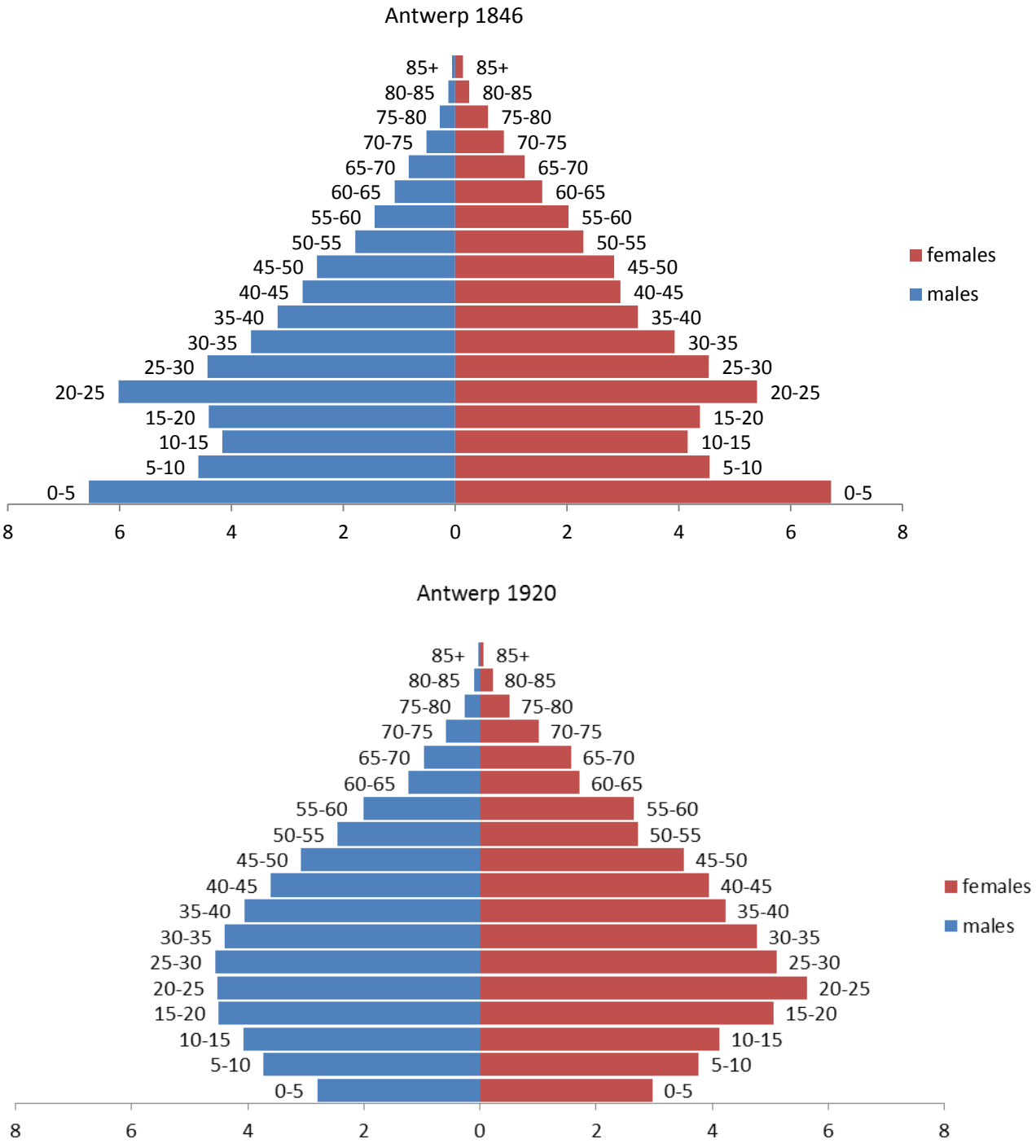
Migration - the second determinant of Antwerp's population growth – kept on growing during the nineteenth century. The largest part of the migrants still originated from the city's immediate hinterland: the province of Antwerp and most were of rural descent (Lis 1986; Winter 2009). However, in the course of the nineteenth century, the area of recruitment extended gradually. Between 1796 and 1855 the average distance between Antwerp and the birth place of the migrants increased from 61 to 133 kilometers (Winter 2009: 107). During the latter half of the nineteenth century the absolute number of international migrants increased considerably, but their share of the total population only increased from 8,9% in

1846 to 10,2% in 1900. International migrants originated mainly from the Netherlands, Germany and France. The number of Jews grew from about 5,000 in 1893 to some 20.000 at the start of WWI (De Munck, Greefs & Winter 2010: 227). The increase in Jews is highly related to the development of Antwerp's diamond industry.

When it comes to the causes of growing in-migration, we can point at several push and pull factors. During the nineteenth century, the Flemish countryside was in a state of crises. Because of demographic pressure, crops failures, and the gradual destruction of the putting out system, more and more rural dwellers left the countryside. Antwerp attracted many country dwellers, as the city's port offered more and more employment opportunities (Lis 1986; Winter 2009). However, these employment opportunities were often of a temporary nature and so was migration. Although Antwerp's population growth, is to a large degree the outcome of urban in-migration, most migrants stayed only for a limited period of time in Antwerp. Graph 3 shows indeed that out-migration followed mainly the trend of in-migration. The salient character of migration was reinforced by the fact that more and more migrants on their way to America, took a ship in Antwerp. The numbers of emigrants who took a ship in Antwerp reached a height in the 1880's, when yearly between 40,000 to 50,000 left Europe through Antwerp's port. (De Munck, Greefs & Winter 2010: 226.)

