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# Ethnic background, labor market attachment and severe morbidity

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Etnisk bakgrund, integration och sjuklighet: Slutenvård bland invandrare i Sverige 1990–2001

Martin Klinhäll

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# Summary

**Objectives:** The purpose of this study is to analyze to what extent differences in health between groups of different origin remain after considering differences in education, income and labor market status, and whether there exists any patterns according to the socioeconomic character of the country of origin.

**Design:** The study is based on two data sources; Longitudinal Database for Education, Income and Employment, (LOUISE) and the Hospital Discharge Register (HDR). The data set consists of all Swedish and foreign born individuals born in 1945, 1955 and 1965, who were Swedish residents in 1990. The risk of hospitalization is analyzed for the period 1990–2001 using binomial logit regression.

**Results:** When only demographic characteristics are controlled for, most immigrant groups display higher rates of hospital discharge records than native Swedes, but when education, income and labor market status is introduced into the model, only Nordic immigrants display levels of severe morbidity that are significantly higher than the levels for Swedish born. Among welfare recipients, only immigrants from Finland display higher levels of severe morbidity than native Swedes; most immigrant groups display significantly lower levels of severe morbidity than native Swedes. The analysis shows no evidence of a systematic relationship between health status and the socioeconomic character of the country of origin.

**Conclusion:** Higher levels of severe morbidity among immigrants compared to Swedes seem to be explained by the socioeconomic situation in Sweden, rather than health conditions and socioeconomic circumstances before immigration. There is a strong correlation between a weak labor market integration and high levels of severe morbidity in non-Nordic immigrant groups.

# Svensk sammanfattning

Syftet med denna studie är att analysera huruvida skillnader i hälsa mellan olika invandrargrupper i Sverige kvarstår efter att hänsyn tagits till skillnader i utbildning, inkomster och arbetsmarknadsanknytning, samt om det finns några systematiska skillnader ifråga om ursprungsländernas socioekonomiska karaktär. Studien bygger på data från två datakällor: Patientregistret och LOUISE, longitudinell databas över utbildning, inkomster och sysselsättning. Skillnader i slutenvård under perioden 1990 till 2001 analyseras för drygt 350 000 individer, födda 1945, 1955 och 1965.

Resultaten visar att de flesta invandrargrupper har en högre sannolikhet för slutenvård än infödda svenskar, då man endast tar hänsyn till demografiska karakteristika. När man även kontrollerar för utbildning, inkomster och sysselsättning, visar det sig att endast nordiska invandrare uppvisar en högre sannolikhet för slutenvård än svenskar. Bland socialbidragstagare är det bara finska invandrare som har en högre sannolikhet för slutenvård; de flesta andra grupper har en signifikant lägre sannolikhet än svenskar. Ingenting talar för ett systematiskt samband mellan hälsa och socioekonomiska förhållanden i ursprungslandet. Slutsatsen blir därmed att det höga utnyttjandet av slutenvård bland vissa invandrargrupper förklaras av socioekonomiska förhållanden i Sverige, snarare än förhållandena i hemlandet före invandringen. Sjukvårdsutnyttjande bland icke-nordiska invandrargrupper har ett starkt samband med låga nivåer av integration på den svenska arbetsmarknaden.

# 1 Introduction

Studies of sickness absence, early retirement and mortality in Sweden have shown that socioeconomic factors such as gender, education, occupation and income play an important role in explaining the health situation in different groups. Furthermore, several studies show that there are considerable differences in health status between certain immigrant groups and native Swedes. The purpose of this study is to analyze to what extent differences in health between groups of different origin remain after considering differences in education, income and labor market status, and whether there exists any patterns according to the socioeconomic character of the country of origin.

Two alternative hypotheses will be addressed in this study. According to the first hypothesis, health is significantly affected by the existing socioeconomic situation; civil status, income, degree of labor market attachment, education, etc., have important impacts on the health situation of the individual. The other hypothesis attributes health differences today to health conditions in the past; socioeconomic circumstances in early life can to a large extent explain differences in health status later in life.

Immigrants have lower incomes, higher levels of unemployment and a higher social welfare dependency than Swedes (Bevelander 2000, Edin & Åslund 2001, Scott 1999, Rooth 1999, LeGrand & Szulkin 2000, Franzén 2003). In the last 30 years, the income and employment situation for immigrants has deteriorated in comparison to Swedish born, and the degree of this deterioration seems to be correlated to the proximity of the country of origin. Immigrants from countries that are in a broad sense close to Sweden (not only, or necessarily, by geographical distance, but also socially, economically and linguistically) display higher rates of labor market integration and income assimilation than immigrants from more distant countries. For instance, employment rates among Nordic immigrants are close to the level of natives, whereas there are immigrant groups originating from Middle East or Africa that have critically low levels of labor market integration (Swedish Integration Board 2003, 2004).

The relationship between health and socioeconomic circumstances may explain why the health situation among immigrants is worse than among Swedish born. Reports from the Swedish National Board of Health and Welfare show that there are considerable social differences in health and mortality, and that these patterns have been remarkably stable over time, for most diagnoses and regardless of the measure of social status; income, socioeconomic index, or other (Swedish National Board of Health and Welfare 1987, 1991, 1994, 1995, 1997, 2000, 2001, 2005). For instance, total mortality had among men and women 1992–95 had a clear negative correlation with individual income level in 1991 (Folkhälsorapport 2001). People who lack material resources more often report health problems, in particular psychological problems (Social rapport 2001), and self-reported health problems are a well-known predictor for future mortality (McGee, Liao, Cao et al 1999, Lindström, Sundquist & Östergren 2001).

An alternative hypothesis is that observed health differences between immigrants and Swedes not primarily depend on present socioeconomic conditions, but on the situation further back in time. Health problems, psychological as well as somatic, often have their root in circumstances earlier in life (Forsdahl 1977, Barker 1995, Kuh & Ben-Schlomo 1997, Leon et al 1998, Leon et al 2000). Concerning immigrants, there may be circumstances that go back to the time before immigration. Many of the immigrants' origin countries have for a long time been

on a significantly lower socioeconomic level than Sweden. Therefore, if differing health conditions in early life is a main factor behind differences in health between immigrant groups and Swedes, then we expect health differences in Sweden to mirror differences in the socioeconomic character of the origin countries, and the patterns are expected to remain after controls for individual differences in education, income and labor market status.

Several studies have addressed the problem of health differences between Swedish and foreign born, but most of them are conducted on the local level, with relatively small samples (Sundquist 2002, Swedish National Board of Health and Welfare 2005). This study is based on national data and will analyze differences in severe morbidity 1990–2001 between native Swedes and immigrants grouped into 21 categories by geographical origin. Severe morbidity is defined as a health problem serious enough to lead to at least one night's hospital care.

## 2 Methods

This study is based on two data sources; Longitudinal Database for Education, Income and Employment, (LOUISE) and the Hospital Discharge Register (HDR). LOUISE is constructed by Statistics Sweden (SCB), covers the whole resident population of Sweden from 1990 until 2001 and contains socioeconomic and demographic information collected from various official registers. The Hospital Discharge Register is an administrative register with information on inpatient hospital care in Sweden, and begins as a national register in 1987. The register contains information on all completed over-night patient care provided by public hospitals, such as the patient's age, sex and municipality of residence; main diagnosis, secondary diagnoses, operations, etc.; data on the hospital; and certain administrative information. This information is reported annually by each county council in Sweden to the Swedish National Board of Health and Welfare.

The probability of hospitalization is calculated using binomial logit (logistic) regression (see e.g. Hosmer and Lemeshow 1989, Kennedy 1998 and the Stata Reference Manual 1999), which performs maximum-likelihood estimation of models with dichotomous dependent variables coded as 0/1. The likelihood of a non-zero outcome (in this case hospitalization) is estimated, conditional on the values of the independent variables. Estimates are presented as odds ratios. The odds ratio corresponds to the exponent of the estimated coefficient and is used to compare the odds of two groups; it shows an increased or decreased risk of an event happening relative a reference category. Statistical significance is reported at the 5 percent level, referring to the probability of the odds ratio not being different from unity, which is the odds ratio of the reference.

