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## Central Population Registers as a Source of Demographic Statistics in Europe

*Population registers are less well known and documented than other standard systems of demographic information (vital records, censuses, surveys). Although not found everywhere, they do exist in many European countries. They are always run on a municipal basis but computerization now makes it possible to centralize the data and establish national registers. In this overview of 30 European countries, Michel POULAIN and Anne HERM present a comparative analysis of the history of these population registers, both old and new, their varied modes of operation, their advantages and drawbacks. They highlight the potential now available for rapid production of demographic data and for research. They call for closer cooperation between statistical institutes and researchers, and for access to individual data in strict compliance with the rules governing personal data protection.*

The *Multilingual Demographic Dictionary* refers only briefly to population registers:

In these registers every member of the population or every family may be represented by a card, and the register is maintained or updated through information which reaches it through the local registration offices and through registration of any changes of residence (IUSSP, 1982, §213).

The United Nations recommendations emphasize the demographic importance of the population register by defining it as

a mechanism for the continuous recording of selected information pertaining to each member of the resident population of a country or area, making it possible to determine up-to-date information about the size and characteristics of the population at selected points in time (United Nations, 2001, §500).

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More generally, the concept of a register is, under the UNECE definition (2007), “a systematic collection of unit-level data in such a way that updating is possible”.

Eurostat and Danmarks Statistik (1995) specify what is meant by updating:

[U]pdating of a register is the processing of identifiable information with the purpose of establishing, bringing up to date, correcting or extending the register in such a way that it can be maintained as a continuous set of records.

In a population register, the individual units are actual people and updating involves all the administrative information concerning them. Usually the individuals concerned are those administratively resident in a given territory, municipality, region or country. Their data are updated for births, deaths, marriages and divorces, and also for changes of address and migration. It is the continuous nature of the updating, including that of the individual's usual address, that is the specific characteristic of a population register and its major advantage for producing demographic statistics.

The main purpose of a population register is to obtain a precise identification of each individual. It also provides aggregate data about the entire population concerned, making it possible to implement and monitor a wide range of public management and planning policies. The population register is also useful for statistical purposes: it can be used to estimate the size of a population and its socio-demographic structure at a point in time, as well as population change and its various components. Furthermore, if the system is fully operational for the continuous recording of changes of address, it is the main source of data on migration.

A first principle for organizing a population register is that it should be compulsory and cover the entire population concerned. Although coverage of vital events is often comprehensive, the critical point is the exhaustiveness of the compulsory process whereby individuals declare any change of residence. A register can be kept manually, but computerization optimizes its use, facilitates updating and, not least, improves its reliability. Clearly, it is thanks to computerization that registers are now centralized at national level in a large number of countries, with the development of central population registers.

The progressive introduction of these registers has radically altered the way in which demographic statistics are produced in a given country. Once the initial problems of errors and omissions in the registers and in the communication between register administrators and producers of statistics are resolved, the value of central registers is undeniable. Most of the demographic variables traditionally collected during censuses or via vital events can now be accessed by optimal use of central population registers. The range of possibilities for demographic analysis is broadened because, in addition to cross-sectional data at a point in time, the population register provides biographical data on a given individual's successive vital events.

This article compares the central population registers of European Union member states, plus Iceland, Norway and Switzerland. It presents the advantages and limitations of central registers for producing demographic statistics. A brief literature review shows their value for demographic research and, more specifically, for event history analysis.

The information presented here was collected during visits on behalf of Eurostat to the statistical offices of the various countries studied. The main purpose was to harmonize international migration statistics (Poulain, 1995; Poulain et al., 2006). In each country we met senior officials responsible for administrative population records and examined in detail the operation of the central registers. In October 2003, a questionnaire survey was administered to representatives of national statistical offices assembled in Luxembourg for a meeting. Subsequently, further visits to most of these countries under the MIMOSA<sup>(1)</sup> and ILMAS<sup>(2)</sup> projects enabled us to update the data, so the information given here has been verified up to 2010 for the last countries visited. In view of the frequent modifications to the database management systems, and the member states' obligation to comply with European regulations<sup>(3)</sup> on international migration statistics, more recent changes may have been made in some cases.

