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Registration of immigrants' educational attainment in Sweden: an analysis of sources and time to registration

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Abstract

Swedish register data include a number of variables related to individuals' educational level. In contrast to many other countries, the registers even include information on the education obtained by immigrants outside Sweden. For studies on immigrants' labour market integration, this is an important asset. However, the quality of data in terms of the source and extent of data coverage for different migrant groups is less well-known. This explorative paper investigates the sources of information for immigrants' educational levels, and examines the time taken until their education is registered for different migrant groups. Employing register data on immigrants who arrived in Sweden in the period 2000–2016, the methods include a descriptive analysis of the main sources of educational attainment, and event history analysis to estimate survival rates for not being in the educational registers. The results indicate that the 'survey of foreign-born' and the Swedish Public Employment Service are the two major sources of information regarding immigrants' educational attainment in their year of arrival. However, the survey's non-response rate is high. Results from the event history analysis show that as the length of stay in the country increases, the share of immigrants with missing educational information decreases substantially, especially after 2 years, with rather large differences for groups of immigrants. For the majority of refugees and family migrants, 2 years after arrival their educational levels are registered, while the educational levels of many Nordic migrants remained unregistered even after 10 years. In addition, attained education of women and younger immigrants is more often registered. Measuring the educational level of refugees and family migrants from 2 years after arrival can provide a reasonable representation of their educational characteristics at the time of migration, while it is questionable to use Nordic migrants' educational level at any time.

Keywords: Swedish register data, Educational registers, Missing educational information, Immigrant population, Lack of registration

Introduction

Since the 2000s, Sweden has received an unprecedented flow of immigrants; on average 100,000 new immigrants each year (Statistics Sweden, 2018a). Having information on the educational level of this rising immigrant population is crucial for three main reasons.

First, labour market integration is important for the overall integration of immigrants in Sweden because it provides a source of income and enhances immigrants' social capital (Bäckman & Franzén, 2007; Lundborg, 2013). In this regard, education is the primary determinant of an individual's labour market integration (Becker, 1994). However, many studies have found that immigrants fare worse in labour markets compared to Swedes with a comparable educational level. A lack of recognition of foreign qualifications and transferability issues are two main reasons for immigrants' poor performance in the Swedish labour market (Dahlstedt & Bevelander, 2010; Manhica et al., 2019; Nordlund et al., 2015; Tibajev & Hellgren, 2019).

The recognition and validation of foreign credentials improves an employer's knowledge about immigrants' levels of education, thereby positively affecting immigrant labour market outcomes (Dahlstedt & Bevelander, 2010; Damelang & Abraham, 2016; Tibajev & Hellgren, 2019). Sweden has a free, voluntary validation system for all European and non-European immigrants (Damelang & Abraham, 2016; Tibajev & Hellgren, 2019). The recognition process for highly educated immigrants is handled by the Swedish Council for Higher Education (UHR), which controls the authenticity of diplomas and the accreditation of education providers and evaluates the field and level of education for the purpose of determining the degree equivalent in the Swedish system. Once all the necessary documents have been provided and submitted, the process, depending on the workload of the council, may take from three to seven months (Swedish Council for Higher Education, 2021). Tibajev and Hellgren (2019) found that immigrants who validated their educational qualifications within their first 10 years of residency in Sweden had 4.4% higher employment rates than those who did not.

Given that countries have different educational systems, the transferability of foreign qualifications is another barrier to immigrant labour market integration. A pre-immigration educational qualification may not be fully transferable in the host country, causing it to lose value (see Basilio et al., 2017; Hardoy & Schøne, 2014; Kanas & Van Tubergen, 2009; Nordlund et al., 2015). Foreign educational qualifications may contain significant region-specific skills that are less relevant in the host country, specifically for non-western immigrants (see Basilio et al., 2017). The issue of relevance also differs according to immigrants' purposes for migrating, with labour immigrants who are selected based on working criteria performing relatively better in host country labour markets (Aydemir, 2011; Irastorza & Bevelander, 2017). In such studies, educational attainment is a pivotal determinant when examining immigrants' labour market outcomes and identifying difficulties related to their education.

Second, in many cases, pre-immigration education is not fully acknowledged in Sweden (Behtoui, 2004; Duvander, 2001; Nordlund et al., 2015). Immigrants are instead expected to obtain further education in Sweden to enhance their local human capital. Therefore, based on their educational level upon arrival, many attend different levels of studies. To understand and explore the educational trajectories that immigrants follow in countries of destination, it is important to have the correct information on their educational level upon arrival. Having this information also helps researchers examine the effects of other factors—such as discrimination—that

negatively affect immigrants' labour market outcomes regardless of their locally obtained education (see Duvander, 2001).

Third, beyond the economic aspect of education, knowledge of immigrants' education plays an essential role in evaluating their social capital upon arrival. Many immigrants, particularly family immigrants and refugees, who make up a large share of the total immigrant population, are neither in the labour market nor in school during their first few years after arrival (Bevelander & Irastorza, 2014). Thus, their educational attainment upon arrival may be a good indicator of their socioeconomic status.

Sweden is one of few European countries with rich longitudinal register data containing different educational registers. Information on highest completed level of education, field of study, participation in Swedish language courses for immigrants (SFI), enrolment in studies and type of studies is collected by the Swedish Educational Registration (Utbildningsregistret, UREG). To enhance the quality of educational registers, the educational information for every registered individual is obtained and updated from different sources (Statistics Sweden, 2013, 2016a). For immigrants, the data even include information on education obtained outside Sweden, providing a unique opportunity for researchers to examine diverse aspects of immigrants' educational trajectories.

Nevertheless, despite the availability of rich Swedish register data, a recent study by Saarela and Weber (2017) showed that for a large share of Finnish migrants, educational information prior to immigration (particularly recently arrived immigrants) was either missing or misclassified. However, misclassification issues greatly diminished 5 years after arrival. Careja and Bevelander (2018), in their study on the application of population registers for migration research, contended that register data on migrants' pre-immigration education may be biased, as such data tend to be self-reported, and migrants may not accurately report their education.