There is reason to believe that migrants ended up at the edge of urban society. According to Lis (1969), many of the rural migrants in the mid of the nineteenth century, fleeing from crises on the hinterland and attracted by the city, did not find the work they were so hoping for. Although the harbor activities were expanding and unskilled migrants got hold off them more than natives (although initially this was due to the lack of interest of natives in the new labor segment), the amount of jobs available for low skilled laborers fluctuated heavenly from day to day and employment was by no means a certainty of city life (De Munck, Greefs & Winter, 2010). Many fortune seekers were doomed to join the underclass of beggars and the homeless. But also the ones who did found work in the new harbor were not a priori protected from precarious living circumstances: long working days, low wages and temporary unemployment were the essence of the dockworkers' stories (De Munck & Van Ginderachter, 2010).

Graph 4 and 5: Population Pyramids of Antwerp, 1846 & 1920



Source: Recensement Général 1846, 1920.

6 Data and method

The data on Antwerp stems from the Anwerp COR* database. This database contains demographic (fertility, mortality, migration, marriage, etc.) and social-economic (illiteracy, occupation, place of residence, etc.) information of the life-courses of about 30.000 persons, who lived between 1846 and 1920 in the Antwerp district (Matthijs & Moreels 2010). The data is derived from both the population registers and the vital registration records (birth, marriage and death certificates). Like the French TRA*-database, the Antwerp COR* database is based on a letter sample. All those people whose last name started with the letters 'COR' were selected in the population registers and the birth, marriage and death certificates, as well as the family members, they shared a household with. After collecting all the pieces of the life course of these people, the collected data was cleaned and standardized. Subsequently the different observations were linked.

The data retrieval we conducted for this paper consists of natives and migrants who lived in the city of Antwerp and its suburbs Hoboken, Wilrijk, Berchem, Borgerhout, Deurne and Merksem. Together they form what we call the larger Antwerp metropolitan area. In the absence of information on for example nationality, we determined whether a research person was a migrant or native on the basis of his/ her birth place. This implies that the population of natives includes second and third generation migrants. Migrants are those people who were born outside of the larger Antwerp metropolitan area, but lived there at a certain period in their life-course.

For all migrants and natives we created a person period file, which included the events of the thirtieth birth day, in-migration and out-migration, marriage, divorce, becoming a widow(er) (in order to create the time-varying marital status variable), death and end-of-registration (as an artificial event). To this person period file we added the following independent variables: sex, origin (native versus migrant), birth cohort, region of birth, age at immigration (coded as 0 for natives), social class (measured around age 30) and civil status. Only the last variable was added as a time-varying covariate, the others are time-constant variables.

The social class variable is based on occupational titles. These occupational titles of research persons were coded in HISCO (Historical International Standard Classfication of Occupations. The HISCO codes were transformed into the HISCLASS (Historical International Social Class Scheme) classification system. This resulted in twelve categories,

taking into account skill degree, supervision level, and whether the occupation was manual or non-manual work. Some of these categories were merged and brought back to five somewhat hierarchical levels: 1 Professionals, 2 foremen, skilled and lower skilled workers, 3 farmers, 4 unskilled workers and day laborers and 5 unknown/ none.

While we were creating the person-period file, we encountered problems related to missing and incorrect dates for all categories of events. For missing days and months, we made use of some simple imputation techniques. If both day and month of an event were missing, we imputed July 1st representing the mid-year. In the case of a missing birth month, we imputed the month as June. If the birth day was missing we imputed the day as 15, representing the mid-months.

Another problem we had to deal with, is the fact that out-migration in the Belgian population was under-registered. In order to avoid problems related to long term survivors (people who did not die in the data, just because they had left Antwerp and consequently their deaths were not registered), we checked their last appearance in the population register and censored them with the help of variable, which identified there last appearance in the registers. This was possible, because the population registers were updated about every ten years, on the basis of the latest census.

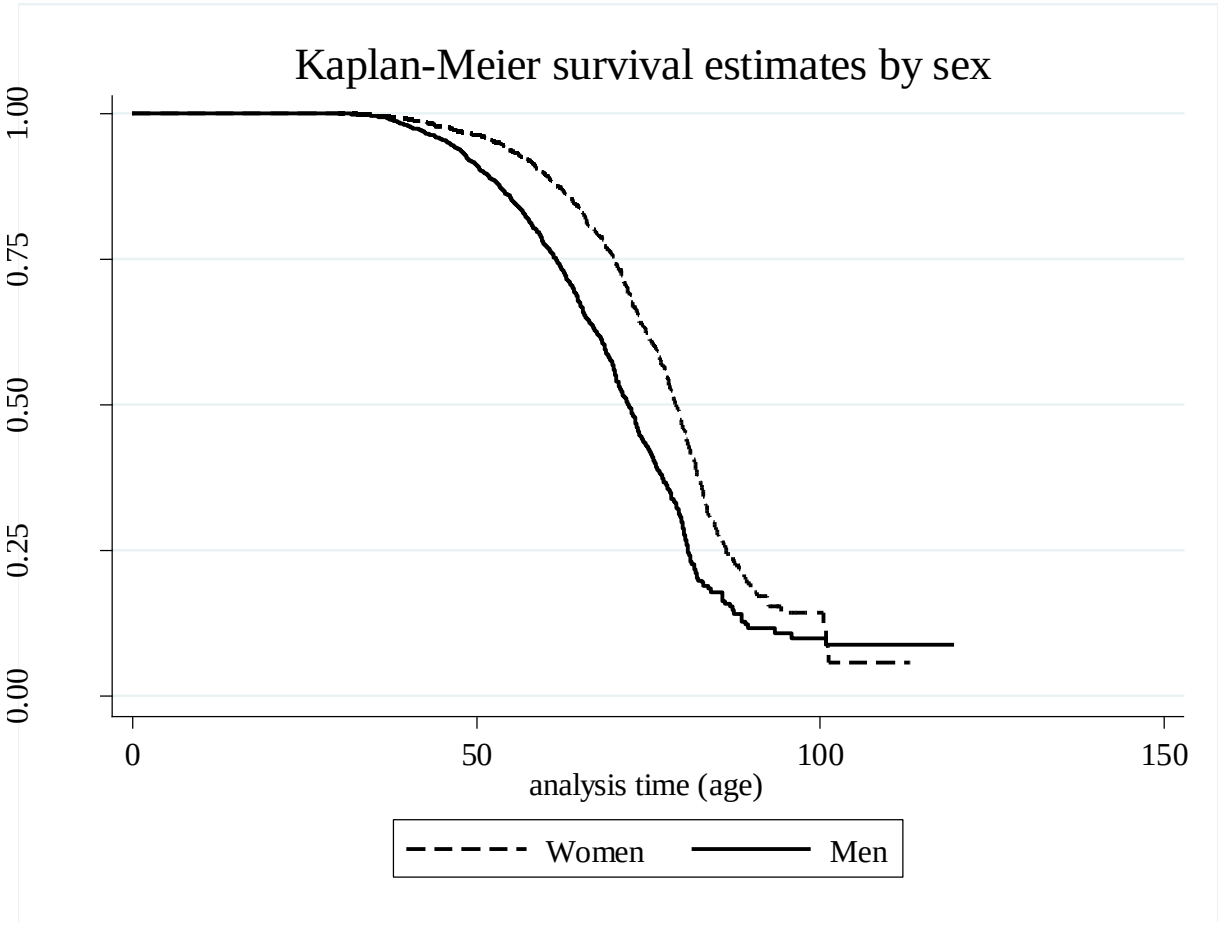
To get a first idea about the differences in mortality according to the main variables in the analysis (sex, birth cohort, region of birth, age at immigration), we make use of Kaplan-Meier Survival Curves. This is a nonparametric estimate of the probably of surviving at time *t* (Cleves et al., 2008). It is a way of getting an idea about survival chances by each individual covariate at any moment during the analysis time.