Three birth cohorts of Swedish and foreign born individuals were selected for this study. They were born in 1945, 1955 or 1965, and registered as Swedish residents in 1990. Individuals who entered Sweden in 1990 or later were not included in the sample. Hence, the data set consists of all individuals from these three birth cohorts who lived in Sweden in 1990. They are observed from 1990 until 2001, unless they emigrate or die before the end of the observation period.

In the official registers, the resident population differs somewhat from the real resident population due to two types of registration problems. The first problem is the well-known problem of "invisible" emigration (Nilsson 1991, Ekberg 1994, Ringbäck-Weitof et al. 1998, Ringbäck-Weitof et al. 1999, Klinthäll 2003). Some emigration is not reported by the migrants to the authorities and therefore, these individuals will stay registered as Swedish residents until emigration is eventually

reported or until the individual is taken off the register because the authorities have discovered that the person is no longer in the country.

Indications of under-registration of emigration include low mortality rates or many zero-income households in certain groups. In order to check the extent of the problem in the data sample used for this study, an analysis of the occurrence of individuals without any disposable income was made. Total disposable income as it is defined here includes all forms of officially recorded post-tax income, such as work income, capital income, sickness benefits, unemployment benefits, pensions, welfare payments, etc. that the individuals has received in a calendar year. Reasons for not having any officially registered income can be that the individual is supported by someone else, and/or has income from work in the informal sector, or that the individual is no longer in the country.

Table 1 shows that, among those without any disposable income, foreign born individuals are clearly over-represented; whereas close to 10 percent of the total sample is foreign born, nearly 60 percent of all individuals who totally lack income in a whole year are foreign born. Since foreign born display higher emigration rates than Swedish born, there is good reason to assume that the main reason for not having any disposable income is emigration. Table 1 also shows that those without any income are clearly under-represented in the Hospital Discharge Register. If a large fraction of those without income have left the country, this under-representation would be expected. However, as long as you are registered as resident in Sweden, you are entitled to free hospital care. Hence, even if you, although unofficially, live and work abroad, you have the possibility of returning to Sweden for hospital care.

**Table 1** Indications of under-registration of emigration from Sweden. Birth country and Hospital Discharge Register records by disposable income

	Birth country		Total
	Sweden	Other	
Whole sample	89.52	10.48	100
Income	89.74	10.26	100
No income	41.23	58.77	100
	HDR record		Total
	Yes	No	
Whole sample	6.37	93.63	100
Income	6.39	93.61	100
No income	2.04	97.96	100

Sources: Statistics Sweden and Swedish National Board of Health and Welfare

Although the total number of possibly emigrated individuals (i.e. individuals without disposable income) is small; only half a percent of the sample, it may cause substantial bias in a study that analyses differences between immigrant groups. Appendix table A2 shows that there is considerable variation according to country of birth. Under-registration of emigration appears to be particularly frequent among Greeks and immigrants from "Other Western World", a group dominated by North Americans; the share of individuals without income is 14 percent among immigrants from "Other Western World" and 10 percent among Greeks. The problem seems to be least among Nordic born, primarily due to cooperation between the Nordic states regarding the registering of migration between the countries. The problem also seems to be smaller among those born in refugee



source countries, basically due to low levels of return migration to these countries.

The second problem is less well-known and concerns individuals who were not registered as Swedish residents in a certain year, but who appear in the registers later, without any registered information on immigration date. This is a circumstance that has not gained sufficient attention, since it has potential to create considerable measurement problems in register-based research. Since the data sample used in this study was constructed through the merging of twelve annual cross-sections of the total population of the three selected birth cohorts, and all observations with a immigration year later than 1989 were omitted, the number of individuals included in the data sample should decrease with time, due to emigration and deaths, but instead it increased quite substantially. The number of individuals included in the data rose by 8 percent, from 356,485 in 1990 to 385,262 in 2001. In the period under study, 28,777 individuals show up "from nowhere". One possible explanation is that, for some reason, immigration date was not registered on immigration. The problem seems to be larger in younger and more mobile ages; the cohort born 1965 (25 years old in 1990) increased by 16 percent, or 21,024 individuals, compared to 2 and 4 percent for the cohorts of 1945 and 1955 respectively. The problem is not concentrated to the foreign born; 75 percent of the individuals who were not in the registers in 1990 but appear later are Swedish born. Depending on sampling technique and type of study, this problem may give rise to substantial estimation bias, particularly in studies on young and mobile groups. Since LOUISE is a data base frequently used in social science in Sweden, there may already be studies that suffer from biased results due to this problem.

In sum, this study follows the total population born 1945, 55 and 65, from 1990 until 2001, or until they die or emigrate. Individuals without any disposable income are regarded as emigrated and thus omitted. Only those who are registered as residents of Sweden in 1990 are included; individuals who appear later are omitted regardless of immigration date (or lack thereof).

## 3 Results

### 3.1 All diagnoses

As a first step, we look at the probability of being taken into hospital care for any diagnosis, except diagnoses that are related to childbearing.<sup>1</sup> In order to minimize biased results due to unreported emigration, individuals without any registered disposable income are omitted from the sample. Table 2 shows odds ratios for immigrants from 21 different countries and regions, with reference to native Swedes.

Model 1, displayed in the first column of table 2, only includes controls for calendar year and demographic characteristics, i.e., birth cohort, sex, civil status and presence of children in the household. As expected, the risk for severe morbidity is positively correlated with age; there are significant differences between the three birth cohorts. Females display higher likelihood of severe morbidity than males, a pattern which is in line with studies on self-reported health (Swedish National Board of Health and Welfare 2005). In line with many studies on morbid-

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<sup>1</sup> ICD9 codes 630-676, ICD10 codes O00-O99.

ity and mortality, morbidity is negatively correlated with parenthood (Macintyre 1992, Elstad 1996, Ringbäck-Weitoff Haglund & Rosén 2000, Ringbäck-Weitoff et al 2002); table 2 shows that at least one child in the household is associated with a lower risk for hospitalization. Also when it comes to civil status, results are in line with earlier mortality and morbidity studies; those who are married or cohabiting run a lower risk of over-night hospital care compared to single, widowed and divorced individuals. Singles in their turn run a lower risk of hospital care than widowed or divorced persons.

**Table 2** Logistic estimation of severe morbidity in Sweden 1990–2001. Over-night hospital care for any diagnosis, except records related to childbearing. Odds ratios