Imperfection in educational attainment in register data is not peculiar to Sweden; in Denmark, for instance, information on the highest level of education for immigrants who arrived after 2006 is missing unless migrants obtained education in Denmark (Nielsen et al., 2017). Therefore, Statistics Denmark conducts an extensive survey to collect information about migrants' educational attainment. However, the response rate for the survey is rather low, leading to a high share of missing educational attainment among migrants (Mørkeberg, 2000). Similarly, in Norway (Jentoft, 2014) and the Netherlands (Linder, 2019), education obtained in other countries is largely missing in the registers. Jentoft (2014) has applied an imputation method to estimate and replace missing educational data in the Norwegian registers.

Given this contradictory picture—rich Swedish register data, but a large share of missing educational data among the immigrant population, particularly upon arrival—the aim of this paper is to examine the extent to which the highest completed educational level of immigrants is covered by Swedish register data, by using a longitudinal approach from the time of arrival until 10 years later. In doing so, I address two questions. First, what are the sources of information on immigrants' educational attainment in their year of arrival? Second, to what extent does the share of missing information on immigrants' educational attainment improve with longer residency in Sweden and how does this vary by migrant groups?

Data and methods

In order to address the first research question, I reviewed and analysed existing government reports on the Swedish Educational Register. These reports (Statistics Sweden, 2013, 2016a) provide comprehensive information regarding the methods used to register and classify an individual's education, the sources of education and the reasons for missing information in the registers. Second, I used the population registers to descriptively identify the main sources of educational attainment for immigrants arriving in Sweden in the period 2000–2016 who were 18–65 years old at the time of immigration. For these cohorts, I investigated the sources of information on highest completed education in the year of arrival.¹

In order to address the second research question, a longitudinal design was used to analyse the timing of the registration of educational attainment for immigrants between the ages of 18–65 whose educational level was not registered upon arrival in the country. To do so, I used event history analysis (EHA), which contains a variety of statistical techniques to analyse the occurrence and timing of events (Allison, 2010). The use of EHA is well-suited to addressing questions of how long it takes until a certain event occurs, in this case, the time to register an immigrant's educational level. Using EHA, the descriptive statistic of survival functions, which measure the probability of not experiencing the event by time t , is estimated (Rabe-Hesketh & Skrondal, 2012, p. 751). The current paper employs EHA in a descriptive way by using survival functions for different migrant groups and does not estimate determinants using multivariate models.

The data were constructed in person-year format, with a record for each individual in every year. The individuals in the risk set are immigrants with missing educational information in the year of arrival in Sweden. Immigrants who either emigrated, died or did not have their education registered by the end of the observation period were right-censored. Table 4 in the Appendix shows that men, younger migrants, and Nordic migrants are more often censored. As the latest register is for 2016, for this part of the analysis, the study population was limited to immigrants who entered Sweden in the period 2000–2006, who were then followed for 10 further years.

I used a collection of longitudinal register data compiled by Statistics Sweden, accessible through Statistics Sweden's system of Microdata Online Access (MONA), which includes geographic, demographic and socioeconomic registers on the entire Swedish population. Individuals have an anonymised ID, enabling the merging of different data sets. The longitudinal integrated database for health insurance and labour market studies (LISA), the longitudinal database for integration studies (STATIV) and the register of the total population (RTB) were the main data sets used in this study. LISA contains socioeconomic information for individuals aged over 15 who are registered in Sweden as of 31 December of each year. The information in LISA is collected from several individual registers (Statistics Sweden, 2016b). For this study, the most important registers in LISA were those obtained from the Swedish Education Register, namely the highest completed level of education (Sun2000niva) and the source of educational information

¹ Many refugees stay in Sweden for a long time before obtaining a residence permit. However, as I did not know their actual year of arrival, I used their year of registration into the Swedish registers instead.

(Källkod). Information in the educational register on field of study (Sun2000Irn) and educational enrolment (StudDelt) was not used in this research.

Information on reasons for immigration and country of origin was derived from STATIV (Statistics Sweden, 2018b). Here, I distinguished between labour migrants, refugees, students and family migrants. For immigrants who did not need a residence permit, I created three alternatives based on their country of origin: European Union (EU) immigrants, Nordic immigrants and non-EU immigrants. For Nordic and EU immigrants, the reasons for migration are not registered and such immigrants have the right to work, study and live in Sweden without needing a residence permit (Swedish Migration Agency, 2020). From RTB, the year of birth, gender and year of first immigration were used. Throughout this paper, an immigrant is defined as a foreign-born individual. It is worth noting that due to the lack of incentives for reporting emigration from Sweden, there is the potential problem of over-coverage in register data, which is the case when migrants are registered to reside in Sweden but they no longer do so (Monti et al., 2020). According to Statistics Sweden (2015), over-coverage has been estimated to be around 4–8% of the total foreign-born population in Sweden. Over-coverage can therefore be one of the reasons for the high rate of missing educational information in register data.

Results

Registration of individuals' educational level in Sweden

In the following sections, government reports on the system of educational registers in Sweden are reviewed, providing insights into the organisation of the registration of education, the sources of educational attainment, as well as the classification methods of educational attainment. This sets the groundwork for the subsequent section, where the sources of immigrants' educational information in the year of arrival are explored.

Classification of education

For each registered inhabitant in Sweden, education-related variables are collected and registered by UREG. All information collected by this register is classified based on a standard category, the so-called SUN classification (*Svensk UtbildningsNomenklatur*), in accordance with the international standard classification of education (ISCED). The SUN classification consists of two modules: a level module that shows the highest completed education, starting at primary education for less than 9 years (code 1) and continuing to the doctorate as the highest level of education (code 7). The orientation module refers to the field of education and consists of three digits. The first digit refers to the highest level of study and follows the level module, while the second and third digit refer to the field of study. To obtain a SUN code, an individual's education must be complete (Statistics Sweden, 2013, 2018c).

Educational information collected in UREG is updated continuously and is reported by Statistics Sweden on 31 December of each year. Figure 1 shows the share of missing educational information for each year by month of arrival. The share of missing educational information is considerably higher for those arriving in the second half of the year. Therefore, it may be concluded that the lag in registration is an important reason for the high share of missing values on education in immigrants' year of arrival.