## I. Origins of population registers

Population registers go back a long way and the earliest register of households and individuals has been dated to the Han Dynasty in China in the second century BC (OSCE, 2009).

Within Europe, a population register system is first attested in the Nordic region. According to Arosenius (1928), and Hofsten and Lundström (1976), in 1665, the Lutheran bishop Johannes Gezelius the elder ordered the clergy of the diocese of Åbo (now Turku, Finland) to record all the families in each parish. However, it was not until 1686 that a single decree ordered each pastor to make a list of all the families in his parish (*husförhör*, local hearing of people's knowledge of the catechism) in what amounted to a parish population register of

- married couples;
- legitimate and illegitimate children with their date and place of birth, date of christening and parents' names;
- deaths and burials;
- all arrivals and departures from the parish.

(1) The MIMOSA (MIgration MOdelling for Statistical Analyses) research project was headed by NIDI and funded by Eurostat.

(2) The ILMAS (Implementation of the Legislation on Migrations and ASylum) project was headed by the Catholic University of Louvain (UCL) and funded by Eurostat.

(3) In particular, Regulation (EC) No 862/2007 on Community statistics on migration and international protection.

From 1749, the parish data were collected and centralized so as to establish statistics of population change for the whole of Sweden. Pastors had each year to fill in three tables on printed forms,<sup>(4)</sup> of which the third described the population by age, sex, marital status and occupation on 31 December. To complete this table, all arrivals and departures from the parish had to be recorded. This first population register could now be used to produce demographic statistics.

In the Austrian Empire, Maria Theresa issued an imperial rescript dated 13 October 1753 requiring all parish priests to produce each year a “description of souls” with the sex, age and occupation of each person (Hecht, 1977). By letters patent of 17 December 1777, population registers were established to provide a permanent record of the population, comprising marital status, age and social status of each inhabitant by house and family. However, the decision was not implemented and it was in Revolutionary France that local administrations were first required to maintain “a record of the inhabitants under their respective jurisdictions, containing their surname, given names, place of birth, last domicile, occupation, trade and other means of subsistence” (Art. 1 and 2, Title I, Act of 19-22 July 1791).

This measure, designed to facilitate law and order in municipalities, was strengthened by the Decree of 10 Vendémiaire Year II (2 October 1795) specifying that each municipality in the Republic should produce a table containing the names, ages and status or occupation of all its inhabitants over the age of 12, their place of residence and the date on which they had arrived in the municipality (Pasinomie, 1st series, vol. 7, p. 79). Leboutte and Obotela (1988) cite a prefectural order of 12 July 1808 specifying how these decrees were to be implemented:

[E]very year, during the first ten days of January, mayors shall record on the table of citizens domiciled in their municipalities any modifications made necessary by changes of domicile occurring the previous year. They shall record in the same place those citizens who have proven that they have, during the intervening period, established domicile in the municipality, and they shall only erase those who have in practice left their habitual domicile in the same municipality during that same year.<sup>(5)</sup>

Even if, as suggested by Hélin (1980), these provisions were probably applied poorly or not at all, Biraben (1970) sees them as the precursors of the population registers currently maintained in Belgium and the Netherlands. With the collapse of the Empire in 1815, France finally turned its back on the principle of population registers. In the Netherlands, which at the time included territories that would later become Belgium, a proposal made in 1827 and

(4) The three tables contained the following information: data on christenings (by sex and month, distinguishing between legitimate and illegitimate children) and burials (by sex and month, distinguishing three categories: children under 10, other unmarried persons, married and widowed persons); further data on burials (by sex, cause and age group: under one year, 1-2, 3-4, 5-9, 10-14, etc.); data on the population distribution by sex and age group (as above), marital status and occupation.

(5) *Mémorial administratif du département de l'Ourthe*, t. 14, 1808, no. 448, pp. 38-39.

attributed to Quetelet revived the idea of establishing a population register on the occasion of the 1829 census (Randeraad, 1995). The instructions for that census published in the *Staatsblad* no. 62, dated 3 September 1829, state:

Art. 1. The census and registration of inhabitants domiciled in the kingdom has as its main purpose to establish in each locality population registers containing the information and details about the population that it is necessary and useful to possess in the interest of the State.

