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*Source / Izvornik:* **Collegium Antropologicum, 2009, 33, 141 - 145**

**Journal article, Published version**

**Rad u časopisu, Objavljena verzija rada (izdavačev PDF)**

*Permanent link / Trajna poveznica:* <https://um.nsk.hr/um:nbn:hr:105:974611>

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*Download date / Datum preuzimanja:* **2024-08-04**



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# Healthy Migrant Effect within Croatia

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## ABSTRACT

*The aim of this study was to investigate the demographic determinants and health status of within-country migrants in Croatia. Data from the Croatian Adult Health Survey from 2003 (N=9,070) were used in the analysis. Migrants due to 1991–1995 war were excluded from the analysis and only those who indicated that the reason for their migration within Croatia was related to employment or other reasons were included. Prevalence of hypertension and increased body weight was calculated for each of the three migration-related groups (employment-related migrants, other reasons migrants and non-migrants). Migrants were on general younger than non-migrants (more than three quarters of migrant were under 50 years). Employment-related migrants had the lowest prevalence of measured hypertension, while other reasons migrants had the lowest prevalence of increased body weight. Non-migrants had the worse indices in almost every trait and age group that was analysed. The results support the healthy migrant hypothesis, even in case of migrants who migrated within Croatia. However, the results of this study show that health status of migrants may depend on the reasons for their migration, suggesting that future migration studies should record and take this into account.*

**Key words:** migration, Croatia, health, employment, hypertension, overweight, obesity, waist circumference

## Introduction

Human kind has gone a long way from the primordial hunter-gatherer societies that were experiencing substantial migrations. Modern humans are largely sedentary, on general experiencing migration less frequently in their lives. Epidemiological studies of migrants have early indicated that migration could have a strong impact on public health<sup>1</sup>, and that it may even cause a substantial bias in the cross-sectional studies that omit information on migration patterns<sup>2</sup>. Summarized conclusions from a number of other studies suggest that migrants have lower morbidity and mortality rates, in both immigration country and even after they have returned to their home country<sup>3–5</sup>. This phenomenon has been termed 'healthy migrant effect'. Several explanations were invoked, suggesting that migrants were in general healthier before they embarked (meaning that only the healthier would be able to emigrate in the first place), that they may experience benefits of the recipient country health care, and that upon return to their original home country they bring healthy lifestyle habits further supporting their health. Migrants sometimes even have lower mortality rates than the original population to which they migrated to<sup>6</sup>, despite the lower socio-economic

status to which they were exposed both in the home country as well as in the immigration country<sup>7</sup>. However, healthy migrant effect has been denied in some studies, suggesting that it may both be not very prevalent and not have very strong health effects<sup>8</sup>.

Croatian population experienced 1991–1995 war, during which roughly a third of the country or a total of ten counties were affected by the warfare and a substantial percent of the population from these ten counties experienced migration<sup>9,10</sup>. Although this type of migration was most likely associated with poor health outcomes, the main focus of the majority of epidemiological migration studies was performed during peace conditions, investigating the health status of migrants from the Central America into the USA<sup>8</sup>. Migrant studies in Europe were performed less frequently, with notable examples of the Netherlands<sup>2</sup> and Sweden<sup>11</sup>, where beneficial effects of migration were not as strong as elsewhere.

It should also be noted that the health effects of human migration are not necessarily beneficial. Type 2 diabetes and obesity were strongly increased in certain migrant groups that were showing migration with strong

urbanization tendency<sup>12</sup>. Additionally, population mixing was associated with increased incidence of certain types of cancer, namely leukaemia<sup>9</sup>. Therefore, the aim of this study was to investigate the demographic determinants and some cardiovascular health indicators among within-country migrants in Croatia, whose migration was related to employment opportunities or reasons other than 1991–1995 war in Croatia.