	Model 1	Model 2	Model 3
Year (1990–2001)	1.00	<b>1.03</b>	<b>1.03</b>
Born 1945	<b>1.41</b>	<b>1.45</b>	<b>1.47</b>
Born 1955	<b>1.14</b>	<b>1.17</b>	<b>1.16</b>
Female	<b>1.17</b>	<b>1.08</b>	<b>1.09</b>
Divorced/widowed	<b>1.52</b>	<b>1.56</b>	<b>1.41</b>
Single	<b>1.26</b>	<b>1.27</b>	<b>1.18</b>
Child(ren) in household	<b>0.86</b>	<b>0.94</b>	<b>0.90</b>
Finland	<b>1.31</b>	<b>1.24</b>	<b>1.19</b>
Other Nordic	<b>1.22</b>	<b>1.16</b>	<b>1.12</b>
Former Yugoslavia	<b>1.09</b>	0.96	<b>0.94</b>
Greece	<b>0.86</b>	<b>0.73</b>	<b>0.72</b>
Turkey	<b>1.33</b>	1.06	<b>0.94</b>
Iraq	<b>1.38</b>	<b>1.18</b>	<b>0.88</b>
Iran	<b>1.29</b>	<b>1.16</b>	<b>0.90</b>
Chile	<b>1.19</b>	1.06	<b>0.89</b>
Somalia	<b>1.71</b>	<b>1.51</b>	1.09
Poland	1.00	0.98	<b>0.91</b>
Other Western Europe	0.98	0.96	<b>0.94</b>
Other Eastern Europe	0.97	0.96	<b>0.89</b>
Other Southern Europe	<b>1.11</b>	0.99	0.97
Other Western World	<b>0.83</b>	<b>0.85</b>	<b>0.85</b>
Middle East	<b>1.57</b>	<b>1.28</b>	0.98
North Africa	<b>1.33</b>	<b>1.15</b>	0.95
Other Africa	<b>1.08</b>	0.98	<b>0.78</b>
Central Asia	<b>1.24</b>	<b>1.13</b>	1.02
Far East	<b>0.81</b>	<b>0.72</b>	<b>0.69</b>
Other Latin America	0.97	0.92	<b>0.81</b>
Unknown	<b>1.84</b>	1.56	1.57
Secondary education		0.88	<b>0.91</b>
University max 3 years		<b>0.74</b>	<b>0.78</b>
University > 3 years		<b>0.70</b>	<b>0.75</b>
Second quintile		<b>0.91</b>	<b>0.95</b>
Third quintile		<b>0.76</b>	<b>0.80</b>
Fourth quintile		<b>0.66</b>	<b>0.70</b>
Fifth quintile		<b>0.58</b>	<b>0.62</b>
Unemployed			<b>0.93</b>
Welfare recipient			<b>2.38</b>

**Note:** Statistical significance (5% level) in bold figures. Reference categories: Born 1965, male, married, no children in household, Swedish, primary education, first quintile income level, not unemployed, not welfare recipient.

*Source:* Statistics Sweden

Table 2 shows significant differences in severe morbidity according to country of birth. In model 1, where only demographic characteristics are controlled for, only three immigrant groups display lower rates of hospital discharge records than native Swedes; Greeks, immigrants from “Other Western World” (a group domi-

nated by North American immigrants) and immigrants from “Far East” (appendix table A1 shows how countries have been grouped together). Four groups are not statistically different from Swedes, whereas the other 14 immigrant groups display significantly higher rates of hospital discharge records than native Swedes. This result confirms the view that the health situation in immigrant groups in Sweden is in general more problematic than among those born who were born in the country.

Social differences in health and mortality in Sweden are significant. It is an established fact that the lower the social status, the higher the risk for health problems. Another fact is that there are significant social differences connected to geographical origin. Several immigrants groups display low levels of income assimilation and weak attachment to the labor market. At the same time, many of these immigrant groups display relatively high levels of education.

In the second model in table 2, income level and educational level are added as dependent variables. The effects of both income and education are significant; the higher the level, the lower the risk of hospitalization. The introduction of these socioeconomic indicators also has the effect that odds ratios for severe morbidity relative to native Swedes decrease for all immigrant groups except for those from “Other Western World”. Since there is correlation between health and socioeconomic situation, but also between socioeconomic situation and country of origin, odds ratios for country of origin change when income level is introduced into the model. In model 1, the effect of social differences on health is to a large extent captured by the country of origin indicator, whereas in model 2, it is primarily captured by the indicators for income and education.

In model 3, two indicators of labor market attachment are introduced; *Unemployed* indicates whether an individual has received any unemployment compensation in a calendar year, and *Welfare recipient* indicates whether there has been any welfare payments to the household in a calendar year. When these two indicators are included, the odds ratios for all immigrant groups decrease, some of them quite substantially. In the third model, only Nordic immigrants display levels of severe morbidity that are significantly higher than the levels for Swedish born. The difference between the results in the first model and the third model is striking: In the first model, only three immigrant groups had lower rates of severe morbidity than Swedes, compared to thirteen in the third model. When education, income and labor market status is introduced into the model, odds ratios for six groups, i.e. immigrants from former Yugoslavia, Turkey, Iraq, Iran, Chile and “Other Africa”, change from significantly above unity to significantly below. The odds ratio for welfare recipients is high; the probability of over-night hospital care is more than twice as high for welfare recipients than for the rest of the population.

The results indicate that most immigrant groups are not less healthy than native Swedes in a comparable social situation, rather the opposite. The increased risk of severe morbidity for most immigrants groups shown in model 1, without controls for income, education or labor market attachment, simply mirrors differences in socioeconomic situation. When controls for socioeconomic differences are introduced into the model, most immigrants groups display a *lower* risk of severe morbidity. Immigrants on average have less economic resources and we know that poverty affects health status negatively; they are not unhealthy because they are immigrants, but they are unhealthy because they are poor.

The results could, however, be interpreted in an alternative way: Due to unfavorable health conditions in the past, some immigrants suffer from persistent health problems, which in turn has a negative effect on labor market situation. Therefore, the socioeconomic hardship found in many immigrant groups is essentially a

result of reduced health status; they are not unhealthy because they are poor, but they are poor because they are unhealthy.

If poverty in certain immigrant groups is due to health problems that existed already at the time of immigration, welfare recipients in these groups are expected to have increased risks of severe morbidity, since they are primarily selected by health-related human capital characteristics. On the other hand, if poverty in these groups is due to a disadvantageous socioeconomic situation, we expect welfare recipients to have reduced risks of severe morbidity, since they are primarily selected by labor market-related human capital characteristics.

In table 3 the likelihood of severe morbidity is analyzed for welfare recipients separately from the rest of the sample. The results show that among welfare recipients, only immigrants from Finland display a higher level of severe morbidity than native Swedes and that most immigrant groups display significantly lower levels of severe morbidity than native Swedes.

**Table 3** Logistic estimation of severe morbidity in Sweden 1990–2001. Over-night hospital care for any diagnosis, except records related to childbearing. Separate estimation for welfare recipients