For the multivariate event history analysis, we turn, in first instance, to Gompertz proportional hazard models with baseline specified as age. Gompertz models were chosen as they fit adult mortality well, specifically for ages 30-90, and allow for either increasing or decreasing hazard rates over time (Cleves et al., 2008). Our outcome variable is death at age 30+ and an analysis of relative risks was conducted to estimate the associations between our main variables of interest and other explanatory variables. The time at risks start at the thirtieth birth day for natives and for migrants arriving in the city before the thirtieth birthday. For migrants arriving in the Antwerp metropolitan area at a later moment in the life course, the time at risks starts from the moment they arrived in the city. Censoring occurs if individual left the area of observation or at the end of registration, i.e. 1920. Death is specified as the failure event.

7 Some Preliminary Results

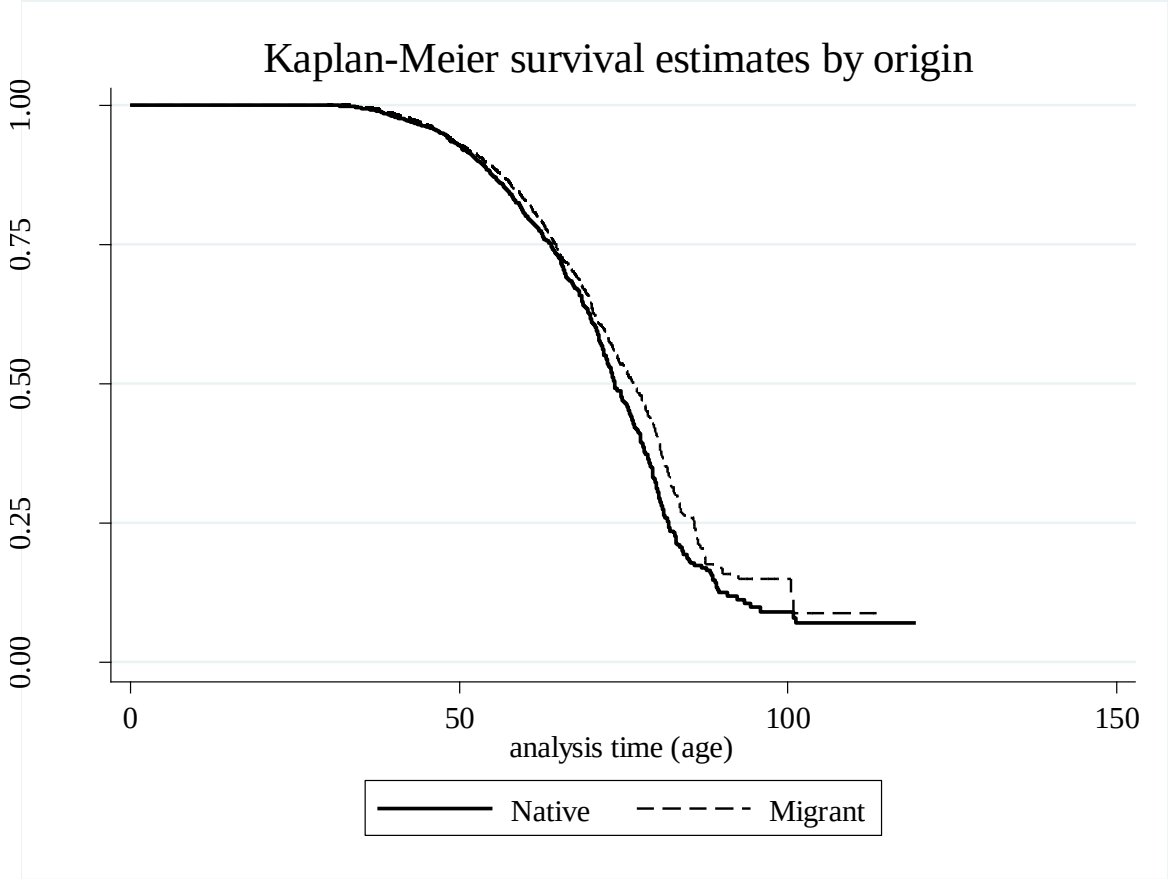
7.1 Bivariate results

The Kaplan-Meier estimates by sex show, that women had at any age, from their thirtieth birth day on, higher survival chances compared to men. This is line with our expectations, as women have always lower mortality risks, if they do not face any form of discrimination.