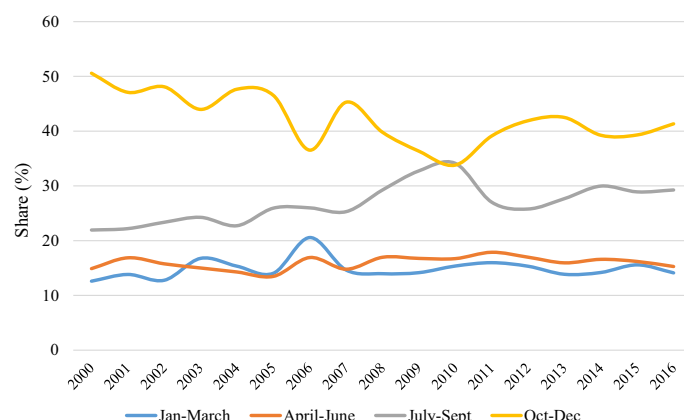


Fig. 1 Share of migrants with missing educational information by month of arrival. Variables measured on December 31 in year of arrival

In addition to the lag in registration, Statistics Sweden (2018c) states other reasons that lead to uncertainty in statistics on how the population is educated:

- Classification of formal education only: information collected in UREG is compiled and categorised according to SUN categories, which only cover formal education. Any education inconsistent with the SUN classification does not result in that education being registered. For instance, apprenticeships, short courses, vocational and labour market-related educational training courses are not approved by SUN. Individuals having completed these types of education are assigned a missing value on education in UREG.
- Misclassification: information collected via UREG may be coded incorrectly, resulting in a missing value in the SUN classification. However, by enhancing the coding methods and increasing the sources of information, Statistics Sweden constantly tries to reduce coding errors.

Sources of registration

UREG collects information regarding individuals' highest completed educational level from a wide range of sources, which have increased over time (see Table 5 in the Appendix). These sources mostly fall into three categories: administrative sources, a survey of foreign-born and different register databases.

Based on a classification of the level of precision of the information obtained from different sources, Statistics Sweden assigns different codes to each source to indicate its quality. Sources with higher codes have higher quality. Sources providing three-digit information on both level and orientation (see the previous section) denote higher quality, while other sources, especially those that are specific to the foreign-born population, and that provide information on the level module only are considered to be of lower quality (Karlsson, 2020).

The educational registers are updated annually, and if multiple educational entries for an individual are found, the highest completed education is preferred (Statistics Sweden, 2016a). When individuals have multiple educational entries at the same level, the following order is applied in selecting the highest educational level (Statistics Sweden, 2013, 2016a, 2016b; Voss, 2019):

- The most recent year of obtaining the highest completed education;
- Education from qualitatively better sources (as indicated in the previous paragraph);
- The highest code for the field of education, that is, codes assigned in the orientation module in the SUN classification.

An exploration of sources of educational attainment for cohorts of recent immigrants

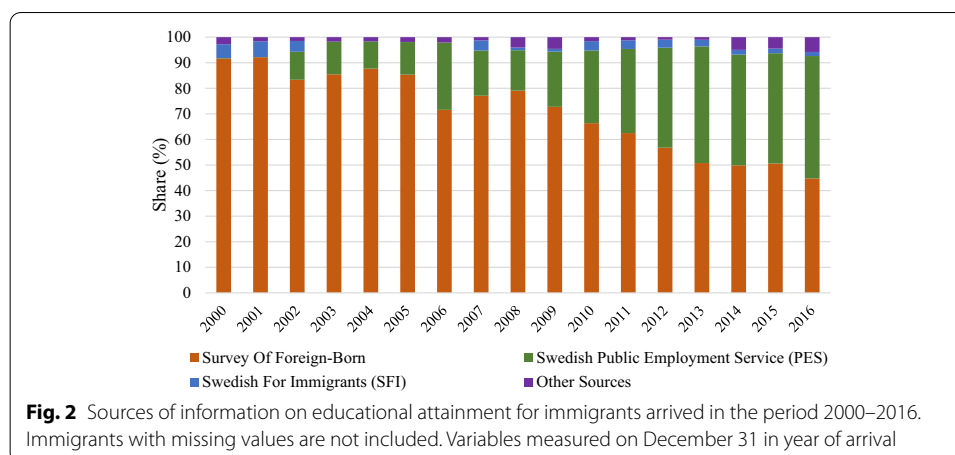
This section examines the sources of the highest completed educational level of seventeen groups of immigrants to Sweden. Table 1 shows the educational attainment of the nearly 900,000 immigrants who arrived in the period 2000–2016, with educational attainment measured in the year of arrival. In each year, about half of all immigrants have missing educational information upon arrival, with some variation over the years without seeing a clear improvement over time.

Figure 2 shows the main sources of information for immigrant educational attainment in the year of arrival. Among the different available sources (see Table 5 in the Appendix), the so-called survey of foreign-born and the Swedish Public Employment Service (PES)

Table 1 Educational level of immigrants aged 18–65 at arrival, measured in year of arrival

Year of arrival	Missing educational information	Primary or lower secondary education	Upper secondary education	Tertiary education	Total	
	%	%	%	%	N	%
2000	52.2	7.1	11.2	29.4	25,666	100
2001	52.5	7.3	11.0	29.1	26,602	100
2002	48.2	8.7	12.6	30.4	29,361	100
2003	52.5	8.4	11.4	27.7	30,264	100
2004	51.6	7.6	11.7	29.1	30,298	100
2005	58.5	6.1	10.1	25.3	33,908	100
2006	62.1	8.6	9.4	19.8	54,216	100
2007	53.1	8.6	11.7	26.6	56,919	100
2008	54.6	7.5	10.8	27.1	55,012	100
2009	56.2	8.2	10.1	25.5	56,944	100
2010	53.0	10.6	10.4	26.0	55,471	100
2011	47.9	12.7	11.9	27.4	51,353	100
2012	45.2	14.0	12.8	28.0	54,497	100
2013	43.0	16.0	12.5	28.5	59,261	100
2014	37.4	17.7	14.0	30.9	69,796	100
2015	38.8	18.0	13.7	29.4	73,952	100
2016	41.8	17.5	13.3	27.5	96,442	100
Total	48.6	12.1	11.9	27.4	859,962	100