	Welfare recipients			Not welfare recipients		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Year (1990–2001)	1.00	<b>1.01</b>	<b>1.02</b>	<b>1.01</b>	<b>1.03</b>	<b>1.03</b>
Born 1945	<b>1.26</b>	<b>1.30</b>	<b>1.15</b>	<b>1.47</b>	<b>1.51</b>	<b>1.51</b>
Born 1955	<b>1.26</b>	<b>1.28</b>	<b>1.21</b>	<b>1.12</b>	<b>1.15</b>	<b>1.15</b>
Female	1.00	1.02	<b>0.97</b>	<b>1.19</b>	<b>1.10</b>	<b>1.10</b>
Divorced/widowed	<b>1.73</b>	<b>1.76</b>	<b>1.88</b>	<b>1.33</b>	<b>1.37</b>	<b>1.37</b>
Single	<b>1.54</b>	<b>1.56</b>	<b>1.65</b>	<b>1.13</b>	<b>1.14</b>	<b>1.14</b>
Child(ren) at home	<b>0.65</b>	<b>0.71</b>	<b>0.73</b>	<b>0.87</b>	<b>0.93</b>	<b>0.93</b>
Finland	<b>1.21</b>	<b>1.18</b>	<b>1.17</b>	<b>1.24</b>	<b>1.19</b>	<b>1.19</b>
Other Nordic	0.93	<b>0.91</b>	0.91	<b>1.21</b>	<b>1.17</b>	<b>1.16</b>
Former Yugoslavia	<b>0.72</b>	<b>0.70</b>	<b>0.69</b>	<b>1.10</b>	1.00	1.00
Greece	<b>0.42</b>	<b>0.40</b>	<b>0.40</b>	0.92	<b>0.80</b>	<b>0.80</b>
Turkey	<b>0.84</b>	<b>0.78</b>	<b>0.78</b>	<b>1.29</b>	1.07	1.07
Iraq	<b>0.69</b>	<b>0.68</b>	<b>0.72</b>	<b>1.29</b>	1.15	1.14
Iran	<b>0.65</b>	<b>0.67</b>	<b>0.71</b>	<b>1.25</b>	<b>1.15</b>	<b>1.15</b>
Chile	<b>0.65</b>	<b>0.63</b>	<b>0.65</b>	<b>1.19</b>	<b>1.09</b>	<b>1.09</b>
Somalia	0.94	0.97	1.04	1.30	1.19	1.19
Poland	<b>0.64</b>	<b>0.65</b>	<b>0.66</b>	1.01	1.00	1.00
Other Western Europe	0.87	0.89	0.89	0.96	0.95	0.95
Other Eastern Europe	<b>0.58</b>	<b>0.60</b>	<b>0.61</b>	0.99	0.98	0.98
Other Southern Europe	0.79	<b>0.77</b>	<b>0.77</b>	<b>1.11</b>	1.02	1.02
Other Western World	0.96	1.01	1.03	<b>0.80</b>	<b>0.82</b>	<b>0.82</b>
Middle East	<b>0.89</b>	<b>0.84</b>	<b>0.86</b>	<b>1.43</b>	<b>1.21</b>	<b>1.21</b>
North Africa	<b>0.75</b>	<b>0.73</b>	<b>0.74</b>	<b>1.26</b>	1.12	1.12
Other Africa	<b>0.61</b>	<b>0.61</b>	<b>0.63</b>	0.98	0.91	0.91
Central Asia	<b>0.78</b>	<b>0.79</b>	<b>0.79</b>	<b>1.22</b>	<b>1.14</b>	<b>1.14</b>
Far East	<b>0.59</b>	<b>0.56</b>	<b>0.56</b>	<b>0.80</b>	<b>0.73</b>	<b>0.73</b>
Other Latin America	<b>0.63</b>	<b>0.65</b>	<b>0.68</b>	0.92	<b>0.89</b>	<b>0.89</b>
Unknown	0.42	0.43	0.43	<b>2.13</b>	1.88	1.88
Secondary education		<b>0.88</b>	<b>0.90</b>		<b>0.91</b>	<b>0.91</b>
University max 3 years		<b>0.65</b>	<b>0.67</b>		<b>0.80</b>	<b>0.80</b>
University > 3 years		<b>0.65</b>	<b>0.66</b>		<b>0.76</b>	<b>0.76</b>
Second quintile		1.00	0.99		<b>0.96</b>	<b>0.96</b>
Third quintile		<b>0.89</b>	<b>0.86</b>		<b>0.81</b>	<b>0.81</b>
Fourth quintile		<b>0.78</b>	<b>0.73</b>		<b>0.71</b>	<b>0.71</b>
Fifth quintile		<b>0.79</b>	<b>0.72</b>		<b>0.63</b>	<b>0.63</b>
Unemployed			<b>0.64</b>			1.01

**Note:** Statistical significance (5% level) in bold figures. Reference categories: Born 1965, male, married, no children in household, Swedish, primary education, first quintile income level, not unemployed, not welfare recipient. *Source:* Statistics Sweden.

Apparently, Swedish and Finnish welfare recipients seem to be selected by health-related human capital factors, such as reduced physical or psychological capacity, to a larger extent than other groups. Conversely, welfare recipients in other groups are more likely to be selected in terms of labor market-related human capital characteristics. Lack of networks in the labor market, insufficient language skills, discrimination in the labor market, etc. are more common reasons for weak labor market integration in these groups than among Swedes and Finns. Whereas people who belong to groups that are well integrated on the labor market are relatively more likely to become welfare recipients because they have health-problems, people who belong to groups that are poorly integrated in the labor market are relatively more likely to be welfare recipients already before they get health-problems.

The situation is quite different when looking at the results for those who did not receive any welfare payments. Most odds ratios for this group differ from the results for welfare recipients. In model 1, only one immigrant group, Other Western World, displays an odds ratio significantly below unity. In model 3, four groups have odds ratios below unity, i.e. immigrants from Greece, Other Western World, Far East and Other Latin America, whereas six of them have odds ratios significantly above unity; Finnish, other Nordic, Chilean, Iranian, Middle Eastern and Central Asian immigrants,. The remaining eleven groups are not statistically different from Swedes. There is a clear negative relationship between morbidity and education as well as between morbidity and income.

In sum, when looking at all diagnoses except those connected to childbearing, we find that most immigrant groups have higher rates of severe morbidity than Swedes, but when controlling for educational level, income, unemployment and welfare dependency, only the Nordic immigrant groups display higher levels of severe morbidity than Swedes. Hence, high levels of severe morbidity among immigrants is strongly correlated to a weak labor market attachment in Sweden.

When it comes to the relationship between severe morbidity and the socioeconomic character of the country of origin, there are no clear patterns. Immigrants from countries on relatively high levels of GDP per capita, with low infant mortality rates<sup>2</sup> are not generally healthier than immigrants from poor refugee sending countries. Neither when looking separately at those who did and did not receive welfare payments, are there any clear patterns when it comes to the socioeconomic character of the country of origin. When looking at welfare recipients, only Finnish immigrants have higher levels of severe morbidity than Swedes, after controlling for educational level, income, unemployment and welfare dependency. Immigrants from the other Nordic countries, other Western Europe, other Western World and Somalia are not significantly different from Swedes, and all other immigrant groups have odds ratios significantly below Swedes. Concerning those who did not receive welfare payments, immigrants from the Nordic countries, i.e. primarily labor migrants, display higher levels of severe morbidity, whereas other labor migrant groups, such as those from Greece and "Other Western World" seems to be healthier than Swedes. Immigrants from Chile, Iran, other Middle east and Central Asia, i.e. primarily refugee immigrants, display higher levels of severe morbidity than Swedes, whereas other Latin Americans and immigrants from the Far East appear to be more healthy.

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<sup>2</sup> Appendix table A3 shows infant mortality rate 1960, for most countries the earliest year with available data.

## 3.2 Psychological health

A large part of the literature on migration and health focus on psychological health (see Evans 1987, Sundquist 1994, Hjern 1995, Johansson 1997). Causes and consequences of the act of migration may expose migrants to an increased risk of psychological health problems. One common theme is the psychological stress that migration itself brings about, through the uprooting from a well-known and safe milieu to a foreign environment (e.g. Westermeyer et al 1989, Enesten & Larsson 1992), another theme is the psychological health in refugees, who may have been victims of persecution, war or torture in their country of origin. Studies have shown that victims of torture still suffer from post-traumatic stress syndrome (PTSD) ten years or more after the torture (i.e. Petersen 1989, Carlson & Rosser-Hogan 1993).

Psychological problems may cause welfare dependency, but also be a result of welfare dependency (or rather a result of a lack of material resources). We know that most immigrant groups have a higher welfare dependency than Swedes, and a number of studies find indications of worse mental health among immigrants than among Swedes (e.g. Johansson et al 1997, Zolkowska et al 2001, Hjern & Allebeck 2002, Robertson et al 2003, Hjern Wicks & Dalman 2004). Table 4 shows the results of an analysis of the likelihood of being taken into hospital for psychological health problems. The first three columns show the odds ratios for hospital care for all diagnoses of psychological health problems (alcohol abuse, drug abuse, psychiatric diagnoses, psychoses, depressions and suicide attempts), the next three show the odds ratios for hospital care for alcohol and drug abuse only and the last three columns show the odds ratios for hospital care for all diagnoses of psychological health problems except diagnoses related to alcohol and drug abuse.

The first column shows that six immigrant groups have higher rates of hospital care for psychological health problems than Swedish born. However, when education and income is controlled for, odds ratios for all immigrant groups decrease, and when unemployment and welfare dependency is introduced, they decrease further and only Finnish born immigrants have a higher rate of hospital care for psychological health problems than Swedish born. The odds ratio for Finns is remarkably high, at the same time as odds ratios for most other immigrant groups are very low. The groups who seem to have worst mental health seem to be among those who have the highest scores on labor market integration, i.e. Nordic immigrants and immigrants from Europe and "other Western World". However, it seems like certain cultural patterns, and in particular drinking habits, to a large extent explain this pattern (Ringbäck-Weitof et al 1999, Hjern & Allebeck 2004). The next three columns show the odds ratio for being taken into hospital for alcohol- and drug abuse. The odds ratio for Finns in column two is even higher than in the first three columns, whereas the odds ratios for practically all other immigrant groups is lower than in the first three columns. Apparently, psychological problems due to alcohol and drug abuse is a problem in the Nordic born groups (including Swedes) and in particular among Finnish immigrants, but in comparison, really not an issue among non-Nordic immigrants.