## Materials and Methods

The source of information for this study was the Croatian Adult Health Survey (CAHS). This is a large, cross-sectional study that was performed in 2003. CAHS is based on the representative household based sample of the adult population of Croatia (aged 18 or more years). The final sample consisted of 9,070 respondents, with a response rate of 84%. The sample was targeted to be representative for either entire Croatia or six geographical regions that were made by joining the county level data. Additionally, a complex weighting scheme was employed, in order to further increase the sample representativeness. Further details on the CAHS are given elsewhere<sup>13</sup>.

Inclusion criteria for this study were that the respondents indicated employment-related and other reasons-related migration in period 1991–2003. County of origin and immigration county were also recorded, in order to establish a pattern of migration within Croatia. All those respondents who indicated that the reasons for their migration was due to or was in any way related to the 1991–1995 war were excluded from the analysis. Additionally, migrants from other countries into Croatia were also excluded from the analysis.

Several health measures were compared – hypertension (measured by the public health nurses who were providing measurements for the CAHS and defined as having either systolic blood pressure over 140 mmHg or diastolic blood pressure over 90 mmHg), body mass index and waist circumference (also measured by the public health nurses). Educational status was also taken into

account, as well as the utilization of the preventive physical examination in a year preceding the study.

The sample was divided in four age groups (18–34, 35–49, 50–64, 65 and over), in order to show migrant health status stratified by age. The data were analysed using weighted estimates, meaning that each respondent represented a number of people from the adult Croatian population. Chi-square and Mann-Whitney test were used in statistical analysis, performed by SAS software version 8.02.

## Results

According to the CAHS sample, a total of 54 and 231 respondents reported migration due to employment or other reasons, respectively, accounting for 0.7% of Croatian adult population that has experienced migration due to employment and 3.4% of population that has experienced migration due to other reasons (Table 1). Most employment migrants were recorded migrating into the Vukovar-Srijem County (19.9%), city of Zagreb (11.8%), Primorje-Goran County (10.6%) and Split-Dalmatia County (10.1%) (Figure 1a). Most migrants due to other reasons were recorded migrating to Split-Dalmatia County (15.5%), the city of Zagreb (13.2%) and Brod-Posavina County (12.1%) (Figure 1b). Based on the CAHS sample, projected population size that experienced wartime related migration as a refugee was 329,863, while a total of 29,724 persons are projected to have migrated due to military recruitment and warfare involvement.

Most migrants were in the younger age groups, with 81.3% of employment-related and 78.9% of other reasons migration respondents belonging to 18–49 age group (Table 1). Both migration types were more common among men (51.3% of employment migrants and 51.8% of other reasons migrants were men, both  $P < 0.001$ ). Analysis of the elderly subgroup (aged over 65) migrating due to other reasons showed that they were the most commonly migrating into Primorje-Goran County (19.2%), Brod-Posavina County (18.1%) and city of Zagreb (13.4%). To-

**TABLE 1**  
PROJECTED POPULATION SIZES THAT EXPERIENCED EMPLOYMENT AND OTHER REASONS MIGRATION  
FROM THE CROATIAN ADULT HEALTH SURVEY 2003 SAMPLE

	Age group				Total
	18–34	35–49	50–64	65–101	
Non-migrants; n (%)	763,139 (92.4)	775,237 (95.6)	789,641 (98.1)	610,414 (98.4)	2,938,431 (95.9)
Employment related migration; n (%)	8,044 (1.0)	8,963 (1.1)	2,699 (0.3)	1,4661 (0.2)	21,172 (0.7)
Other reasons migration; n (%)	54,848 (6.6)	26,393 (3.3)	12,949 (1.6)	8,751 (1.4)	102,941 (3.4)
Total; n	826,031	810,593	805,289	620,631	3,062,544