Source: Swedish register data, author's calculations



are the two major sources that supply information on immigrants' educational levels at time of arrival. The share of registered education coming from the survey has decreased over time. Until 2013, the survey of foreign-born was the major source, while little information was obtained from the PES, particularly in 2000 and 2001 (0.26% and 0.08% of the total, respectively). Since 2013, however, PES has become almost equally important as the survey of foreign-born. SFI is another source of information, although its contribution to the educational register is very small. In the period 2000–2003, almost 5% of the information about immigrants' educational levels was obtained from SFI, decreasing substantially in the 3 years after that. Since 2007, with some variation, only a small share of registered education comes from SFI. Since the survey of foreign-born and PES are regarded as qualitatively better sources than SFI (Statistics Sweden, 2013, 2016a, 2016b), the latter is used only for immigrants for whom no educational information is otherwise available. When no educational information is available from these three sources, other sources may be used, most often the Swedish Migration Agency. As immigrants are not obligated to report their educational level to the Migration Agency (Statistics Sweden, 2013), this source is of limited value and importance to the educational register. In the following, the survey of foreign-born and PES—as the main sources of information—are discussed.

The survey of foreign-born

For immigrants who acquired their education abroad, the survey of foreign-born is often the main source for the registration of their educational attainment. Since 1999, the survey has been mailed to all immigrants aged 20–59 for whom information on their educational attainment is missing, in the year after arrival (Statistics Sweden, 2016a). The questionnaire can either be answered online or by post (see Fig. 7 in the Appendix for the answer categories in use in the form). The survey consists of five questions:

- Have you received an education in a country other than Sweden?
- How many years in total did you attend compulsory, upper secondary or vocational school in a country other than Sweden?
- How many years did you study at university/college (or receive some other form of post-secondary education) in a country other than Sweden?
- In which year did you receive your highest degree?
- What was your specialisation or field of study when you received your highest degree in a country other than Sweden? (Statistics Sweden, 2016c)

To increase the response rate, the questions are asked in a simple way that should be understandable by people with different levels of education; moreover, the survey is available in the most frequently used foreign languages in Sweden (Statistics Sweden, 2016c). However, the non-response rate from the survey is quite high, especially among EU and Nordic immigrants (Saarela & Weber, 2017; Zander, 2018). The data collected through the survey are self-reported (see Statistics Sweden, 2016c) and, given that educational certificates are not required as evidence of educational attainment, the quality of information gathered may be imperfect (Careja & Bevelander, 2018). For immigrants without educational information in the registers, the survey is re-sent every year.

The Swedish Public Employment Service

The second important source to acquire information on immigrant educational attainment is PES. When immigrants register as job seekers in PES, information about their educational level is often registered and sent to the educational register. In addition, PES provides courses to facilitate immigrants' entry into the labour market and, during such courses, their educational level may also be registered. Except for some regulated professions (for instance, medicine and healthcare, which by law require formal recognition of education), immigrants are generally not required to attach their certified validated educational documents as proof of their educational attainment (see PES, 2019a). Thus, similar to the survey of foreign-born, educational attainment obtained by PES relies on self-reporting in most cases.

An event history analysis of registration of immigrants' highest educational level

This section examines whether and to what extent the share of missing information on immigrants' educational attainment improves with increasing time in Sweden. The analysis is based on all immigrants arriving in Sweden in the period 2000–2006, who were followed for 10 years. Table 2 shows descriptive statistics on the groups of immigrants. More than half of these recent immigrants had missing educational information upon their arrival, which varies by their mode of legal entry, gender, and age at immigration.

Table 2 Educational attainment of immigrants aged 18–65 at arrival, 2000–2006

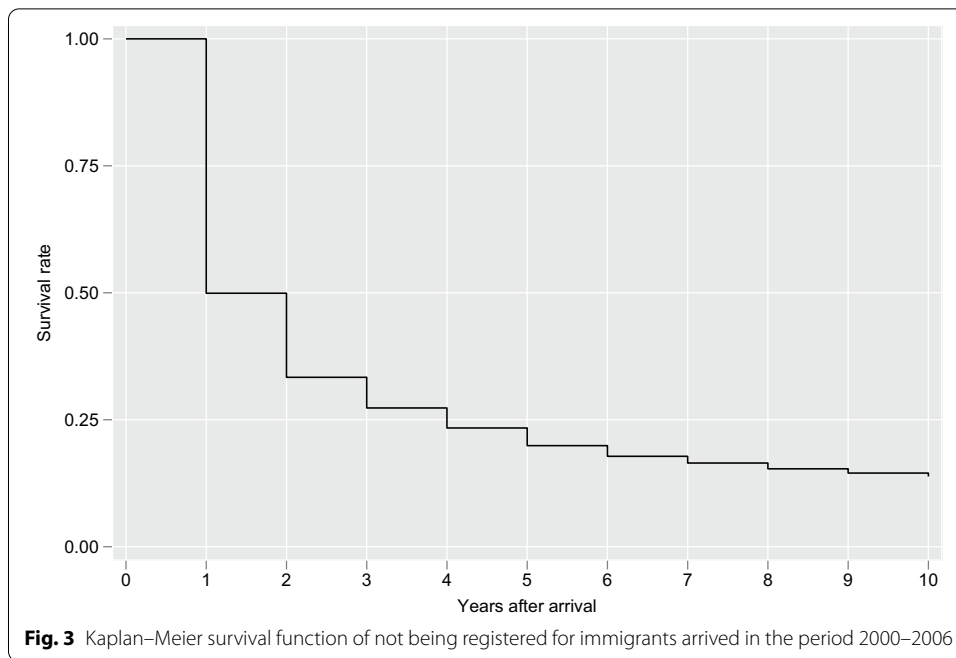
	Missing educational information	Primary or lower secondary education	Upper secondary education	Tertiary education	Total	
	%	%	%	%	N	%
<i>Year of arrival</i>						
2000	52.2	7.1	11.2	29.4	25,666	100
2001	52.5	7.3	11.0	29.1	26,602	100
2002	48.2	8.7	12.6	30.4	29,361	100
2003	52.5	8.4	11.4	27.7	30,264	100
2004	51.6	7.6	11.7	29.1	30,298	100
2005	58.5	6.1	10.1	25.3	33,908	100
2006	62.1	8.6	9.4	19.8	54,216	100
<i>Migrant types</i>						
With residence permit						
Family migrants	50.2	9.7	13.1	27.0	98,812	100
Refugees	57.0	12.8	12.7	17.5	33,056	100
Labour migrants	58.4	1.5	7.8	32.3	21,273	100
Students	64.8	0.1	0.8	34.2	16,234	100
Other migrants	51.7	11.9	10.1	26.3	20,900	100
Without residence permit						
Nordic migrants	57.3	3.3	10.9	28.5	28,746	100
EU migrants	71.4	1.9	7.6	19.1	7018	100
Born outside EU	68.8	4.8	6.6	19.8	4276	100
<i>Age at immigration</i>						
18–25	66.8	6.9	10.8	15.4	56,423	100
25–45	49.0	8.1	11.3	31.6	148,293	100
45–55	56.4	8.8	10.2	24.6	17,213	100
55–65	77.7	5.7	5.1	11.5	8386	100
<i>Gender</i>						
Men	56.4	7.3	11.1	25.2	114,860	100
Women	53.5	8.2	10.7	27.6	115,455	100
Total	55.0	7.8	10.9	26.3	230,315	100