**Table 4** Logistic estimations of severe psychological morbidity in Sweden 1990–2001. Likelihood of over-night hospital care due psychological health problems as main diagnosis

	1. All diagnoses of psychological health problems			2. Alcohol and drug abuse only			3. Psychological health problems except alcohol and drug abuse		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Year (1990–2001)	<b>0.98</b>	<b>1.05</b>	<b>1.04</b>	<b>0.98</b>	<b>1.05</b>	<b>1.04</b>	<b>0.98</b>	<b>1.05</b>	<b>1.05</b>
Born 1945	<b>1.48</b>	<b>1.50</b>	<b>1.90</b>	<b>2.43</b>	<b>2.40</b>	<b>2.75</b>	<b>1.12</b>	<b>1.15</b>	<b>1.14</b>
Born 1955	<b>1.84</b>	<b>1.85</b>	<b>2.04</b>	<b>2.77</b>	<b>2.69</b>	<b>2.53</b>	<b>1.48</b>	<b>1.50</b>	<b>1.42</b>
Female	<b>0.88</b>	<b>0.78</b>	<b>0.68</b>	<b>0.36</b>	<b>0.33</b>	<b>0.36</b>	<b>1.47</b>	<b>1.30</b>	<b>1.33</b>
Divorced/widowed	<b>5.40</b>	<b>5.90</b>	<b>4.50</b>	<b>8.16</b>	<b>7.95</b>	<b>4.76</b>	<b>4.17</b>	<b>4.75</b>	<b>3.71</b>
Single	<b>4.85</b>	<b>5.00</b>	<b>4.34</b>	<b>6.27</b>	<b>5.72</b>	<b>4.04</b>	<b>4.20</b>	<b>4.53</b>	<b>3.79</b>
Child(ren) at home	<b>0.59</b>	<b>0.83</b>	<b>0.65</b>	<b>0.47</b>	<b>0.68</b>	<b>0.57</b>	<b>0.66</b>	<b>0.91</b>	<b>0.80</b>
Finland	<b>2.04</b>	<b>1.72</b>	<b>1.69</b>	<b>2.91</b>	<b>2.26</b>	<b>1.89</b>	<b>1.41</b>	<b>1.24</b>	<b>1.12</b>
Other Nordic	<b>1.20</b>	1.01	0.93	<b>1.32</b>	1.07	0.96	1.11	0.97	0.91
Former Yugoslavia	<b>1.19</b>	<b>0.85</b>	<b>0.79</b>	<b>0.53</b>	<b>0.34</b>	<b>0.32</b>	<b>1.60</b>	<b>1.23</b>	<b>1.18</b>
Greece	<b>0.57</b>	<b>0.36</b>	<b>0.30</b>	<b>0.27</b>	<b>0.16</b>	<b>0.16</b>	0.79	<b>0.53</b>	<b>0.53</b>
Turkey	1.09	<b>0.58</b>	<b>0.39</b>	<b>0.26</b>	<b>0.13</b>	<b>0.10</b>	<b>1.55</b>	0.92	0.77
Iraq	0.82	<b>0.49</b>	<b>0.31</b>	<b>0.17</b>	<b>0.10</b>	<b>0.06</b>	<b>1.43</b>	0.91	0.64
Iran	1.09	<b>0.74</b>	<b>0.44</b>	<b>0.74</b>	<b>0.49</b>	<b>0.27</b>	<b>1.34</b>	0.96	<b>0.67</b>
Chile	<b>0.80</b>	0.57	<b>0.34</b>	<b>0.36</b>	<b>0.23</b>	<b>0.17</b>	<b>1.09</b>	0.83	<b>0.65</b>
Somalia	0.96	0.62	<b>0.37</b>	0.00	0.00	0.00	<b>1.72</b>	1.17	0.78
Poland	<b>1.21</b>	1.02	<b>0.77</b>	<b>0.68</b>	<b>0.56</b>	<b>0.43</b>	<b>1.54</b>	<b>1.32</b>	<b>1.16</b>
Other Western Europe	<b>1.14</b>	1.01	<b>0.79</b>	<b>0.55</b>	<b>0.48</b>	<b>0.45</b>	<b>1.59</b>	<b>1.43</b>	<b>1.40</b>
Other Eastern Europe	0.95	<b>0.81</b>	<b>0.61</b>	<b>0.48</b>	<b>0.40</b>	<b>0.32</b>	<b>1.28</b>	1.13	0.99
Other Southern Europe	1.19	0.87	0.95	0.83	<b>0.57</b>	<b>0.55</b>	<b>1.47</b>	1.13	<b>1.11</b>
Other Western World	1.20	1.04	1.12	0.89	0.81	0.83	1.38	1.19	1.20
Middle East	<b>1.37</b>	<b>0.77</b>	<b>0.39</b>	0.71	<b>0.36</b>	<b>0.21</b>	<b>1.80</b>	1.10	0.76
North Africa	1.13	<b>0.70</b>	<b>0.34</b>	<b>0.23</b>	<b>0.13</b>	<b>0.08</b>	<b>1.95</b>	1.30	0.99
Other Africa	0.84	<b>0.60</b>	<b>0.37</b>	<b>0.34</b>	<b>0.23</b>	<b>0.13</b>	1.18	0.88	0.63
Central Asia	1.01	0.75	<b>0.61</b>	<b>0.28</b>	<b>0.21</b>	<b>0.17</b>	<b>1.49</b>	1.14	0.98
Far East	0.87	<b>0.59</b>	<b>0.58</b>	<b>0.38</b>	<b>0.24</b>	<b>0.21</b>	1.12	0.82	0.79
Other Latin America	<b>0.74</b>	<b>0.57</b>	<b>0.37</b>	<b>0.30</b>	<b>0.22</b>	<b>0.16</b>	1.03	0.83	0.68
Unknown	2.81	1.67	0.73	2.41	1.36	1.42	3.13	1.97	2.03
Secondary education		<b>0.73</b>	<b>0.82</b>		<b>0.73</b>	<b>0.80</b>		<b>0.75</b>	<b>0.83</b>
University max 3 years		<b>0.50</b>	<b>0.59</b>		<b>0.31</b>	<b>0.42</b>		<b>0.61</b>	<b>0.74</b>
University > 3 years		<b>0.59</b>	<b>0.70</b>		<b>0.33</b>	<b>0.45</b>		<b>0.75</b>	<b>0.91</b>
Second quintile		<b>0.60</b>	<b>0.71</b>		<b>0.53</b>	<b>0.75</b>		<b>0.67</b>	<b>0.75</b>
Third quintile		<b>0.31</b>	<b>0.38</b>		<b>0.26</b>	<b>0.44</b>		<b>0.36</b>	<b>0.42</b>
Fourth quintile		<b>0.20</b>	<b>0.25</b>		<b>0.16</b>	<b>0.31</b>		<b>0.24</b>	<b>0.28</b>
Fifth quintile		<b>0.14</b>	<b>0.16</b>		<b>0.11</b>	<b>0.22</b>		<b>0.17</b>	<b>0.20</b>
Unemployed			<b>0.74</b>			<b>0.92</b>			<b>0.61</b>
Welfare recipient			<b>6.97</b>			<b>10.03</b>			<b>4.48</b>

**Note:** Odds ratios. Statistical significance (5% level) in bold figures. Reference categories: Born 1965, male, married, no children in household, Swedish, primary education, first quintile income level, not unemployed, not welfare recipient.

