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Original article

Country of origin and bariatric surgery in Sweden during 2001–2010

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Abstract

Background: The prevalence of obesity, as well as use of bariatric surgery, has increased worldwide. The aim of the present study was to investigate the potential differences in the use of bariatric surgery among Swedes and immigrants in Sweden and whether the hypothesized differences remain after adjustment for socioeconomic factors.

Methods: A closed cohort of all individuals aged 20–64 years was followed during 2001–2010. Further analyses were performed in 2 periods separately (2001–2005 and 2006–2010). Age-standardized cumulative incidence rates (CR) of bariatric surgery were compared between Swedes and immigrants considering individual variables. Cox proportional hazards models were used in univariate and multivariate models for males and females.

Results: A total of 12,791 Swedes and 2060 immigrants underwent bariatric surgery. The lowest rates of bariatric surgery were found in immigrant men. The largest difference in CR between Swedes and immigrants was observed among low-income individuals (3.4 and 2.3 per 1000 individuals, respectively). Adjusted hazard ratios (HRs) were lower for all immigrants compared with Swedes in the second period. The highest HRs were observed among immigrants from Chile and Lebanon and the lowest among immigrants from Bosnia. Except for Nordic countries, immigrants from all other European countries had a lower HR compared with Swedes.

Conclusions: Men in general and some immigrant groups had a lower HR of bariatric surgery. Moreover, the difference between Swedes and immigrants was more pronounced in individuals with low socioeconomic status (income). It is unclear if underlying barriers to receive bariatric surgery are due to patients' preferences/lack of knowledge or healthcare structures. Future studies are needed to examine potential causes behind these differences. (Surg Obes Relat Dis 2015;▮:00–00.)

Keywords: Obesity; Bariatric surgery; Country of origin; Immigrants; Socioeconomic status

Similar to many other Western European countries, there has been an increase in immigration to Sweden during the last decades. In 1990, 11.3% of the total population were first-generation immigrants compared with 14.7% in 2010 [1]. During the 1950s and 1960s, the majority of immigrants came from Italy, Finland, Greece, and the former Yugoslavia to meet an increasing need for industrial labor, whereas immigrants during the 1970s and 1980s were mainly political refugees from Poland, Turkey, Latin America, the Middle East, Asia, Africa, and the former Yugoslavia [2]. Thus, immigrants in Sweden are very heterogeneous regarding reason for emigration, educational

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level, social class, and health status. In general, immigrants have a higher risk for health problems compared with the majority population [2,3]. Decline of the psychosocial status [4] and changes in lifestyle might be possible explanations. Changes in lifestyle may include unhealthy dietary patterns, which might explain why many immigrant groups in Sweden have higher rates of obesity [5–7].

The prevalence of obesity, defined as body mass index (BMI) ≥ 30 kg/m^2, has doubled in Sweden over the past 20 years [8,9]. Obesity is associated with higher mortality, decreased quality of life, and greater overall costs to the healthcare system due to its numerous co-morbidities, such as diabetes, hypertension, cardiovascular disease, sleep apnea syndrome, and degenerative skeletal diseases [10,11]. Morbid obesity (BMI ≥ 40 kg/m^2) is generally refractory to diet, exercise, and drug therapies [12,13]. Bariatric surgery often results in substantial weight loss, resolution and/or improvement of obesity-related co-morbidities, reduced mortality, and improved quality of life [14–16]. In Sweden, individuals with BMI ≥ 40 kg/m^2 or those with BMI ≥ 35 kg/m^2 plus obesity-associated co-morbidity are eligible for bariatric surgery [17]. Studies from countries with private healthcare insurance systems have found that although obesity is more prevalent among economically disadvantaged and ethnic minorities, these patients undergo bariatric surgery less than expected [18–20]. Sweden has universal healthcare insurance, which means that financial reasons should not be a major obstacle in the probability of receiving bariatric surgery. However, earlier studies found that individuals with the lowest socioeconomic status undergo bariatric surgery at a lower rate [21]. In addition, immigrants in general have a higher risk for many health problems [2,3]. The authors' hypothesis was that there are, despite medical eligibility, still differences associated with country of origin and the rate of bariatric surgery in Sweden. The primary aim of the present study was to investigate the potential differences in the use of bariatric surgery by country of origin and gender in Sweden during 2001–2010. The secondary aim was to investigate whether the hypothesized differences in bariatric surgery remain after adjustment for socioeconomic factors. To the authors' knowledge, this is the first nationwide study that compares differences in bariatric surgery rates between Swedes and immigrants.

Materials and methods

Data used in this study incorporated longitudinal hospitalization data for the entire population from the Swedish Inpatient Register, provided by the National Board of Health and Welfare. Population-wide documentation regarding demographic and socioeconomic variables was obtained from the Total Population Register, provided by Statistics Sweden, the Swedish government-owned census bureau. Additional individual-level linkages in the database included data from the national Cause of Death Register [22] and the Immigration Register (to identify dates of immigration and/or emigration). All linkages were performed by the use of an individual national identification number that is assigned to each permanent resident in Sweden for their lifetime. This number was replaced by a serial number for each person to provide anonymity.

The follow-up period started on January 1, 2001, and proceeded until first hospitalization for bariatric surgery, death, emigration, or the end of the study period on December 31, 2010. Further analyses were done in 2 periods separately (i.e., 2001–2005 and 2006–2010) as there was a large increase in the number of surgeries during the second period. Because the analyses were done as closed cohorts, the total number of operated cases for the period 2001–2010 was not the same as the sum of the number of cases for 2001–2005 and 2006–2010.

Outcome variable

The outcome variable was bariatric surgery. The Swedish Inpatient Register was used to identify main diagnoses of obesity and operation in the study population during the study period. The *International Classification of Diseases,* Tenth Revision (ICD-10), was used to identify patients with a diagnosis of obesity (ICD-10, E66) [23]. The Swedish Classification of Operations and Major Procedures was used to identify patients undergoing bariatric surgery: operation codes JDF00-JDF01, JDF10-JDF11, and JDF20-JDF21. The subtypes of bariatric surgery were defined as gastroplasty (JDF00-JDF01), gastric bypass (JDF10-JDF11), and gastric banding (JDF20-JDF21). All the operated cases (events) had both an ICD code for obesity and an ICD code for bariatric surgery.

Individual variables

The individual variables were defined at the initial year for each study period:

Gender: Male or female.

Age: Categorized as 20–29, 30–39, 40–49, or 50–64 years.

Family income: Family income was calculated as annual family income divided by the number of members in the family. The income calculation was weighted, taking the ages of the family members into account. For example, children were given lower consumption weights than adults. The calculation was performed as follows: the sum of all family members' incomes was multiplied by the individual's consumption weight divided by the family members' total consumption weight [24]. The final variable was calculated as empirical quartiles from the distribution [25] and classified as low, middle-low, middle-high, and high. Family's consumption weight was calculated as follows: 1.00 for the first adult, .51 for the second adult, .62 for the