Source: Swedish register data, author's calculations

Variables measured on December 31 in year of arrival

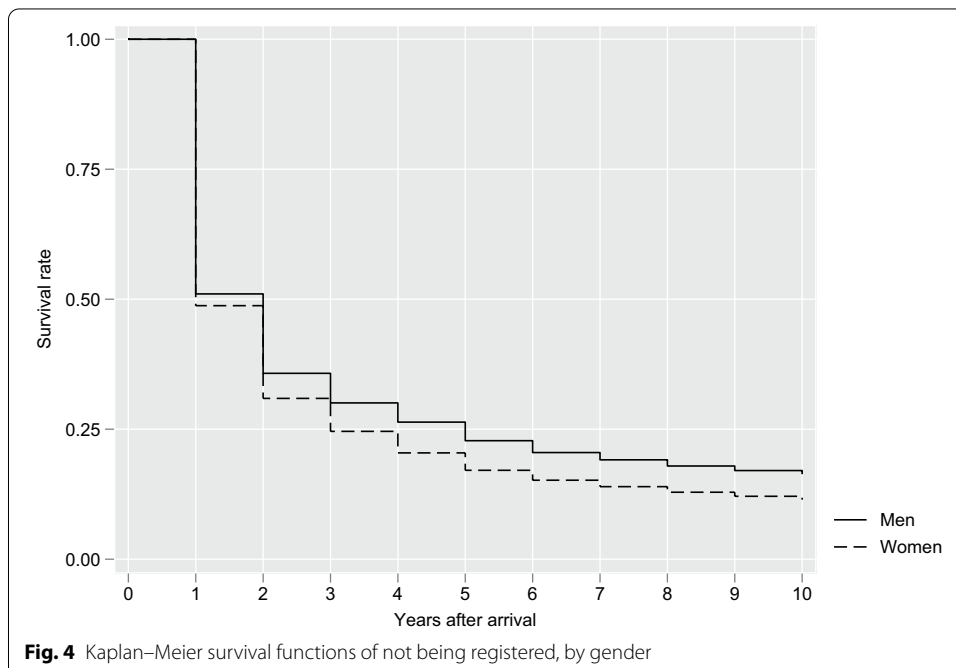
The share of missing education is higher for men than for women and higher for immigrants aged 18–25 and 55–65 compared to other age groups. Missing education is most common among students and immigrants who do not need a residence permit.

For the 126,576 individuals who lack information on their educational attainment, a survival function was conducted to measure the time taken until their educational level was registered, if at all, for the period from arrival until ten years later. Figure 3 shows the Kaplan–Meier survival function measuring the exact time of educational registration. Fifty percent of immigrants were registered after one year, increasing to 70% after



two years. Beyond two years, the survival rate gradually declines, reaching a share of 86% being registered after 10 years.

As the descriptive statistics have shown that missing educational information varies by migrant group (Table 2), Figs. 4, 5, 6 present the results from the EHA by migrant group. Figure 4 shows that the survival rate for immigrant men is higher than that for