Source: Statistics Sweden

Looking at psychological diagnoses other than alcohol and drug abuse in the last three columns, we find that the results are very sensitive to whether education, income, unemployment and welfare dependency is controlled for. Without any such checks, most immigrant groups display worse psychological health than Swedes, and no group is significantly healthier than Swedes. However, there is no clear evidence that immigrants from refugee source countries should be less healthy than other immigrant categories. Actually, in the last column, where education, income, unemployment and welfare dependency is controlled for, Iranians, and Chileans, two of the largest refugee groups in Sweden, actually display significantly lower rates of severe morbidity in psychiatric disease, psychosis, depression or suicide attempt. Those who display significantly worse psychological health are immigrants from Finland, former Yugoslavia, other

Southern Europe (except Greece), other Western Europe and Poland, i.e. groups who are dominated by labor immigrants (although the case of Poland is mixed).<sup>3</sup>

### 3.3 Back and joint problems

In connection to dramatically increasing rates of sickness absence in the 1990s, there has also been a discussion on the physical health in labor migrants, in particular among those who came as recruits to the booming Swedish manufacturing industry in the 1960s, and displayed high levels of sickness absence and early retirement (Hammarstedt 2000 Andrén 2001, Bengtsson & Scott 2005). These groups have had relatively low occupational mobility and thus, a high exposure to work-related health problems due to physically demanding work tasks.

Most of these work related health problems are treated within the primary health care system and do generally not lead to over-night hospital care; therefore, hospitalization is not a precise measure of work-related severe morbidity. However, in order to map differences in physical health problems that may be related to heavy or monotonous work tasks, the likelihood of being taken into hospital for certain back and joint problems was estimated.<sup>4</sup> Table 5 shows that most immigrant groups are not statistically different from Swedes when it comes to these selected back and joint problems. The only groups that display significantly higher rates of severe back and joint problems than Swedes are immigrants from the Nordic countries and Iranians. Chileans, Poles and immigrants from the Far East display lower rates of severe back and joint problems. Apparently, there are no clear indications that immigrant groups dominated by labor migrants have an over-representation of back or joint problems leading to in-patient hospital care.

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<sup>3</sup> Remember that the sample does not include those who immigrated after 1990, therefore most Yugoslavians in this study are labor migrants. The war refugees of the 1990s are not included in the study.

<sup>4</sup> Musculoskeletal health problems with ICD9 codes 715–724 and ICD10 codes M15–M25 or M45–M48 or M50–M54.



**Table 5 Likelihood of over-night hospital care in Sweden 1990–2001 due to back and joint problems as main diagnosis**

	Model 1	Model 2	Model 3
Year (1990–2001)	<b>0.99</b>	1.00	<b>1.01</b>
Born 1945	<b>1.35</b>	<b>1.39</b>	<b>1.37</b>
Born 1955	<b>1.16</b>	<b>1.19</b>	<b>1.17</b>
Female	<b>0.90</b>	<b>0.86</b>	<b>0.86</b>
Divorced/widowed	<b>1.19</b>	<b>1.18</b>	<b>1.16</b>
Single	<b>0.82</b>	<b>0.82</b>	<b>0.81</b>
Child(ren) at home	<b>0.90</b>	<b>0.94</b>	<b>0.94</b>
Finland	<b>1.12</b>	1.07	1.05
Other Nordic	<b>1.50</b>	<b>1.45</b>	<b>1.45</b>
Former Yugoslavia	1.10	1.01	0.99
Greece	0.77	0.71	0.70
Turkey	1.15	1.02	0.98
Iraq	1.13	1.08	1.00
Iran	<b>1.47</b>	<b>1.47</b>	<b>1.40</b>
Chile	<b>0.71</b>	<b>0.66</b>	<b>0.63</b>
Somalia	0.61	0.60	0.55
Poland	<b>0.72</b>	<b>0.73</b>	<b>0.73</b>
Other Western Europe	0.87	0.88	0.88
Other Eastern Europe	1.07	1.10	1.09
Other Southern Europe	0.65	0.62	0.61
Other Western World	0.84	0.96	0.96
Middle East	1.20	1.09	1.00
North Africa	1.20	1.14	1.08
Other Africa	0.80	0.77	0.73
Central Asia	0.64	0.62	0.61
Far East	<b>0.29</b>	<b>0.28</b>	<b>0.28</b>
Other Latin America	<b>0.59</b>	<b>0.59</b>	0.58
Unknown	0.00	0.00	0.00
Secondary education		<b>0.94</b>	<b>0.96</b>
University max 3 years		<b>0.75</b>	<b>0.77</b>
University > 3 years		<b>0.59</b>	<b>0.60</b>
Second quintile		<b>1.15</b>	<b>1.17</b>
Third quintile		<b>1.08</b>	<b>1.09</b>
Fourth quintile		<b>0.94</b>	<b>0.93</b>
Fifth quintile		<b>0.82</b>	<b>0.81</b>
Unemployed			<b>0.81</b>
Welfare recipient			<b>1.47</b>

**Note:** Odds ratios. Statistical significance (5% level) in bold figures. Reference categories: Born 1965, male, married, no children in household, Swedish, primary education, first quintile income level, not unemployed, not welfare recipient.

Source: Statistics Sweden

### 3.4 Cohort differences

The LOUISE-database does not contain any information on the reason for immigration, i.e. whether an individual came as a refugee, a labor immigrant, a student or as a relative. One possible proxy for this information is country of origin, since some origin countries have been primarily labor recruitment sources, whereas other countries have been sources of refugee immigration. However, some countries has been a mix of both, for instance, Turkey and Yugoslavia were first sources of labor immigration and then sources of refugee immigration. Immigration from Poland has also been of a mixed character, with both labor and refugee immigrants. Labor immigration was considerably restricted as a consequence of the 1968 Immigration Act and immigration became increasingly dominated by refugees from the mid-1970s onwards. Therefore, the three cohorts in the data set used for this study are differently mixed, with the largest share of

labor immigrants in the cohort born 1945 and the largest share of refugees in the cohort born 1965. Because of the age difference in itself, but also the varying shares of labor immigrants and labor market opportunities in different cohorts, as well as varying circumstances and experiences during childhood in different cohorts and immigrant groups, health outcomes are not expected to be the same for the three cohorts included in this study.

Table 6 shows the results of separate estimations of the likelihood of over-night hospital care for the three cohorts included in this study. One striking result is that, regardless of which cohort we look at, odds ratios for *Female*, *Divorced/Widowed*, *Single* and practically all immigrant categories decrease when controls for education, income, employment status and welfare dependency are introduced into the model. Hence, these indicators can be regarded as "poverty indicators", since they pick up effects of low educational level, low income, unemployment and, in particular, welfare dependency. Practically all indicators of geographical origin change in the same way as the "poverty indicators", and we already know that being an immigrant in Sweden is connected to a high likelihood of unemployment and low incomes.

On the other hand, there are not many large differences between different cohorts of the same origin. Younger Iraqis and Somalis seem to be less healthy, compared to Swedish born, than older Iraqis and Somalis. These two groups are the two most recent larger refugee groups in Sweden and have a younger age distribution than other immigrant groups and at the same time, younger cohorts may have had a higher exposure to war and persecution in their home countries. On the other hand, among Latin American immigrants, excluding Chileans, the younger also seem to be relatively less healthy than the older, although this migration flow is of an older date. The opposite seems to hold for immigrants from Iran and other immigrants from the Middle East, as well as for immigrants from Central Asia, where the younger cohorts seem relatively more healthy than the older. To conclude, there is no clear aggregate pattern when it comes to health differences between cohorts from different countries.

