

# Long-distance Migration and Mortality in Sweden: Testing the Salmon Bias and Healthy Migrant Hypotheses

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## **Vital events across space and time**

The demographic study of migrant populations sometimes produces different “paradoxes” as observed demographic rates often fail to conform to expectations. This happens in fertility research (e.g., Frank and Heuveline 2005) as well as in mortality research (e.g., Palloni and Arias 2004). Sometimes these paradoxes stem from the methodological challenges of studying migrant populations. These involve not only the standard demographic consideration of proper time to event data but also the need of considering data that stretch over several geographies. In most cases, the demographic study of migrants needs to grasp dimensions of both time and space. In reality, however, most data sources are collected in one given geography only. If vital events for migrants to and from that area are more likely to occur there than in the other geographies where they spend their lives then the observed demographic rates for these migrants will be distorted. The fertility literature identifies migration effects in fertility, in terms of artificially elevated fertility rates of migrants being produced by situations when childbearing occurs in connection with migration (Andersson 2004, Milewski 2006, Parrado 2011). The mortality literature points at suggested salmon effects in mortality, being produced by situations when migrants opt to return to their country of origin in anticipation of death. The latter case would produce reduced mortality rates for immigrants in the host country where data on migrants are collected.

## **Migrant mortality paradoxes**

A stream of recent research has focused on the Hispanic mortality paradox in the United States, as expressed in lower mortality of Hispanics than of Non-Hispanic whites, despite their imminent socioeconomic disadvantages. (For a review of the state of current research in the United States, see Markides and Eschbach 2005, 2011.) Similar patterns have been observed for immigrant populations across Europe (e.g. Anson 2004, Deboosere and Gadeyne 2005, Kibele 2008, Uitenbroek 2002). Salmon effects may have produced these patterns of reduced migrant mortality but there are at least two competing mechanisms that may also have contributed to these patterns: those of i) selective immigration of healthy migrants or immigrants with healthy life styles (e.g., Deboosere and Gadeyne 2005) and ii) the underreporting of emigration and return-migration events. It is widely known that migrants are more likely to report their

immigration to a new country than their emigration or subsequent return migration. Such patterns of underreporting contribute to the distortion of observed demographic rates. As the population under risk in a given country is inflated and the reports of vital events (deaths, births, civil-status changes) instead are registered in another country, the observed demographic rates of the immigrant population will be depressed.

### **Testing migrant-mortality paradoxes**

The testing of these competing hypotheses has not been entirely successful, mainly due the lack of data that spans both time and space. Turra and Elo (2008) note that longitudinal surveys that follow individuals in and out of a host country are needed to fully explore the role of migration for mortality and other demographic processes. Such surveys are rarely available and hardly large enough to detect differentials in mortality. Register data may be more useful for mortality research, but register data are bound to be restricted to one specific country context. However, such data may be used to look at salmon effects and other migration effects that may occur *within* the country where the data are recorded. In this study, we will exploit Swedish register data to detect possible salmon and healthy-migrant effects for long-distance migrants within that country. Sweden is a fairly large country in terms of geography, at least by European standards, and by focusing on the long-distance migrants from Northern to Southern Sweden we are capable to detect and distinguish between salmon and healthy-migrant effects in migrant mortality. As Swedish registers cover the entire resident population of the country and its vital events with a high degree of efficiency, the issues of underreporting of events will be minimized.

### **Migrants from Norrland to Southern Sweden**

We will provide a direct test of the two hypotheses for long-distance migrants in Sweden using individual level register data that follow all individuals living in Sweden from the 1960s through 2007. The sparsely populated forested Northern part of Sweden, coined *Norrland*, has been characterized by considerably outmigration during the entire study period. In our study, we follow all individuals born in Norrland over time since 1968, from which we have annual data on region of residence, and observe how their mortality patterns compare to those of the remaining population. We answer several questions: Do migrants from Norrland to Southern Sweden have a lower mortality than the general population of Norrland? Do they have lower mortality than the population of Southern Sweden? Do return migrants to Norrland have a higher mortality than those who stay in Southern Sweden? Are these patterns altered by age?

### **Data and Methods**

We apply a longitudinal approach using Swedish population registers and hazard regression methods to examine the age, duration-specific and time-varying influences of migration on

individual mortality. Swedish population registers are considered a source of detailed and very exact information with a very low percentage of missing data. The information collected for every individual are vital events such as birth, death, and migration, as well as a variety of detailed background information such as place of birth, place of death, marital status, occupation, education, and taxable incomes. The base population of our analysis consists of all people aged 18-100 living in Sweden between January 1<sup>st</sup>, 1970 and December 31<sup>st</sup> 2007. The total considered population amounts to 11.9 million Swedish born individuals, 5.9 million of them are men and 6.0 million women. About 473,000 people were born in Norrland and have moved to other parts of Sweden, about 131,000 of them returned to Norrland during our observation period.

To address our hypotheses we distinguish the following groups: 1) Swedes born in Norrland who migrated from Norrland to other parts of Sweden 2) Swedes born in Norrland who migrated from Norrland and returned to Norrland 3) Swedes who were born in Norrland and remained there, and 4) Swedes who were born in Sweden outside of Norrland. Foreign-born people are excluded from the analyses. To test the healthy migrant hypothesis we will compare the mortality of group 1 with that of group 3 and 4. If the healthy migrant hypothesis holds we expect that individuals that had made a long-distance move (group 1) should have lower mortality than any of the other two groups. To address the salmon bias hypothesis we will compare the mortality of group 2 with all other groups. If the salmon bias hypothesis holds we expect that migrants who returned to Norrland have an elevated mortality. The contributions of both effects are evaluated. Separate analyses for adult mortality and old age mortality (65+) as well as interaction models with age are conducted.

### **First results**

First descriptive results confirm that both mechanisms can be observed for internal migration in Sweden. An evaluation of the importance of both effects by age and results of the multivariate hazard regression models will be available in time for the EPC.

### **Conclusion**

In previous research, tests of the healthy migrant and selective return migration hypotheses have not been entirely successful in the case of the mortality of international migrants. In our study, we avoided some of the most imminent data problems by investigating both hypotheses for internal long-distance migrants in Sweden.

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