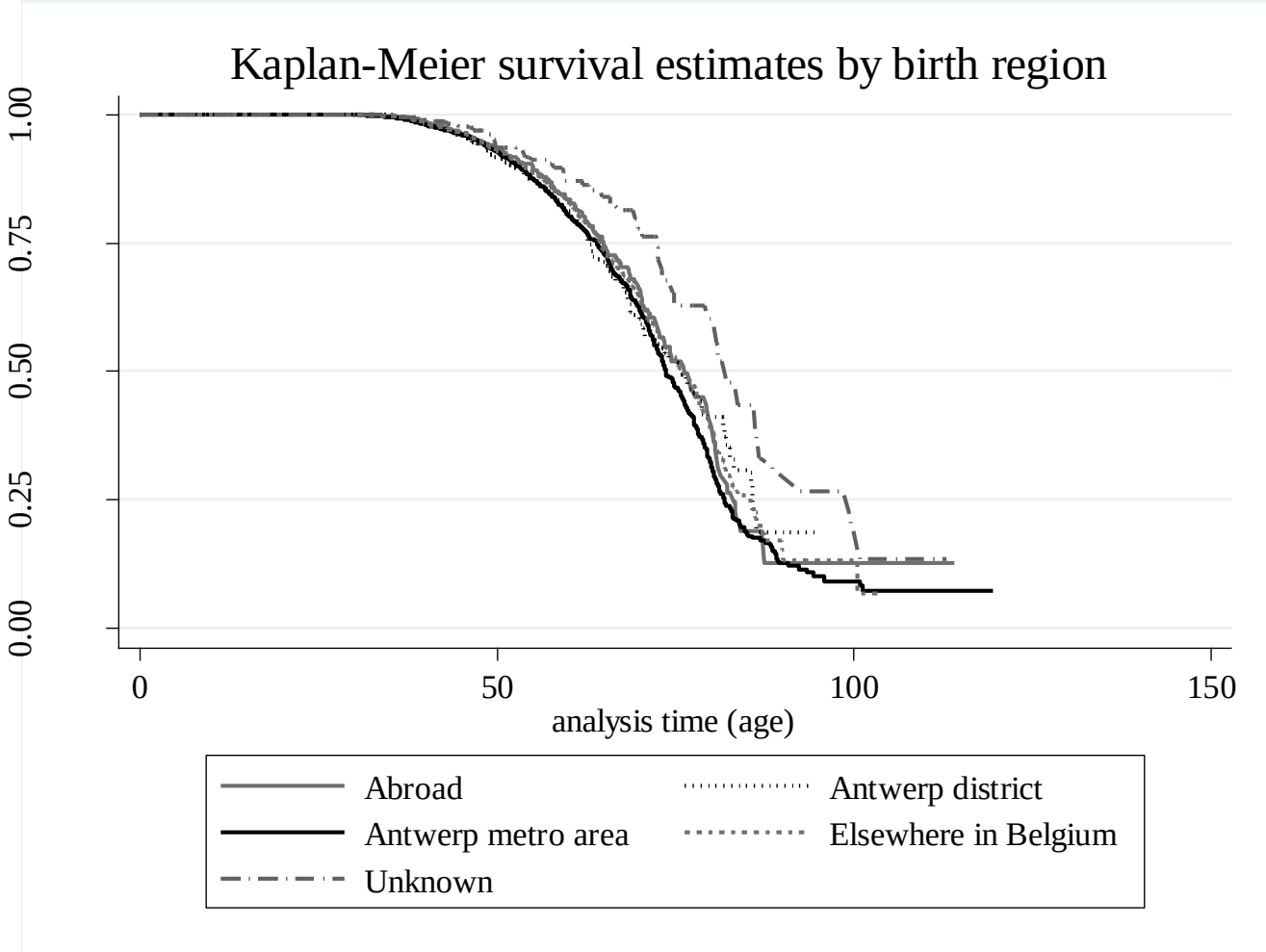
Our bivariate results concerning geographic origin are not completely in line with our expectations. The Kaplan-Meier estimates show that until about age 60 migrants and natives had comparable survival chances. From then on, migrants had lower mortality risks and from about age 70 on, there is a clear divergence observable in the survival chances of natives and migrants, favoring the latter category. This result suggests a healthy migrant effect, with long-lasting positive effects in later life, as has for example been observed by Alter & Oris (2005). However, the fact that survival chances for migrants and natives were until about age 60 highly comparable, asks for explanations. After all if, migrants were positive selected, one

would have expected also lower mortality risks for migrants in this stage of the life-course. Is the healthy migrant effect weakened before the age of 60? Is this a consequence of higher mortality risks for certain causes of death, like infectious diseases or work-related accidents, as described by Robert Lee (1999) for nineteenth century Bremen? Moreover, the Kaplan-Meier estimate contradicts the picture drawn by Kestzenbaum & Rosenthal on France. They found that the healthy migrant effect applied especially during the first years after arrival in the city, but disappeared subsequently. However, Kestzenbaum & Rosenthal focused on rural-to-urban migrants within France, while we take also urban-to-urban and international migrants into account. Moreover, our time of analysis is age, and not time since arrival.