When it comes to variables other than geographical origin, there are some clear differences between cohorts. In comparison to males of the same age, younger females are less healthy than older females. Being single does not seem to be as much a "poverty indicator" for young people as for older cohorts, simply a result of selection effects not being as dominant in younger ages. The opposite holds for parenthood; living in a household with children is a poverty indicator for the youngest cohort, but not else. Young families with children is the one category that receives the most welfare payments in Sweden and therefore, this is not a surprising result. There are high costs involved in establishing a household with children, in particular for young persons who are not yet firmly rooted in the labor market. Otherwise, research has shown that parenthood generally lowers the risk both for bad health and low income, due to selection effects and/or behavioral factors. (Macintyre 1992, Elstad 1996)

There is a clear positive health-effect of education for all three cohorts; the higher the educational level, the lower the probability of severe morbidity. However, educational level is one of the variables where the effect on health differs the most between cohorts. Table 6 shows that the effect of education becomes weaker with age; odds ratios for levels of education higher than primary are lower the later you are born. This is likely to be the result of an expanding educational system; the average length in the educational system has been rising with time and therefore, the group with only primary education in young cohorts is more negatively selected than in older cohorts.

**Table 6** Logistic estimation of severe morbidity in Sweden 1990–2001. Over-night hospital care for any diagnosis, except records related to childbearing. Separate estimation for cohorts born 1945, 1955 and 1965

	1945			1955			1965		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Year (1990–2001)	<b>1,01</b>	<b>1,03</b>	<b>1,04</b>	<b>0,99</b>	<b>1,02</b>	<b>1,02</b>	<b>0,98</b>	<b>1,01</b>	<b>1,01</b>
Female	<b>1,04</b>	<b>0,92</b>	<b>0,94</b>	<b>1,18</b>	<b>1,12</b>	<b>1,12</b>	<b>1,39</b>	<b>1,35</b>	<b>1,35</b>
Divorced/widowed	<b>1,47</b>	<b>1,49</b>	<b>1,41</b>	<b>1,60</b>	<b>1,65</b>	<b>1,43</b>	<b>1,72</b>	<b>1,67</b>	<b>1,39</b>
Single	<b>1,39</b>	<b>1,34</b>	<b>1,29</b>	<b>1,37</b>	<b>1,41</b>	<b>1,27</b>	<b>1,13</b>	<b>1,11</b>	<b>0,98</b>
Child(ren) at home	<b>0,83</b>	<b>0,89</b>	<b>0,88</b>	<b>0,75</b>	<b>0,84</b>	<b>0,81</b>	<b>1,05</b>	<b>1,03</b>	<b>0,93</b>
Finland	<b>1,32</b>	<b>1,26</b>	<b>1,23</b>	<b>1,32</b>	<b>1,25</b>	<b>1,18</b>	<b>1,21</b>	<b>1,13</b>	<b>1,08</b>
Other Nordic	<b>1,21</b>	<b>1,15</b>	<b>1,13</b>	<b>1,26</b>	<b>1,18</b>	<b>1,14</b>	<b>1,21</b>	<b>1,10</b>	1,07
Former Yugoslavia	<b>1,17</b>	1,04	1,01	1,05	<b>0,91</b>	<b>0,89</b>	0,93	<b>0,85</b>	<b>0,84</b>
Greece	<b>0,80</b>	<b>0,68</b>	<b>0,66</b>	0,89	<b>0,76</b>	<b>0,76</b>	0,94	<b>0,78</b>	<b>0,79</b>
Turkey	<b>1,32</b>	1,06	0,91	<b>1,45</b>	<b>1,14</b>	1,01	<b>1,15</b>	<b>0,85</b>	<b>0,80</b>
Iraq	1,19	1,00	<b>0,76</b>	<b>1,27</b>	1,12	<b>0,85</b>	<b>1,72</b>	<b>1,31</b>	0,99
Iran	<b>1,52</b>	<b>1,30</b>	0,99	<b>1,37</b>	<b>1,25</b>	0,99	<b>1,16</b>	1,05	<b>0,82</b>
Chile	<b>1,13</b>	1,01	0,90	<b>1,23</b>	1,10	0,91	1,11	0,94	<b>0,80</b>
Somalia	0,45	0,37	0,25	1,36	1,30	0,98	<b>2,07</b>	<b>1,62</b>	1,18
Poland	0,97	0,95	<b>0,90</b>	1,01	0,99	0,93	1,04	0,95	<b>0,86</b>
Other Western Europe	0,94	<b>0,92</b>	<b>0,91</b>	0,99	0,96	0,96	1,05	0,99	0,95
Other Eastern Europe	0,96	0,93	<b>0,90</b>	0,96	0,94	<b>0,87</b>	0,94	0,91	<b>0,80</b>
Other Southern Europe	1,11	1,01	0,99	1,01	0,90	0,88	1,18	1,02	0,97
Other Western World	0,84	0,85	0,84	<b>0,82</b>	0,84	0,83	0,83	0,82	0,83
Middle East	<b>1,81</b>	<b>1,51</b>	<b>1,20</b>	<b>1,73</b>	<b>1,42</b>	1,07	<b>1,30</b>	0,96	<b>0,75</b>
North Africa	<b>1,46</b>	<b>1,24</b>	1,10	<b>1,22</b>	1,05	<b>0,86</b>	<b>1,33</b>	1,05	0,88
<b>Other Africa</b>	<b>1,13</b>	<b>1,06</b>	<b>0,91</b>	<b>1,10</b>	<b>0,99</b>	<b>0,80</b>	<b>1,06</b>	<b>0,87</b>	<b>0,69</b>
Central Asia	<b>1,33</b>	1,18	1,10	<b>1,29</b>	<b>1,20</b>	1,09	1,04	0,87	<b>0,78</b>
Far East	<b>0,62</b>	<b>0,55</b>	<b>0,52</b>	<b>0,82</b>	<b>0,72</b>	<b>0,70</b>	0,90	<b>0,75</b>	<b>0,74</b>
Other Latin America	0,86	<b>0,80</b>	<b>0,72</b>	<b>0,85</b>	<b>0,82</b>	<b>0,72</b>	<b>1,26</b>	1,15	1,03
Unknown	1,95	1,71	1,85	1,25	1,04	1,16	<b>2,34</b>	2,01	1,78
Secondary education		<b>0,97</b>	<b>0,98</b>		<b>0,86</b>	<b>0,90</b>		<b>0,69</b>	<b>0,77</b>
University max 3 years		<b>0,91</b>	<b>0,93</b>		<b>0,72</b>	<b>0,78</b>		<b>0,53</b>	<b>0,61</b>
University > 3 years		<b>0,84</b>	<b>0,85</b>		<b>0,67</b>	<b>0,74</b>		<b>0,49</b>	<b>0,56</b>
Second quintile		<b>0,92</b>	<b>0,94</b>		<b>0,90</b>	<b>0,95</b>		<b>0,93</b>	<b>0,98</b>
Third quintile		<b>0,75</b>	<b>0,78</b>		<b>0,74</b>	<b>0,79</b>		<b>0,77</b>	<b>0,83</b>
Fourth quintile		<b>0,63</b>	<b>0,66</b>		<b>0,66</b>	<b>0,71</b>		<b>0,68</b>	<b>0,74</b>
Fifth quintile		<b>0,54</b>	<b>0,56</b>		<b>0,58</b>	<b>0,63</b>		<b>0,61</b>	<b>0,66</b>
Unemployed			<b>0,89</b>			<b>0,90</b>			<b>0,97</b>
Welfare recipient			<b>2,13</b>			<b>2,54</b>			<b>2,32</b>

**Note:** Odds ratios. Statistical significance (5% level) in bold figures. Reference categories: Born 1965, male, married, no children in household, Swedish, primary education, first quintile income level, not unemployed, not welfare recipient.

Source: Statistics Sweden

The opposite holds for the effect of unemployment. Table 6 shows that the effect of unemployment becomes stronger with age, something which is also to a large extent a selection effect. Unemployment rates in young age groups is considerably higher than in older and more established groups in the labor market. Whereas unemployment is relatively common among young people, those unemployed in the older age groups constitute a more negatively selected group.