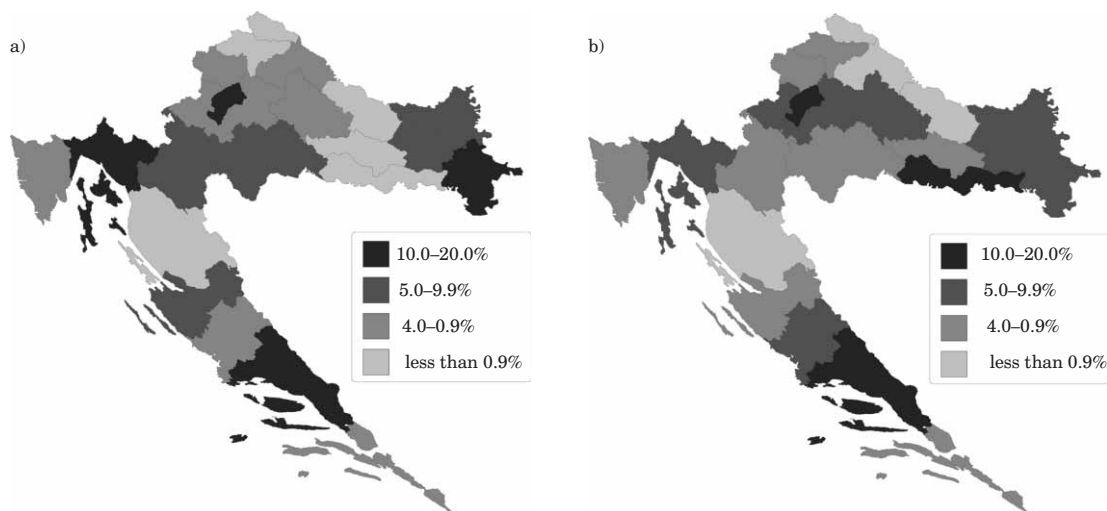


Fig. 1. Percent of migrants from the Croatian Adult Health Survey 2003 sample who migrated into the recipient county for a) employment-reasons and b) other reasons.

tal of 36.2% of elderly who migrated for other reasons migrated to the coastline counties, suggesting that migration of elderly to the coastline is more prevalent than expected on the basis of the county population size based on the Census of population 2001 ( $P < 0.001$ ). Both migrant types were having higher education level than non-migrants (total of 23.5% of employment-related migrants and 20.5% of other reasons migrants had a college or university degree, as compared to 13.2% among non-migrants;  $P < 0.001$ ).

After sample breakdown in four age groups, the results indicated that employment-related migrants were the least often having measured hypertension; other reasons migrants were having intermediate prevalence of hypertension, while non-migrants had the highest prevalence of hypertension (Table 2). However, in the youngest age group (18–34) prevalence of hypertension was the lowest in non-migrants, intermediate in employment-related migrants and the highest in other reasons migrants (Table 2). In contrast, body weight showed somewhat different pattern, suggesting that the prevalence of overweight and obesity was the lowest in other reasons migrants, intermediate in employment-related migrants and the highest in respondents who did not report migration at all (notably, employment-related migrants were having the highest prevalence of obesity) (Table 2).

Comparison of waist circumference indicated similar result as the body mass index classes – non-migrants were having the highest waist circumference in both genders, employment-related migrants were intermediate, while the other reasons migrants had the lowest waist circumference ( $P < 0.001$  for all comparisons). Finally, the utilization of the general physical examination in a year preceding the study was much higher in both migrant groups, when compared to non-migrants. This effect was observed in the entire sample as well as after the sample breakdown in four age groups (Table 3).

## Discussion

The results of this study suggest that respondents from the CAHS who reported non-wartime, within country migration were on general having better health indices, supporting the presence of 'healthy migrant effect' even within one country (most published studies so far compared the health status of foreign migrants into the recipient country<sup>3,5</sup>). However, this study also clearly identifies that the reason for migration may be the modulator of the healthy migrant effect. Therefore, one of the main recommendations from this study is to record and take into account the reasons for migration rather than collecting the information on migration only.