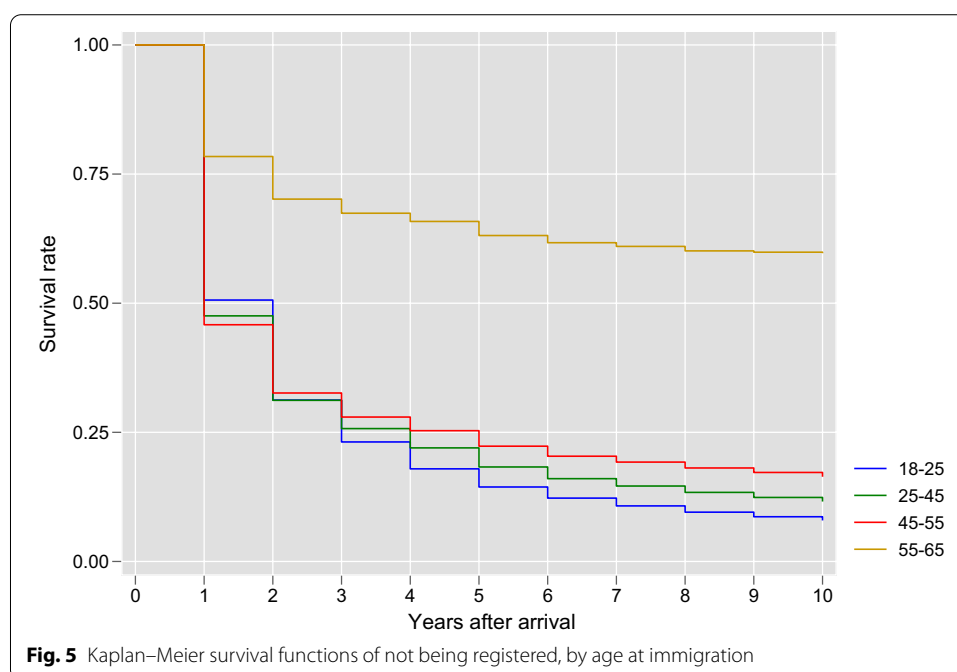


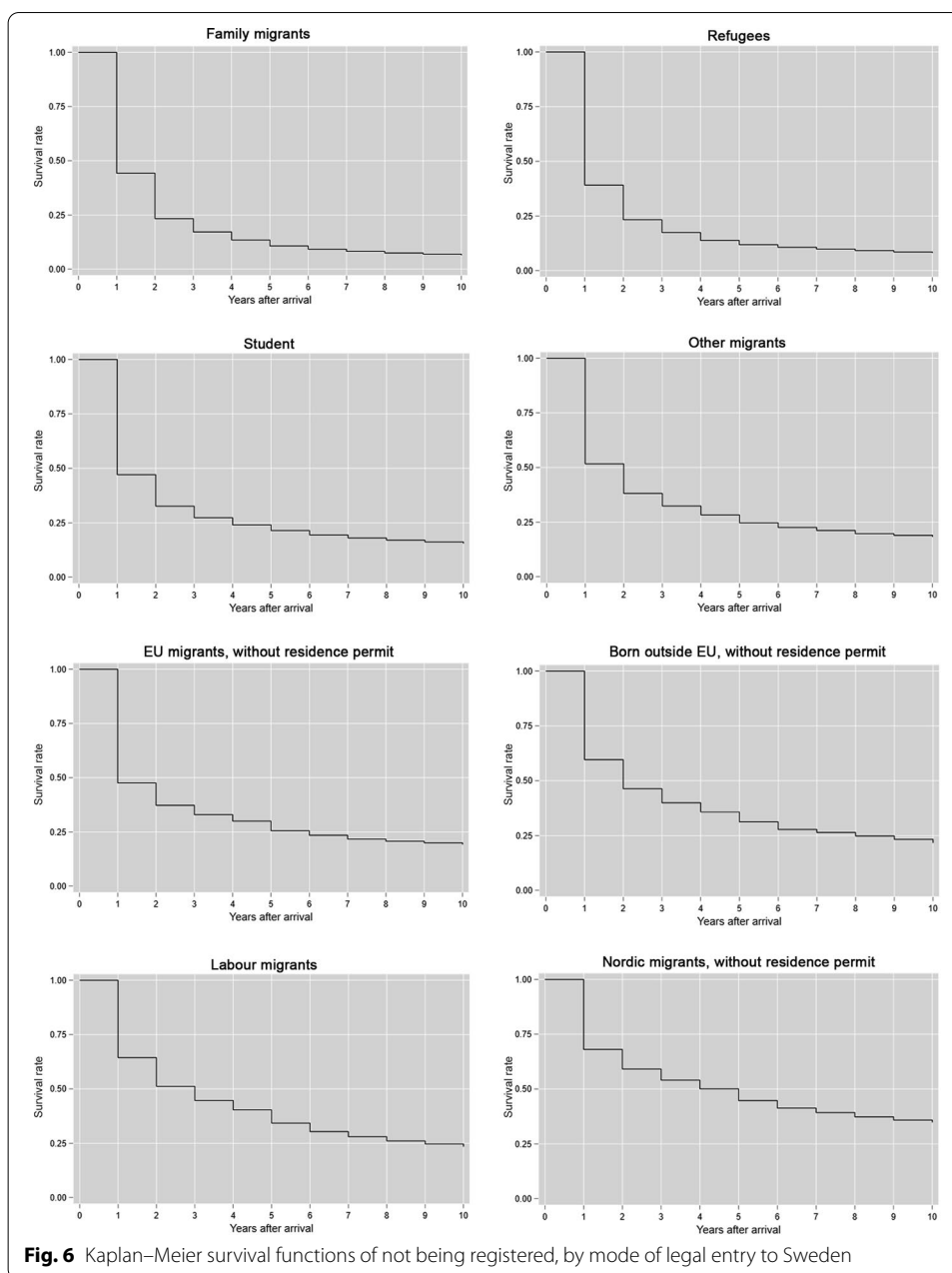
immigrant women in all years after arrival, meaning that women's educational attainment is more often registered than men's at all time points.

Figure 5 shows that the oldest immigrants have the highest survival rates compared to other age groups. After two years, about 70% of all other age groups have their educational attainment registered, yet a large share of older immigrants remains unregistered. Even after 10 years, 60% of older immigrants are not registered in UREG. A possible explanation is that immigrants of labour market-age are more likely to have their educational attainment registered through an employment agency, university or other educational organisation, whereas those entering Sweden at older ages may not take up work and therefore do not get registered.

Figure 6 shows that refugees and family migrants have the lowest survival rates overall, meaning that they have the highest rates of registration, and, only a small share of these migrants are not registered in UREG after 10 years. Labour market integration is one possible reason for the variation among different migrant groups. Refugees and their families may participate in a 24-month establishment programme administered since 2010 by PES, which provides them with daily allowances and housing benefits (Emilsson, 2014; PES, 2019b). During the establishment programme, many immigrants have their education registered.

By contrast, Nordic migrants have the highest survival rate in all years; 30% remain unregistered in UREG after ten years. One possible explanation is that due to the relatively easy mobility between Sweden and the other Nordic countries (Iceland, Norway, Finland, and Denmark), where no residence permits are required (Swedish Migration Agency, 2019), these migrants are not registered by the migration agency and therefore their education is not registered through this authority. Additionally, they have a high employment rate after arrival (Bevelander & Irastorza, 2014) and are less likely to actively search for employment through channels such as PES. Labour migrants represent the second-largest group with





the highest survival rate in all years, compared to much lower rates for refugees and family immigrants, who are usually not employed in the first years after arrival.