The instructions sent out<sup>(6)</sup> specify that “each page of the register of inhabitants shall be designed to contain twenty names... The names shall be recorded on each page leaving sufficient space to allow a new line to be inserted in order to indicate clearly any movements of population”.

As a result of political events – Belgium gained its independence on 21 July 1831 – the central statistical commission ceased its activities and the registers again fell into disuse. The number of municipalities where the register initiated in 1830 was still regularly kept was so low that new measures became necessary to bring them back into use. Article 2 of the Royal Decree of 30 June 1846 announced that:

[F]or statistical purposes and to ensure the uniform application of the principles enshrined in the Civil Code concerning domicile, the census to be held in 1846 provides for a population register to be maintained in each municipality from 1 January 1847, for which the census results shall serve as a basis.

The instructions accompanying the royal decree specify that “this register shall constantly record the variations that occur in the population as a result of births, deaths and changes of dwelling or residence”.

At international level, the resolutions of the first international statistical congress chaired by Quetelet, also reflect a clear desire to standardize population registration methods. Quetelet’s concern was to obtain detailed statistical data that were internationally comparable. This can be seen in the following specific recommendation concerning population registers:<sup>(7)</sup>

VII. It is essential to establish a population register in each municipality. Each household shall occupy one page. The first records shall be taken from the information provided by a general census and shall be followed in order by all the changes that occur among the members of that household. Administrative measures shall ensure that changes of domicile are recorded so that there is an exact correspondence between deletions and new arrivals.

The effects of this recommendation were rather variable, as few statisticians managed to convince their governments of the need to introduce compulsory population registers. As noted by Jacques and Michel Dupâquier (1985), it was unrealistic to expect all national statistics to achieve the level of accuracy and

(6) *Mémorial administratif de la province de Namur*, 1829, no. 1588, pp. 217-224.

(7) *Compte rendu des travaux du Congrès général de statistique*, Brussels, 1853, p. 113.

abundance of detail that Quetelet had been able to impose in Belgium. Using an instrument of demographic observation similar to that applied in Sweden, Belgium developed population registers at national level for all citizens, and not, as in Sweden, for all members of the Lutheran Church.

Nicolai's survey (1906) on behalf of the International Statistical Institute, presented to the London Congress in July 1905, sheds light on the use of population registers at the turn of the century. It shows that registers had been made compulsory in only three countries, namely Belgium, by the Royal Decree of 30 June 1846, confirmed by the Act of 2 June 1856; the Netherlands, by the Royal Decree of 27 December 1849, also confirmed by the Royal Decree of 3 November 1861; and Italy, with the introduction of the *anagrafe* by the Decree of 31 December 1864, confirmed by the Act of 20 June 1871. These registers were optional in seven countries: Austria, France, Germany, Luxembourg, Norway, Spain and Sweden. Nicolai reported extensively on the usefulness of population registers and stressed their essential contribution to the production of statistics. In France this contribution had also been advocated by Bertillon (1890): "while showing us the problem [the unreliability of certain quantitative data], statistics also provide the remedy, namely the establishment of population registers".

## II. Central population registers

Population registers were centralized in the second half of the twentieth century. It was Iceland that set up the first central population register at national level in 1953 (Watson, 2010), at a time when registers were still kept manually. This exploit needs to be kept in proportion, however, since the population of Iceland is no more than that of a large town and centralization was relatively simple.

During the 1960s, the movement gathered pace as central registers were introduced in Sweden (1966), Norway (1968), Denmark (1968), and Finland (1970) (Poulain et al., 2006). The idea of central registers also occurred in Belgium, and a national register was devised in 1968, first informally and then on a legal basis from 1985 (Poulain, 2010).

More recently, the Netherlands (1994), Spain (1996) and Austria (2000) have also opted for central population registers, along with the Baltic countries and most countries of Central Europe. They are also being developed in Germany, Italy and Switzerland. The question has been raised in other countries, such as the United Kingdom (Redfern, 1989), but in France it remains taboo, if we are to believe the title of Jacod's working paper "No hope of building comprehensive demographic and social information on population register in France" (1995).