This study also showed that migration is associated with higher preventive examination utilization, thus suggesting that migrants might be more prone to preventive actions despite their better health status. This finding may, however, be modulated by the higher educational status of migrants, compared to the non-migrant population, which is a factor that is often associated with the use of preventative medical services<sup>14</sup>. Unfortunately, the cross-sectional nature and of this study does not allow any further conclusions, as one of the possible explanations for this could be that employers were requesting physical examinations before candidates could be employed, thus biasing and overestimating the physical examination uptake in the employment-related migrant group.

Migration pattern of Croatian population from this study supported widely spoken urbanization tendency, with most respondents moving into counties with large cities, such as Zagreb, Split, Rijeka, and Osijek. At the same time, several counties were constantly in the lower end of the migration scale, suggesting that immigration into these counties was very rare or inexistent; these included Virovitica-Podravina county, Međimurje and Lika-Senj county (Figure 2). Migration of elderly seemed to

**TABLE 2**  
HYPERTENSION, OVERWEIGHT AND OBESITY PREVALENCE IN THREE MIGRATION GROUPS FROM THE CROATIAN ADULT HEALTH SURVEY 2003 SAMPLE

	Age group				Total
	18–34	35–49	50–64	65–101	
<b>Hypertension; n (%)</b>					
Non-migrants	84,152 (10.9)	228,283 (29.4)	430,006 (54.2)	416,016 (67.9)	1,158,457 (39.2)
Employment-related	1,816 (16.7)	893 (6.6)	1,949 (37.0)	2,377 (56.3)	7,036 (20.7)
Other reasons related	14,090 (21.0)	8,441 (25.7)	6,440 (44.5)	8,646 (66.3)	37,617 (29.5)
<b>Overweight; n (%)</b>					
Non-migrants	183,477 (23.8)	322,236 (41.6)	353,442 (44.7)	283,180 (46.4)	1,142,336 (38.7)
Employment-related	2,038 (23.1)	3,716 (27.3)	2,582 (49.0)	1,564 (37.1)	9,900 (31.0)
Other reasons related	13,346 (19.9)	12,996 (41.1)	7,116 (50.3)	5,331 (40.9)	38,790 (30.8)
<b>Obesity; n (%)</b>					
Non-migrants	56,543 (7.3)	159,194 (20.6)	235,159 (29.9)	162,507 (26.7)	613,404 (20.9)
Employment-related	828 (9.4)	3,399 (25.0)	1,160 (22.0)	1,478 (35.0)	6,866 (21.5)
Other reasons related	9,740 (14.5)	5,170 (16.3)	2,029 (14.3)	3,199 (24.5)	20,138 (16.0)

**TABLE 3**  
THE UTILIZATION OF PREVENTIVE PHYSICAL EXAMINATION WITHIN THE YEAR PRECEDING THE SAMPLING AMONG THE THREE INVESTIGATED MIGRATION GROUPS FROM THE CROATIAN ADULT HEALTH SURVEY 2003 SAMPLE

Migration group; n (%)	Age group				Total
	18–34	35–49	50–64	65–101	
Non-migrants	146,056 (18.9)	151,147 (19.4)	140,196 (17.7)	74,108 (12.1)	511,507 (17.3)
Employment-related	2,220 (20.4)	3,878 (28.5)	1,160 (22.0)	1,092 (25.9)	8,350 (24.6)
Other reasons related	18,845 (28.1)	3,365 (10.3)	3,284 (22.7)	2,935 (22.5)	28,429 (22.3)
Total; n	167,121	158,390	144,640	78,135	548,285 (100.0)

show a different pattern, with more elderly moving to the seaside than expected on the basis of size of the county population. This result is even more interesting knowing that the CAHS did not cover the main hypothetical elderly immigration target – islands. This means that the extent of mainland-to-coastline among elderly could be even stronger (more prevalent) in reality than the one shown by this study.