Another explanation of the large share of missing values on education among Nordic migrants may be that some of these may reside in Sweden but work in either Denmark or Norway. Around a quarter of all Nordic migrants who remain unregistered ten years after arrival live in Malmö. These are mainly Danish migrants, whose numbers have doubled in Malmö since the opening of the Öresund bridge in 2000 (Bruckmeier & Knutsson, 2012). Because housing costs are cheaper in Sweden and wages are higher in Denmark, many Danish migrants live in Sweden while keeping their jobs in Denmark (Matthiessen, 2004). The relatively strict Danish rules on marriage-based

Table 3 Age distribution of migrants who remain unregistered ten years after arrival, by mode of legal entry

	18–25 (%)	25–45 (%)	45–55 (%)	55–65 (%)	Total (%)
<i>With residence permit</i>					
Family migrants	23.8	55.8	8.3	12.1	100
Refugees	11.6	30.9	15.3	42.2	100
Student	42.5	56.8	0.6	0.1	100
Labour migrants	14.8	73.5	8.7	3.0	100
Other migrants	18.8	52.8	7.4	21.0	100
<i>Without residence permit</i>					
Nordic migrants	23.2	45.5	8.2	23.1	100
EU migrants	22.4	57.0	10.5	10.1	100
Born outside EU	34.0	52.8	7.1	6.1	100

Source: Swedish register data, author's calculations

migration may be another reason for Danes with a foreign spouse, to live in Southern Sweden, where the rules are more liberal, and to commute to Copenhagen for work (Kauppinen & Poutvaara, 2011).

As many Nordic migrants do not get their educational attainment registered, one may expect them to be relatively older at migration. Table 3 shows the age composition of migrants who are not registered ten years after arrival. In contrast to our expectation, Nordic migrants whose education remains unregistered after ten years are most often the younger to middle aged, with the elderly making up a quarter of this group.

Before closing this section, it is worth mentioning that although the share of missing educational information among the migrant population diminishes significantly with extended residency, it is still high in comparison to the Swedish-born population. According to Statistics Sweden, in 2019, educational information was missing for only 1% of Swedish-born individuals aged 16 and older (Statistics Sweden, 2021), compared to 30% for migrants 2 years after arrival. Given that missing education can imply any educational level—primary, upper secondary or tertiary—comparing the educational attainment of migrants with the Swedish-born population is problematic and needs to be carried out with caution.

Conclusion and discussion

Sweden has very rich longitudinal register data containing information on different aspects of individuals' education, such as highest completed educational level, field of study, year of obtaining an education, enrolment in studies and type of study. Nevertheless, educational information regarding a large share of immigrants, especially at their time of arrival, is either missing or misclassified (Saarela & Weber, 2017). This study has examined the sources of information for immigrants' educational levels in their year of arrival and the extent that migrant characteristics are associated with registration of education in the registers over time. After discussing the main findings, I will suggest some practical recommendations for researchers using register data on immigrant education.

First, for all registered individuals in Sweden, their educational information is constantly updated based on a variety of sources of different quality (Statistics Sweden,

2013, 2016a, 2016b). The survey of foreign-born and the PES are the main sources providing information about immigrants' education in their year of arrival. Both sources provide self-reported information on immigrants' education (PES, 2019a; Statistics Sweden, 2016c), raising concerns about the validity of the data acquired. In other words, as migrants may inaccurately report their education (Careja & Bevelander, 2018), we need to question the extent to which the information obtained from these sources indicates the correct level of education of these immigrants.

Second, based on a longitudinal analysis of seven recent cohorts of immigrants, I have shown that more than half of all immigrants lack educational attainment in the registers in the year of arrival and that there is much heterogeneity among the group of migrants with missing information in the educational registers. Employing EHA has shown that with increasing length of residency, the share of immigrants with missing educational information diminishes significantly. This is consistent with previous studies showing that the share of misclassified individuals (Saarela & Weber, 2017) or persons with missing educational information (Jentoft, 2014) reduces with length of stay in the host country. Seventy percent of immigrants with missing educational attainment upon arrival have their educational level registered in the second year after arrival. However, the registration of education varies greatly by migrant group, and mostly so by age at immigration, gender and mode of legal entry. The results show that refugees and family migrants, women, and immigrants younger than 55 years at immigration have their education registered to a higher extent than other groups.

The educational attainment of migrants differs from that of the Swedish-born population in two ways. First, the share of persons with missing educational information is extremely low among Swedish-born people (1%). Second, for the majority of immigrants, the survey of foreign-born and PES are main sources of educational information, which are both based on self-reporting (Careja & Bevelander, 2018; Statistics Sweden, 2016c), while for the native population their education is derived from the high quality sources. Therefore, studies relying on educational attainment for migrants, for instance, in comparing the labour market integration of migrants and Swedish-born people have to be carried out and interpreted with caution.

Based on these findings, I recommend the following for researchers using register data on immigrants' educational levels. This paper has shown that missing educational information is highly prevalent among immigrants upon arrival, after which it greatly reduces. This issue is not particular to Sweden; Statistics Norway and Denmark also have evidenced a high rate of missing educational information among migrant population which decreases with an extended length of stay in the host country (Jentoft, 2014 for Norway; Mørkeberg, 2000 for Denmark). This paper also found that a noteworthy share of refugees and family migrants are registered 2 years after arrival (around 75%), with a very gradual increase in the share registered after that. Based on these findings, I suggest using migrants' educational level at least 2 years after arrival instead of in the year of arrival. This is important for two reasons. First, it gives a more realistic picture of the initial socioeconomic status of immigrants. Second, it is a more reliable determinant of immigrants' labour market outcomes. The picture is different for Nordic migrants, who to a large extent remain unregistered even after 10 years. Higher employment rates among Nordic migrants (Bevelander & Irastorza, 2014), the ease of mobility

between Sweden and other Nordic countries without the need to acquire a residence permit (Swedish Migration Agency, 2019), and the popularity of living in Sweden while working in Denmark (Kauppinen & Poutvaara, 2011; Matthiessen, 2004) leads to a negligible need to register their education in Sweden, and therefore leads to a large share of missing educational entries in the registers. For Nordic migrants, length of residency is hardly associated with an increase in registration of educational attainment, and it is therefore questionable to use educational attainment for this group at any point in time.

I also recommend not replacing missing education in the year of arrival with any specific educational level (see e.g. Manhica et al., 2019). A lack of formal schooling, incorrect coding and a lag in registration all lead to missing educational information and, therefore, missing educational information does not imply specific educational levels. The replacement of missing information with a specific educational level is a potential mistake that over- or underestimates the actual educational attainment of immigrants and yields biased results.