## 4 Discussion

There are certain variables in this analysis, such as nationality indicators (i.e. not Swedish born), gender and civil status indicators (not being male or married), for which the odds ratios decrease when education, income, unemployment and welfare dependency is controlled for. In particular when welfare dependency is introduced into the models, signs or magnitudes change for the female, single, divorced, widowed and foreign born categories. The reason is that welfare dependency is unevenly distributed across gender, civil status and nationality groups and therefore, in models without human capital and labor market status controls, being female, single, divorced, widowed or foreign born works as “poverty indicators”; i.e. they pick up the effects that a lack of economic resources have on health. Most epidemiological research has shown that poverty, also in well-developed welfare states, constitutes a powerful health risk. As we know, there are complicated, or at least interdependent, links between health and poverty, often in an evil circle: bad health because of poverty leads to more poverty because of bad health, and it frequently spills over to the next generation.

However, when it comes to nationality background, this analysis has shown that the feed-back patterns regarding health to poverty are less clear-cut. Practically all immigrant categories increase their “health scores” when checks for income, education and labor market status are introduced. When individuals who received welfare payments are analyzed separately from those who did not, the health-poverty links for immigrants look different. Only Finnish born welfare recipients had higher levels of severe morbidity than Swedish and most immigrant groups display significantly lower levels of severe morbidity, compared to native Swedes. The conclusion is that foreign born groups of welfare recipients have a different selection; they are not welfare recipients due to health problems to the same extent as native Swedes. When we look at foreign born individuals who did not receive welfare payments, the picture is mixed; some groups seem to be more unhealthy than native Swedes, some are healthier, and some groups are not statistically different.

When psychological diagnoses other than alcohol and drug abuse (which primarily seems to be a problem among the Nordic born) were analyzed, we found that results are very sensitive to whether education, income, unemployment and welfare dependency is controlled for. Without any such checks, practically all immigrant groups except had worse psychological health than Swedes. However, there is no indication of immigrants from refugee source countries having a worse psychological health situation than other immigrant categories. Nor were there any indications of more back and joint problems among labor immigrant categories.

The analysis shows no evidence of a systematic relationship between health status and the socioeconomic character of the country of origin. Country of origin *per se* does not seem to affect the risk for severe morbidity in Sweden, although a few nationalities seem to have health patterns that are different from the other. In practically all models, Finnish immigrants display the highest level of severe morbidity. Earlier studies have shown that Finnish immigrants have higher age-specific mortality than Swedish born or any other immigrant group, in particular alcohol-related mortality. Selective immigration and return migration patterns seem to be the main explanation to this (Theorell et al 1980, Ringbäck-Weitof, Gullberg & Rosén 1998). On the other hand, East Asians, Greeks, and immigrants from “Other Western World” (i.e. primarily Americans) display relatively low levels of severe morbidity. These immigrant groups are different both when it comes to the reason for immigration and the socioeconomic circumstances in the country of birth, and therefore, we cannot conclude that the health situation be-

fore immigration explains differences in severe morbidity between immigrant groups.

The main conclusion is instead that the socioeconomic situation in Sweden to a large extent explains why immigrants have higher levels of severe morbidity than Swedish born. Being an immigrant in Sweden is highly connected to a risk of low income and unemployment and we know that a lack of resources increases the likelihood of health problems. When the social situation in terms of education, income, unemployment and welfare dependency is controlled for, only Nordic immigrants are less healthy than native Swedes. Among welfare recipients, only Finns are less healthy than Swedish born, indicating that immigrants are differently selected into welfare dependency. Whereas people who belong to groups that are well integrated on the labor market to a large extent become welfare recipients because they have health-problems, people who belong to groups that are poorly integrated in the labor market to a large extent get health-problems because they lack economic resources. Weak labor market integration seems to be the main explanation to severe morbidity in non-Nordic immigrant groups.

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# Appendix A1

## Country groupings

### Other Nordic

Denmark, Iceland, Norway

### Other Western Europe

Andorra, France, Ireland, Liechtenstein, Luxembourg, Netherlands, Switzerland, United Kingdom, Germany, Austria.

### Other Eastern Europe

Albania, Bulgaria, Rumania Hungary, Czech Republic, Slovakia, Former Soviet Union.

### Other Southern Europe

Italy, Malta, Monaco, Portugal, San Marino, Spain, Vatican.

### Other Western World

Australia, Canada, New Zealand, United States

### Middle East

Israel, United Arab Emirates, Gaza, Yemen, Jordan, Kuwait, Lebanon, Palestine, Qatar, Saudi-Arabia, Syria, Bahrain, Oman, Cyprus

### North Africa

Algeria, Libya, Egypt, Morocco, Tunisia

### Other Africa

All other African countries except Somalia

### Central Asia

Afghanistan, Bangladesh, Bhutan, , Burma, India, Maldives, Mongolia, Nepal, Pakistan, , Sri Lanka

### Far East

Hong Kong, Indonesia, Japan, China, Taiwan, Cambodia, North and South Korea, Laos, Malaysia, Philippines, Brunei, Singapore, Thailand, Vietnam, Fiji, Kiribati, Micronesia, Nauru, Palau, Papua New Guinea, Salomon Islands, Tonga, Vanuatu, West Samoa.

### Other Latin America

South and Central America except Chile

## Appendix table A2

### Total number of observations and fraction of zero-income households by country of birth

<i>Country of birth</i>	<i>Total no. of observations</i>	<i>Percent zero-income households</i>
Sweden	3 586 919	0,21
Finland	134 685	0,71
Former Yugoslavia	27 900	1,25
Other Nordic	41 799	1,58
Turkey	17 734	1,58
Chile	14 163	1,79
Poland	21 250	1,86
Other Eastern Europe	21 308	2,54
North Africa	5 397	2,85
Iraq	5 888	3,21
Central Asia	7 021	3,28
Other Africa	11 291	3,35
Iran	26 544	3,76
Middle East	13 670	4,02
Far East	12 445	4,96
Other Western Europe	27 142	5,07
Somalia	601	5,66
Other Southern Europe	7 593	5,95
Other Latin America	8 881	6,14
Greece	8 168	9,89
Other Western World	6 343	13,9
Unknown	125	17,6

# Appendix table A3

## Ranking by infant mortality rate 1960 (per 1000 live births)

<i>Country</i>	<i>Infant mortality rate</i>
Other Latin America	187
Somalia	185
Other Africa	177
Iran	164
Turkey	163
North Africa	157
Central Asia	145
Far East	117
Iraq	117
Chile	107
Middle East	95
Former Yugoslavia	85
Poland	55
Other Southern Europe	44
Greece	40
Other Eastern Europe	39
Other Western Europe	31
Other Western World	25
Finland	21
Other Nordic	20
Sweden	17

**Note:** Values for larger groups of countries are weighted averages; only the larger immigration countries in each group are included; weights correspond to the immigrant population in Sweden 2001 according to the following (weights in parenthesis):

*Source:* World Development Chart 2003.

Other Nordic: Denmark (0,53), Norway (0,47)

Other Western World: USA (0,76), Australia (0,12), Canada (0,12)

Other Western Europe: Germany (0,72), United Kingdom (0,28)

Other Eastern Europe: Soviet Union (0,41\*), Hungary (0,39), Czech. (0,20)

Other Southern Europe: Italy (0,45), Spain (0,55)

Middle East: Lebanon (0,58), Syria (0,42)

Far East: Vietnam (0,28), Thailand (0,27), Korea (0,23), China (0,22)

Central Asia: India (0,40), Sri Lanka (0,21), Afghanistan (0,18), Pakistan (0,11), Bangladesh (0,11)

North Africa: Morocco (0,41), Tunisia (0,24), Egypt (0,19), Algeria (0,15)

Other Africa: Ethiopia(0,70), Gambia(0,16), Uganda(0,14)

Other Latin America: Colombia (0,30), Peru (0,18), Brazil (0,14), Argentina (0,10), Bolivia (0,09), El Salvador (0,09), Uruguay (0,09)

\*)Infant mortality rate in 1960 is not available for Soviet Union or Russia. Instead a non-weighted average for Estonia, Latvia, Lithuania, Belarus and Ukraine is used.

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Authors: Magnus Bygren & Ann-Zofie Duvander  
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