Riandey (1996) added “in France, the absence of municipal or national registers is a contradiction in the management of local and national government”, mentioning in particular “the disarray of municipalities faced with their ignorance of changes in the size and age structure of the population”.

As can be seen from Table 1, of the 30 countries we studied, 23 have population registers at local level and, of these, all except Germany, Italy and Switzerland are developing a central population register.<sup>(8)</sup> Even in the few countries which have no population registers as such, there are often databases on individuals that record and monitor population change at local level. This is the case, for example, in Cyprus, Greece and Malta, where they prefer to call the register a civil register because individuals’ residential addresses are not included. Furthermore, with the streamlining of public sector management and the possibilities offered by computer technology, a large majority of European Union Member States may well adopt a centralized system of population registers over the medium term.

### *The role of statistical offices*

Sweden, the acknowledged pioneer of population registers, is a special case, because that country’s population register was centralized while it was still the responsibility of the Lutheran Church (Hofsten and Lundström, 1976). It was only in 1991 that the entire population registration system was handed over to the tax administration.

In most of the other countries studied, the central population register is under the responsibility of the interior ministry in charge of supervising local administrations and domestic security. Note, however, that in the Netherlands, the GBA system (*Gemeentelijke Basisadministratie Persoonsgegevens*) is based on e-mail exchanges between municipalities which remain fully responsible for their own population registers. There is no central register. Local authorities are in charge of the overall day-to-day management of the register, but within a framework of common rules issued and monitored by the interior ministry. These rules are reducing local autonomy in population management, since the ministry’s role has greatly expanded with centralization.

Iceland is the only country studied where the national statistical office manages the central population register for both administrative and statistical purposes. However, it is not the only country where the statistical institute is involved in the centralization of local population registers. In Sweden, even when the system was still the responsibility of the Lutheran Church, Statistics Sweden was in charge of centralizing the local files (Hofsten and Lundström, 1976). The situation is similar in Norway (Vassenden, 2003) and Spain (Jurado and Padilla, 1999). In some other countries, the statistical offices have set up a “mirror” register that is periodically updated from the central administrative register. The mirror register is anonymized for reasons of confidentiality, and

(8) These three countries are currently examining centralization.

**Table 1. Official names of central population registers, responsible authority and year of creation for 30 European countries.**

Country		Name of register	Type of register *	Responsible authority	Year of creation
Austria	AT	Zentrales Melderegister (ZMR)	Centralized PR	Federal interior ministry	2002
Belgium	BE	Registre national des personnes physiques	Centralized PR	Interior and equal opportunity ministry	1985
Bulgaria	BG	Naselenie Esgraon	Centralized PR	Regional development ministry	1977
Cyprus	CY	Archeio Plithismou	Local CRs	Interior ministry	–
Czech Republic	CZ	Centrální registr obyvatelstva	Centralized PR	Interior ministry	1980
Denmark	DK	Det Centrale Personregister	PIS	Interior affairs ministry	1968
Estonia	EE	Rahvastikuregister	Central PIS	Interior ministry	2002
Finland	FI	Väestötietojärjestelmä	Central PIS	Interior ministry	1970
France	FR	–	–	–	–
Germany	DE	Melderegister	Local PRs. Centralized PRs in some <i>Länder</i> . Central register of foreigners	Municipalities and <i>Länder</i> interior ministries	–
Greece	GR	Διμοτολίο	Local CRs	Interior ministry	–
Hungary	HU	Népeességnyilvántartás	Centralized PR	Interior ministry	1975
Iceland	IS	Thjóðskrá	Centralized PR	Statistics Iceland	1953
Ireland	IE	–	–	–	–
Italy	IT	Anagrafe della popolazione residente	Local PRs, centralized PR in preparation	Interior ministry	–
Latvia	LV	Latvijas Republikas iedzīvotāju reģistrs	Centralized PR	Interior ministry	1992
Lithuania	LT	Gyventojų registro tarnyba prie Vidaus reikalų ministerijos	Centralized PR	Interior ministry	1992
Luxembourg	LU	Répertoire général des personnes physiques	Centralized PR	State information technology centre (CTIE)	1979
Malta	MT	Public Register	Separate civic registers in Malta and Gozo	Home affairs and national security ministry	–
Netherlands	NL	Gemeentelijke basisadministratie persoonsgegevens	Local PRs linked online.	Municipalities and interior and kingdom relations ministry	1994
Norway	NO	Det sentrale folkeregister	Central PIS	Tax Administration of Ministry of Finance	1964
Poland	PL	CBD PESEL (Powszechny Elektroniczny System Ewidencji Ludności)	Centralized PR	Voivodships and interior ministry	1979
Portugal	PT	–	–	–	–
Romania	RO	Registrul permanent de evidentă populației	Centralized PR	Interior ministry	1996
Slovakia	SK	Register obyvateľ'ov Slovenskej republiky	Centralized PR	Interior ministry	1980
Slovenia	SI	Centralni register prebivalstva	Centralized PR	Interior and public administration ministry	1971