My last recommendation relates to the validity of educational attainment for migrants, which mostly relies on self-reporting. A recent study by Careja and Bevelander (2018) proposed that researchers check whether migrants' educational information has been verified by the authorities responsible for the registers. Adding to their recommendations, I propose that certified educational qualifications be provided as a supplementary attachment to the survey of foreign-born or in the job search process, along with reported education, to overcome the issue of self-reporting. However, with regard to the high non-response rate among many immigrants, this should be optional rather than obligatory to avoid the risk of an even higher non-response rate. Doing so can assure the validity of the information obtained from these sources, especially as these are the most important sources for immigrant education. This, in turn, contributes to the quality of studies in which immigrants' educational level plays a salient role.

This study has some limitations that should be addressed in future research. For example, although many immigrants have their education registered 2 years after arrival, the sources of educational information in that year have not been examined. I have discussed how the survey of foreign-born and PES are the two major sources of immigrants' educational information in their year of arrival, which are based on self-reporting. Regarding concerns as to the validity of the data obtained from these sources, it would be worth knowing whether the sources of information change in parallel with increased registration in the second year. Additionally, considering the availability of longitudinal data, an appropriate follow-up to the current study would be to measure changes in educational entries in the registers—to higher or lower educational levels—with regard to changes in data sources. Such a study would also address another important aspect of the quality of registration—validity—which has not been examined in the current paper. A final suggestion is to explore the reasons underlying the relatively large share of missing educational information among Nordic immigrants in border areas. This is particularly essential for researchers focusing on the educational attainment of Nordic immigrants.

Appendix

See Tables 4, 5 and Fig. 7.

Table 4 Descriptive statistics on the censored population

	<i>N</i>	%
<i>Migrant types</i>		
With residence permit		
Family migrants	4889	18.1
Refugees	1675	6.2
Labour migrants	4661	17.3
Students	2733	10.1
Other migrants	2895	10.7
Without residence permit		
Nordic migrants	7855	29.1
EU migrants	1320	4.9
Born outside EU	933	3.5
<i>Age at immigration</i>		
18–25	6194	23.0
25–45	14,571	54.0
45–55	2140	7.9
55–65	4056	15.1
<i>Gender</i>		
Men	16,158	59.9
Women	10,803	40.1
Total	26,961	100

Table 5 Sources of education collected by UREG

Sources in the Swedish register of education
Register-based labour market statistics (1985; 1986; 1987; 1988; 1989)
Swedish for Immigrants (SFI)
Adult education (KOMVUX)
The Swedish Migration Agency, Register of Migration and Asylum statistics
The Swedish Public Employment Service
Population and housing census 1970
Register of wages (private, municipal, county council and public sector)
The Swedish National Board of Student Aid
Survey on Income and Living Conditions (until UREG 2006)
Labour Force Survey
Applicants to tertiary education
The survey of foreign-born education
Register of teaching personnel
Certification from introductory programs (upper secondary education)
Study certificate
Higher education credit HE (until UREG 1999)
Applicants/admitted to upper secondary school
Access programs to higher education
Labour market training
Folk High School, general entry requirements
The National Board of Health and Welfare, old register
The Swedish Council for Higher Education (UHR), foreign post-secondary education not tertiary education
The Swedish Board of Agriculture (registered veterinary)
The Swedish National Agency for Education, foreign teacher education
The Swedish Armed Forces
Register of upper secondary education and post-secondary education not elsewhere collected (EXTAS)

Table 5 (continued)

Sources in the Swedish register of education

Applicants to post-graduate education
 "Various" post-secondary education
 Compulsory school
 Upper secondary school, special courses
 Post-secondary courses in arts and culture
 Swedish schools abroad (compulsory and upper secondary education)
 Foundation year program
 Higher education credit HE (UREG 2000 and onwards)
 Register of Higher Vocational Education
 Swedish defence University
 Register of higher education
 Register of post-graduate education
 Individual information
 Population and housing census 1990

Source: Statistics Sweden (2016b)

NOTE: This is a guide. Enter your answers on the Swedish questionnaire or the web.

Education in a country other than Sweden

If you complete the survey online you don't have to return the questionnaire. Go to www.scb.se/ual and log in with the user name and password listed at the top of the questionnaire.

1. Have you received an education in a country other than Sweden?
☐ Yes
☐ No → Thank you. Please return the questionnaire in the enclosed reply envelope.
2. How many years in total did you attend compulsory, upper secondary or vocational school in a country other than Sweden?
 Please select only one option.
☐ 1-8 years
☐ 9 years
☐ 10-11 years
☐ 12 years or more
3. How many years did you study at university/college (or receive some other form of post-secondary education) in a country other than Sweden?
 Please select only one option.
☐ No post-secondary education
☐ 1 year
☐ 2 years
☐ 3 years
☐ 4 years or more
☐ Postgraduate degree (equivalent to PhD)
4. In which year did you receive your highest degree?
5. What was your specialisation or major field of study when you received your highest degree in a country other than Sweden?
 Please select only one option.
☐ General education
☐ Teacher education, teaching methods
☐ Arts
☐ Humanities, languages, religion
☐ Social and behavioural sciences
☐ Law
☐ Economics and business studies
☐ Commerce, administration
☐ Natural science, computing
☐ Engineering and manufacturing (for example architect)
☐ Master of engineering/technology (four years or more of study at university/college)
☐ Agriculture and forestry (for example veterinarian or agronomist)
☐ Health and medical care, social care (for example pharmacist or dispenser)
☐ Doctor
☐ Dentist
☐ Nurse
☐ Services (for example restaurant, tourism, cleaning, police or military)

Please return the questionnaire in the enclosed reply envelope. No postage is needed. Thank you for your cooperation.

Fig. 7 Questions and answers categories in the survey of the foreign-born. Source: Statistics Sweden (2016c)

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Authors' contributions

Single authorship. The author read and approved the final manuscript.

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Availability of data and materials

The data that support the findings of this study are Swedish register data available from Sweden's system of Microdata Online Access (MONA) compiled by Statistics Sweden. Data are protected by the Sweden Secrecy Act and are not publicly available. Access to data is granted for researchers in Sweden with the specific research projects and after approval of ethical vetting.

Declarations

Competing interests

The author declares that she has no competing interests.

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