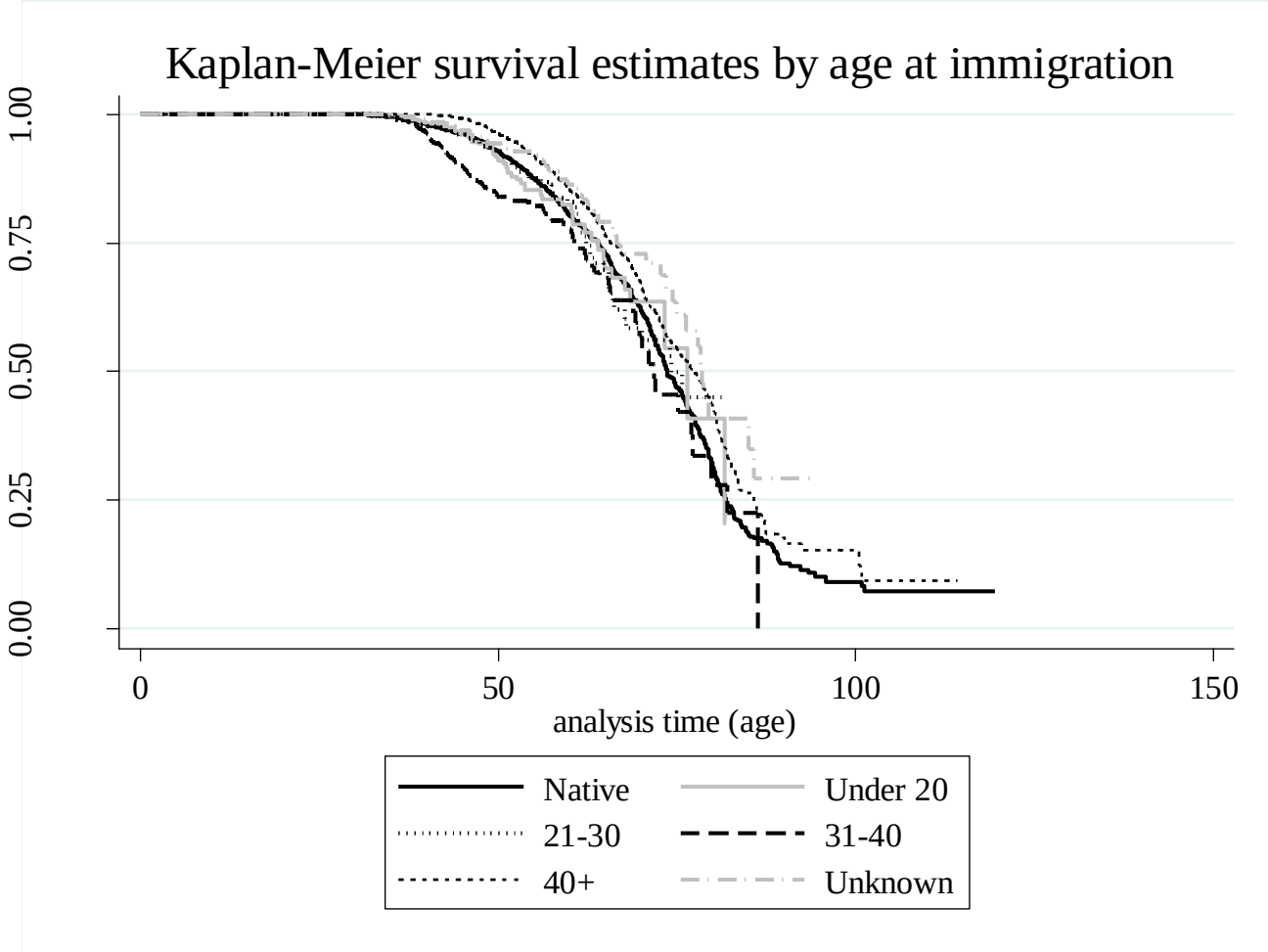
In the next graph we look at differences in survival chances according to birth region. The largest difference is formed by those who are categorized as unknown, as those migrants have from the beginning on much lower mortality risks compared to those natives born in the larger Antwerp metropolitan area. In a next stage we will have a more thorough look at those migrants. Most of them can still be ascribed to the other categories, as missing is often the result of coding issues (spelling of place-names), which can be dealt with manually. The general picture is again that migrants have considerably lower chances to die compared to

natives, pointing at the healthy migrant effect. At older ages, this is especially the case for migrants from the Antwerp district. These migrants are all of rural descent, which suggests that having grown up in the countryside, had a long-lasting positive impact on the health of individuals. It is striking, however, that this advantage did not appear at earlier ages. Even the contrary is true at certain ages. The survival curves for migrants from the Antwerp district are found somewhat below those of the natives at the ages 60 to 70. This indicates some excess mortality at those ages, which we will need to investigate further in a next step. This contradicts, however, even more the idea of a healthy migrant effect among rural migrants which fades slowly away, as described by Kestzenbaum & Rosenthal (2010).



The last Kaplan-Meier graph, we would like to discuss shows differences in survival chances according to age at arrival. This time the general picture contradicts the idea that natives had always lower mortality chances compared to migrants. There is one group of migrants, which was especially at risk. This is the group which arrived between the ages of 31-40. Until about age 80, they had persistently higher mortality risks than the native population. This was

especially pronounced at the ages between 40 and 60, meaning at working ages. This makes us believe, that this excess mortality, might have been related to social exclusion at the labor market. The fact that these persons arrived later in their life, might have made it difficult to find stable employement, and they most likely lacked city specific human capital. However, further research will be necessary to say more about the origins of the vulnerability of this specific group. Also migrants arriving between the ages 21-30 are at some ages at a higher mortality risk than natives, but this is less pronounced. Migrants arriving after age 40 and at an unknown moment in their life course (is especially the case for migrants who entered before the first population register was opened, that is to say before 1846) survival chances were considerably lower than among the native population.



7.2 Multivariate results

In table 1 the results of the event history model (Gompertz) are displayed. These multivariate results are largely in line with the bivariate results from the Kaplan-Meier. Women had significant higher survival chances compared to men. Research persons born in the period 1840-59 had significantly higher mortality hazard compared to research persons in the first

four decades of the nineteenth century. This has most likely to do with three large cholera epidemics (1848-1849; 1859; 1866), which are also visible in the forms of peaks in graph 1. The hazard rates were somewhat lower for the period 1860-1879, but the result is not significant. However, research person born between 1880 and 1890 had significantly lower mortality risks compared to people born in the first four decades of the nineteenth century. This signifies that the mortality transition was well under way.