**Table 1 (cont'd). Official names of central population registers, responsible authority and year of creation for 30 European countries.**

Country		Name of register	Type of register *	Responsible authority	Year of creation
Spain	ES	Fichero de Coordinación de los Padrones municipales (Padrón Continuo)	Centralized PR	National statistical institute (INE)	1996
Sweden	SE	Registret över totalbefolkningen	Central PIS	Tax Agency of Ministry of Finance	1968
Switzerland	CH	Registre des habitants, Centrales Ausländerregister/ registre central des étrangers/ Registro centrale degli stranieri	Local PRs and central register of foreigners	Municipalities and Federal Department of Justice and Police	–
United Kingdom	UK	–	–	–	–

\* PR: population register; CR: civil register; PIS: population information system.  
*Shaded lines:* countries with no population register.

only variables for statistical use are stored in it. This is an essential statistical tool, providing statisticians with an easily accessible source of reliable population data (any administrative errors can be corrected without being subject to strict legislative rules). It can be used to produce and establish population figures for particular dates, if necessary retrospectively, whereas the central register data are changing continually and only provide a snapshot of the current situation. To date, only the Nordic countries, Belgium and the Netherlands have mirror registers for statistical purposes, but most of the other countries with central population registers have begun to take steps in that direction.

The population register is primarily an administrative tool and secondarily a statistical data collection tool. As Desrosières (2004) points out, administrative rules take precedence over the international statistical recommendations that national statistics managers would like to see applied. The statisticians' involvement in the development and effective implementation of the central register vary from one country to another, from mere consultation, as in Belgium, to full control of the system as in Iceland. In most countries, the data are transmitted to the statistical offices, which use them as they stand, with no scope to make corrections or improve definitions. The situation is thus completely different from that of a census, which is under the full control of the country's senior statisticians. Consequently, the statistical offices cannot always follow the United Nations recommendations for the production of demographic statistics.

### *Who is in the population register? How is place of residence defined?*

Citizens, i.e. persons who have citizenship of the country concerned, and who habitually reside in that country, form the main body of the population recorded in the population register. Theoretically, unless the register is still

being developed and is not yet exhaustive, coverage of these persons should be comprehensive. The differences observed between the countries studied, and problems of non-exhaustive coverage are due mainly to the difficulty in recording international migration and primarily concern two categories of people: citizens habitually living abroad and foreigners habitually residing in a country but who are not citizens of that country.

Each individual recorded in the central population register is attached to a specific place of residence which is determined by rules that vary from country to country. Most use the definition proposed by the United Nations, even if the national legal texts supporting these administrative rules make no explicit reference to them, since they are statistical recommendations.

Citizens living abroad include those who are considered as temporarily absent because their absence is shorter than a certain period, which may be three, six or twelve months, depending on the country, and those who have left the country for a longer period or permanently and who should, in principle, be removed from the register, unlike the others. In practice, since there is no incentive to do so, expatriates see no reason to report their departure, while the local authorities of their country of origin maintain the stability of their population numbers by keeping these “temporary”<sup>(9)</sup> emigrants on the register.