Healthy migrant hypothesis has been subjected to substantial amount of discussions and dispute<sup>8,15</sup>. This was mainly in the area of statistical and methodological difficulties, including poor enumeration and similar ana-

lysis artefacts. One of the most intriguing findings is that the first-generation immigrants were healthier than people of similar ethnic backgrounds who were born in the recipient country, but their health seems to diminish gradually over time<sup>16</sup>. Possible factors involved in this deterioration were poverty, living in substandard housing, poor medical care access, adoption of an unfavourable lifestyle patterns associated with overall lower socio-economic status, poor diet, smoking, and substance abuse<sup>16</sup>. This result could indicate that the migrants are indeed selected from the healthier population groups, but that the mechanism of the healthy migrant hypothesis is the result of the interaction of better initial health



status with the favourable socio-economic and health related conditions of the recipient country. This possible explanation could easily be applied to the numerous situations in which healthy migrant effect was described (indicating that the joint effects of better initial health and favourable conditions were met), as well as the possibility in which the healthy migrant effect was not recorded (possible resulting in the disunion of these two main effects). Disentangling the true explanation of the healthy migrant hypothesis is impossible from the cross-sectional nature of data, such as CAHS. Therefore, the healthy migrant hypothesis should be analysed in the follow-up, prospective study design, enabling the calculation of risk and the possibility to establish timeline component. Additionally, any in-depth migration study must record much more information than the regular public healthy surveys do, including migration dynamics, and any changes in the lifestyle and socio-economic status of respondent that occurred as a consequence or was strongly associated with the migration. Another approach to investigation of healthy migrant effect could be done in a

case-control study design, where migrants could be compared to non-migrants using a number of health indicators, but also taking into account detailed information on individual migration pattern and reasons.

The main shortcoming of this study is the low percent of respondents who reported migration, resulting in the possibility of low precision of survey results. Overall results indicate that migration is relatively infrequent phenomenon in Croatian population, with something over 3% of people who have migrated from 1991 and 2003 for reasons other than those related to the 1991–1995 war. Migrants were younger, and largely seemed to be healthier than non-migrant population, supporting healthy migrant effect even within single country migrants.

### Acknowledgements

The study was supported by the Ministry of Science, Education and Sport of the Republic of Croatia (108-1080135-0264).

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### UČINAK MIGRACIJE UNUTAR HRVATSKE NA ZDRAVSTVENO STANJE MIGRANATA

#### SAŽETAK

Cilj ove studije bio je istražiti demografske odrednice i zdravstveno stanje osoba koje su migrirale unutar Hrvatske. Podaci su dobiveni iz Hrvatske zdravstvene ankete iz 2003. godine (HZA), u koju je bilo uključeno ukupno 9.070 ispitanika. Ispitanici koji su prijavili migraciju vezanu uz rat koji je trajao od 1991.–1995. godine bili su isključeni iz studije, dok su oni koji su prijavili migraciju zbog zaposlenja ili zbog drugih razloga bili uključeni u studiju. Istražena je pojavnost povećanog krvnog tlaka i povećane tjelesne težine kod sve tri skupine (migranti zbog zaposlenja, zbog drugih razloga te ispitanici koji nisu prijavili migraciju). Migranti su bili mlađi (više od tri četvrtine migranata bilo je mlađe od 50 godina). Migranti zbog zaposlenja imali su najmanju pojavnost povećanog krvnog tlaka, a migranti zbog drugih razloga imali su najmanju pojavnost povećane tjelesne težine. Ispitanici koji nisu migrirali imali su najlošije pokazatelje u gotovo svakoj dobnoj skupini i za svako svojstvo koje je bilo istraživano. Rezultati potvrđuju pozitivnu povezanost migracije i zdravstvenog stanja, potvrđujući hipotezu zdravih migranata. Međutim, rezultati također ukazuju na to da bi se u budućim migracijskim studijama trebali bilježiti i analizirati i razlozi migracije, koji mogu utjecati na zdravstveno stanje migranata.