For birth region the results are somewhat disappointing, as we have only for one category significant results, those of which we don't know their birth place. They had significantly lower hazards to die. The problem of unknown birth places (n=952), is partially a consequence of a coding issues, which we will handled later on. Partially it is caused because of the absence of any entry for birth place. Scrolling through those birth place entries (those which are now coded as unknown), learns us that most of them are migrants from other provinces in Belgium or from abroad. By handling this problem, the categories of abroad and elsewhere in Belgium, will probably turn significant. The expected effect is a lower hazard ratio for those groups of migrants, which is a result of selection effects. The longer the distance from the birthplace, the more pronounced is the healthy migrant effect.

When it comes to age at arrival, we find that those migrants who arrived between their thirty-first and fortieth birthday, had significantly higher mortality rates compared to the native population, even after having controlled for sex, birth region, socioeconomic status, birth cohort and civil status. Those migrants can thus be identified as a vulnerable group, which experienced excess mortality. Migrants arriving before their thirtieth birthday seem to have experienced higher mortality hazards, but the results are not significant. Migrants who arrived after age forty had a lower relative risk, but the result is not significant, which probably has to with the fact that this group is relatively small.

The results on civil status are rather confusing and we need to see if there did not go something wrong with the construction of the variables, especially the civil status variable. Especially the fact that married persons had higher mortality risks than singles is not very plausible at first sight.

On the basis of the occupational variable, it seems that social class had limited effect on mortality risk, as only the people of which we do not know their occupation, had a lower relative risk compared to the group of foremen, skilled, and lower skilled workers. We might have to reconsider if this is best way of categorizing this social status variable.

Table 1 - Relative mortality risks and standard errors for mortality at ages 30+ for natives and migrants in Antwerp (1846-1920)

		RR	SE
Sex	Female	1	
	Male	1.541***	[0.0843]
Birth cohort	1800-1839	1	
	1840-1859	1.686***	[0.101]
	1860-1879	0.985	[0.0946]
	1880-1890	0.329**	[0.137]
Birth region	Abroad	0.807	[0.127]
	Antwerp district	0.927	[0.139]
	Antwerp metro	1	
	Elsewhere in Belgium	0.876	[0.128]
	Unknown	0.485***	[0.0980]
Age at arrival	Age 0 (Native)	1	
	Under 20	1.454	[0.281]
	21-30	1.379	[0.251]
	31-40	2.407***	[0.386]
	40+	0.913	[0.133]
Civil status	Single	1	
	Married	1.352*	[0.163]
	Widowed	0.828	[0.121]
	Unknown	3.442***	[0.426]
Social class	Professionals	1.035	[0.200]
	Foremen, skilled, and lower skilled	1	
	Farmers	1.140	[0.310]
	Day laborers and unskilled	1.311	[0.208]
	Unknown	0.614***	[0.0784]
Observations	29441		

Exponentiated coefficients; Standard errors in brackets
* p<0.05, ** p<0.01, *** p<0.001
Source: COR data

8 Preliminary Conclusion

Our first preliminary results, indicate that there were considerable differences in mortality risks between natives and migrants, and that in terms of health and mortality the group of migrants was heterogeneous. The Kaplan-Meier estimates suggest a healthy migrant effect, which is especially pronounced at older ages. This is highly in line with finding by Alter & Oris (2005) on Eastern Belgium, but contradicts findings on rural-to-urban migrants in nineteenth-century France to a certain degree. Kestzenbaum & Rosenthal (2010) found that this specific group enjoyed especially lower mortality risks upon arrival in the city; later in the life-course, mortality risks between rural migrants and natives converged. We found rather the opposite as migrants did not enjoy lower mortality risks at early ages, but did so later in life.

The fact that at working-ages the healthy migrant effect is absent, suggests that migrants had a relatively hard time during that phase of their life-course. Otherwise, they had also enjoyed higher survival rates at the ages 30-60. Although we need to search for more evidence to make this claim, our first idea is that social exclusion at the labor market happened to a certain degree, in the sense that migrants were excluded from the healthier and less dangerous jobs. The fact that both the Kaplan-Meier estimates and the Gompertz model show that migrants who entered the larger Antwerp metropolitan area between their thirtieth and fortieth birthday had relatively higher mortality risks than the native population, makes this even more plausible. These migrants might have encountered the most problems in finding their way in the labor market, as they most likely lacked city-specific human capital. The fact that they arrived relatively made it probably more difficult to get integrated at the labor market. An alternative explanation is, that migrants were more susceptible to epidemic diseases, because they lacked defenses and/ or because they lived in the most overcrowded and unsanitary areas of the greater Antwerp area. By extending and fine-tuning the analysis, we should be able to say more about the causes of the observed mortality difference between natives and migrants on the one hand, among different groups of migrants on the other hand.

9 Further Improvement of the Paper

This paper is in every sense work in progress. The text is part of the first author's PhD. project on processes of social inclusion and exclusion of migrants in the Western European Port Cities of Antwerp, Rotterdam and Stockholm (1850-1930). In this wider project several indicators of social inclusion are used, e.g. access to marriage and reproduction, partner choice, social mobility and mortality. In this paper we presented some preliminary results on mortality differences between migrants and natives in idea. The original idea was to include also Rotterdam and Stockholm, but this turned out to be impossible within the available time-span.