For foreigners living habitually in the country, the rules vary from country to country and it would be difficult to summarize them here. The situation of these people depends directly on their residency status in the host country. Holders of long-term or permanent residence permits are generally registered and are eligible to the same entitlements as citizens. The coverage of the foreign national population residing habitually in the country is generally satisfactory, because it is monitored in many ways by local and national authorities. There is nonetheless an obvious risk that foreigners who have returned to their home countries without informing the administration in their habitual place of residence will be erroneously kept on the register.

### *Personal identification code number and data confidentiality*

Implementing a central population register requires the use of a single identification code number for individuals. In many cases, this number was introduced long before the development of registers. In France, one of the first countries to do so, the initiative can be attributed to René Carmille, a punch-card specialist who introduced a 12-digit identification number known as the “*numéro de Français*” (French person’s number) (Lévy, 1989) with the purpose of secretly preparing to remobilize the army disbanded under the terms of the

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(9) When comparing a country’s migration inflows and outflows, it is not unusual to find situations where 90% of out-migrations are not registered. For example, the number of Romanian expatriates living in other European Union countries is estimated at nearly 3 million. Most of them are still included in the official population count for Romania, but also in that of their host countries.

1940 armistice.<sup>(10)</sup> In April 1946, the Service national des statistiques (later INSEE) officially adopted this number as the social security number. In June that year, Sweden passed its personal identification number law for the more specific purposes of the population register (Watson, 2010). The main aim of this single code number was to eliminate double counting, improve coordination between the various administrative registers and improve tax collection procedures. A similar code number was introduced in Iceland as early as 1952, but only in 1964 in Finland for health and pensions insurance, and in 1968 in Denmark. In most other countries this PIN (Personal Identification Number) was introduced when the population register was being centralized and then extended to all administrative registers to facilitate data matching at individual level (NCHS, 1980).

In general, in all countries with central population registers, use of unique identification code numbers has become essential, and it is this number which is used to transfer anonymized individual information for updating purposes. In Denmark, this identification number can be used to link 35 different administrative registers (Thygesen, 1983). However, its use is strictly regulated. In Austria, the principle of a single code number has not been adopted. Lawmakers have preferred to keep different numbers for each register, and to create correlation tables for data matching across registers while ensuring maximum privacy for individuals (Lebhart, et al., 2007). In Germany, there is no PIN as such, but in 2009 a single identification number was introduced for tax collection (*Steueridentifikationsnummer*) which may serve as a PIN in future (De Groot, 2009). In Italy, the fiscal code number (*codice fiscale*) allocated to each individual for taxation purposes might be used as a PIN in the national index of civil records (*Indice Nazionale delle Anagrafi*) currently under development.

The allocation of a personal identification number, the possibility of matching a set of individual data with this number and the centralization of data have given rise to much debate on data confidentiality and privacy. In France in 1971, INSEE launched a project called Safari<sup>(11)</sup> to centralize and interconnect the various identification directories. The project was made public by a journalist at *Le Monde*, which, on 21 March 1974, published an article headed, “Safari or hunting down the French”. Political debate was heated, including insinuations that this national number was the work of the Vichy government and used to hunt down Jews and members of the Resistance. In practice, such misuse did occur in a number of European countries during the Second World War and, more recently, in Rwanda during the 1994 genocide (Seltzer and Anderson, 2001). Tempers only cooled with the passing of the

(10) The number introduced by Carmille played a role in Vichy's racial extermination policy although it has been proved that Carmille sabotaged these registers. He was arrested in 1944 and died in Dachau (Rosental, 2003).

(11) *Système automatisé pour les fichiers administratifs et le répertoire des individus*, automated system for administrative files and directory of individuals.