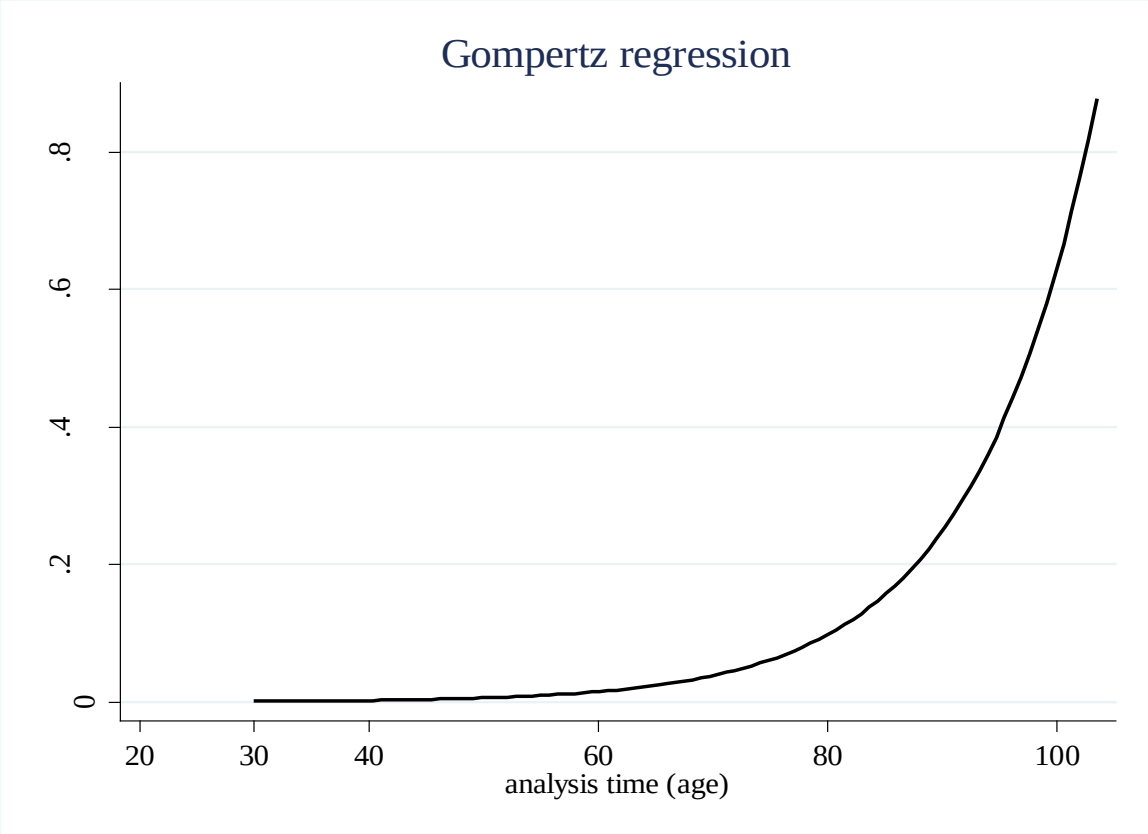
In the next step will improve the analysis on Antwerp. We will add some extra variables in order to get a better idea about the causes of the observed mortality differences. We will add a variable which distinguishes between research persons who were born in the countryside, and migrants born in an urban environment. Existing studies point time and again at the fact that especially migrants born in the countryside enjoyed a healthy migrant effect. Moreover, we will add the variable distance to birth place. We expect that the healthy migrant effect is the most pronounced among those who moved over the longest distance, as the selection effect is most likely the stronges. Weaker persons might still move over some shorter distance, but they are much less likely to move over long distances. We will also add a time-varying covariate which identifies the neighborhood in which a person lived. Since epidemic diseases occurred more often in overcrowded unsanitary neighborhoods, this seems to be an important variable. Moreover, we will add variables, which give us information about the composition of the family. Whether persons lived with or without family in the city might have had a considerable impact on their health and wellbeing, in terms of social assistance and care.

We will also try several interaction effects. The main aim is to identify all those migrants group who experienced excess mortality. Next, we will try to find out why they were more vulnerable than natives and other migrant groups.

Once all the variables are included and the analysis is fine-tuned, we will add a table with descriptive statistics to the paper.

We will do a comparable analysis for Rotterdam and Antwerp and compare the results. Most likely there are also some important inter-city differences, which ask for explanations. We hope to be able to present the whole project at this year's SSHA conference in Chicago.

Appendix


Gompertz regression
0
.2
.4
.6
.8
20
30
40
60
80
100
analysis time (age)

Bibliography

Abraído-Lanza, A., Dohrenwend, B., Ng-Mak, D. & Turner, J. (1999). The Latino Mortality Paradox: A Test of the "Salmon-Bias" and healthy migrant hypotheses. *American Journal of Public Health* 89(10), 1543-1548.

Alter, G. & Oris, M. (2005). Childhood conditions, migration, and mortality: Migrants and natives in 19th-century cities. *Biodemography and Social Biology* 52(3-4), 178-191.

Bengtsson T & Mineau G. (2009). Early-life effects on socio-economic performance and mortality in later life: A full life-course approach using contemporary and historical sources. Social Science & Medicine 68, 1561–1564.

Bouman, P. & Bouman, W. (1955). De groei van de grote werkstad: een studie over de bevolking van Rotterdam. Assen: Van Gorcum.

De Brabander, G (1986)' Een expansie vol conflicten' in : K. Van Isacker & R. Van Uyten (Eds.) *Twaalf eeuwen geschiedenis en cultuur* (Pp298-313). Antwerp: Mercatorfonds.

Derosas, R. (2009). The Joint Effect of Maternal Malnutrition and Cold Weather on Neonatal Mortality in Nineteenth-Century Venice: An Assessment of the Hypothermia Hypothesis. *Population Studies* 63(3), 233-251.

De Vries, J. (1984). *European Urbanization, 1500-1800.* London: Routledge.

Galley, C. (1995). 'A model of early modern urban demography', *Economic History Review* 48:3, 448-469.

Goldman, N. (2001). Social inequalities in health: disentangling the underlying mechanisms. Annals of the New York Academy of Sciences 954, 118-139.

Graunt, J. (1662/1973). 'Natural and Political Observations and Conclusions made upon the Bills of Mortality.' In: P. Laslett (Edt.) *The Earliest Classiscs: John Graunt and Gregory King*. Westmead: Gregg International.

Greefs, H. (2008). Exploiting International Webs of Relations: Immigrants and the Reopening of the Harbour of Antwerp on the Eve of the Nineteenth Century: In: A. Jarvis & R. Lee (Edt.) *Trade, Migration and Urban Networks in Port Cities, c1640-1940.* St. John's: International Maritime Economic History Association.

Hoste, S. & Loyen, R. (2002) '"Sauvon Anvers!" De Maritieme toegangsweg van de haven van Antwerpen vanuit bedrijfshisotrisch perspectief (1870-1940)', *NEHA Jaarboek*, 169-200.

Jackson, J. (1982). Migration in Duisburg, 1867-1890: Occupational and Fimilial Contexts. *Journal of Urban History* 8, 235-270.

Jackson, J. (1997). Migration and Urbanization in the Ruhr Valley 1821-1914. Boston: Humanities Press.

Kestzenbaum, L. & Rosenthal, J. (2010). The Health Cost of Living in a City: The case of France at the End of the 19th Century. *Explorations in Economic History* 48(2), 207-225.

Keyfitz, N. (1980). 'Do Cities Grow by Natural Increase or by Migration?', *Geographical Analysis* 12:2, 287-299.

Keyfitz, N & Phillipov (1981). 'Migration and Natural Increase in Early Modern Cities', *Geographical Analysis* 13:4, 287-299.

Khlat, M. & Darmon, N. (2003). Is there a Mediterranean Migrants Mortality Paradox in Europe? *International Journal of Epdimiology* 32(6), 1115-1118.

Kruithof, J. (1964). 'De Demografische ontwikkeling in de XIXde eeuw'. In: Genootschap voor Antwerpse Geschiedenis, *Bouwstoffen voor de geschiedenis van Antwerpen in de XIXde eeuw* (Pp. 508-543). Antwerp: Anversois.

Lee, R. (1999). 'Urban Labor-Markets, In-Migration, and Demographic Growth: Bremen 1815-1914', *Journal of Interdisciplinary History* 30:3, 437-473.

Lis, C. (1969). Woontoestanden en gangsaneringen te Antwerpen in het midden der 19de eew als maat der klassentegenstellingen. *Belgisch Tijdschrift voor Nieuwste Geschiedenis* 1, 93-131.

Lis, C. (1986). Social Change and the Labouring Poor: Antwerp 1770-1860. New Haven: Yale University Press.

Loyen, R., Van Driel, H., De Goey, F. & Buyst, E. (2004). 'Comparing the ports of Rotterdam and Antwerp: an Introduction', in: F. de Goey (Ed.). Comparative Port History of Rotterdam and Antwerp (1880). Competition, Cargo and Costs. Amsterdam: Aksant

Lucassen, L. (2004). 'De selectiviteit van blijvers. Een reconstructie van de sociale positie van Duitse migranten in Rotterdam (1870-1885)', Tijdschrift voor sociale en economische geschiedenis 1(2), 92-115.

Lucassen, L. (2004). 'De selectiviteit van blijvers. Een reconstructie van de sociale positie van Duitse migranten in Rotterdam (1870-1885)', *Tijdschrift voor sociale en economische geschiedenis* 1(2), 92-115.

Malthus, Th.R. (1798/1960). *An Essay on the Principle of Population, As It Affects the Future Improvement of Society.* New York: Random House.

Markides, K. & Eschbach, K. (2005). Aging, Migration, and Mortality: Current Status of Research on the Hispanic Paradox. *The Journals of Gerontology: Series B* 60 (2), S68-S75.

Matthijs, K & Moreels, S (2010). *The Antwerp COR*-database: A unique Flemish source for Historical-demographic research* 15(1), 109-115.

Meckel, R. (1985). Immigration, Mortality and Population Growth in Boston, 1840-1880. *Journal of Interdisciplinary History* 15(3), 391-417.

Oris, M. & Alter, G. (2001). Paths to the City and Roads to Death. Mortality and Migration in East-Beldium during the Industrial Revolution. *BTNG|RHBC* 31(3-4), 453-495.

Park, R. (1928). 'Human Migration and the Marginal Man', The American Journal of Soicology 33(6), 881-893.

Park, R. & Burgess, E. (1925). The City. Chicago: Chicago University Press.

Puschmann, P., Grönberg, P., Schumacher, R., & Matthijs, K. (2013). Access to Marriage and Reproduction among Migrants in Antwerp and Stockholm. *The History of the Family DOI: 10.1080/1081602X.2013.796889.*

Sewell, W. (1985). Structure and Mobility: the men and women of Marseille, 1820-1870. Cambridge: Cambridge University Press.

Sharlin, A. (1978).'Natural Decrease in Early Modern Cities', *Past & Present* 79, 126-138.

Süssmilch, J. P. (1775-1776/2008). *Die Göttliche Ordnung in den Veränderungen des menschlichen Geschlechts, aus der Geburt, dem Tode und der Fortpflanzung desselben erwiesen.* Hildesheim: Olms.

Thomas, W. Park, R. & Miller, H. (1921/ 1971). *Old World Traits transplanted.* Chicago: Chicago University Press.

Thomas & Znaniecki (1918). *The Polish Peasant in Europe and America.* Chicago: Chicago University Press.

Thornton, R. (1987). *American Indian Holocaust and Survival: A Population History since 1492.* Norman: University of Oklahoma Press.

Wallace, M. & Kulu, H. (2013). Migration and Health in England and Scotland: A Study of Migrant Selectivity and Salmon Bias. *Population, Space and Place.* doi: 10.1002/psp.1804.
Woods, R. (2003). 'Cities, Demographic History of'. In: P. Demeny & G. McNicoll (Eds.). *Encyclopedia of Population.* New York: Macmillan Reference USA.

Winter, A. (2009). *Migrants and Urban Change: Newcomers to Antwerp, 1760-1860.* London: Pickering & Chatto.

Wirth, L. (1928) The Ghetto. Chicago: Chicago University Press

Wrigley, E.A. (1969). *Population and History*. London: Weidenfeld and Nicoloson.

Yew, E. (1980). Medical Inspection of Immigrants at Ellis Island, 1891-1924. *Bull. N.Y. Acad. Med.* 56(5), 488-510.