Informatique et Libertés data protection Act of 6 January 1978 and the creation of the CNIL national data protection agency. More recent evidence suggests that the French remain very wary of centralized and interconnected databases. The first Warsmann Act 2011-525 of 17 May 2011 for simplification of French legal procedures authorizes data sharing between administrative authorities in order to process requests from users. It opens up the possibility of creating by decree an interconnection between the databases of all French administrations (Article 4). This has revived fears of a huge national database and CNIL's comments on the creation of two nominal registers designed to facilitate disaster relief are typical: "their use must be strictly limited to relief operations initiated by a local town hall in an emergency and they are not to be a pretext for establishing a 'population database'".<sup>(12)</sup>

France is not an exception in these matters in Europe. Even before the Second World War, the Netherlands developed a system of population records where a single sheet contained data on each individual "from cradle to grave" (Methorst, 1936). This purely administrative system was designed and developed to register the population for administrative and statistical purposes. It was claimed that it would greatly simplify the management of municipal administration and, at the same time, contribute to social research (Methorst, 1938). However, the malevolent misuse of this system during the war was a major argument expressed in subsequent opposition to any centralized registration system. This distrust was key to the decision to maintain decentralized municipal population registers when the GBA was established in 1985, and only the Centraal Bureau voor de Statistiek was authorized to centralize the data for statistical purposes (Deboosere and Masuy-Stroobant, 2012). A similar climate of opinion fuelled opposition to the census planned for 1981, as was also the case in Germany (Redfern, 1989).

In more general terms, fears about data confidentiality and privacy have led to much discussion and regulation throughout Europe. Significantly, Sweden, the first to use a single code number, was a pioneer in the privacy protection of data held in computer databases, both nationally and internationally. The first national privacy legislation was passed in that country on 11 May 1973. Sweden was also highly active in the Council of Europe in devising legal instruments to protect privacy. Convention 108 "for the Protection of Individuals with regard to Automatic Processing of Personal Data", adopted in 1981, was probably influenced by the French 1978 Act, particularly for the content of Articles 6 and 8. Within the European Union, Directive 95/46/EC on data protection is a framework instrument for national laws protecting "individuals with regard to the processing of personal data and on the free movement of such data". The directive was transposed into the French Act 2004-801 amending the 1978 Act. This French interpretation of the European directive stipulates that an anonymized database that excludes the family name

(12) CNIL website accessed on 2 November 2012.

but includes an individual identification number is indirectly a nominal database, thereby ruling out any possibility of creating a centralized population database.

In Sweden and other Nordic countries, however, privacy and personal identifier appear to co-exist quite happily, and abolition of the national number, a frequent theme of election campaigns, has never actually been carried through because this identifier is used so widely for administrative purposes (Barthélemy, 1986-1987).

### **III. The demographic data provided by a central population register**

In general, the quality of central population registers is constantly improved by users who consult the database on a continuous basis. For obvious reasons, it is in the interest of both local and national administrations to ensure that the status of the individuals as recorded in the population register corresponds to reality. Every effort is made locally to record in the registers all the people habitually resident in that area and to delete those who have permanently moved away. But no matter how much care is taken and how many checks are made, errors occur, sometimes on a recurrent basis, due to mistakes by the individuals or administrations concerned. Although data collection is not the responsibility of the national statistical office, that office needs to thoroughly examine the data provided by the population register and inform the body keeping the register of any difficulties or errors it may find. As Utne (1999) points out, comparing the various sources of data, both statistical and administrative, is the best way of checking the reliability of those data.

Some demographic variables are recorded on the basis of documentary evidence: those concerning birth (including name, sex, date and place of birth, parentage), marriage, divorce and widowhood (including the identity of the late spouse), citizenship and death. In these cases, the risk of error is limited to mistakes in coding or transcription, except in cases of deliberate fraud. Furthermore, an error of this type does not last long in a system that is frequently accessed and checked. Information concerning vital events can thus be considered as extremely reliable.

Another category of data is self-reported. Such data mainly concern changes in place of habitual residence and household composition. The instructions for keeping population registers lay down a set of controls, along with penalties for false declarations. Research into the reliability of population registers is rarely the subject of scientific articles but rather of internal reports, usually made by the statistical office to be read by register managers.

In Belgium, the 3Bbis survey was designed to compare answers to the 3B questionnaire<sup>(13)</sup> given by respondents with information contained in the population register (Poulain et al., 1992). The findings show that 4% of the migrations reported in the survey were not recorded in the population register, and as many as 20% in the case of children leaving home. A subsequent survey identified specific instances where changes of habitual residence might not be declared. The de facto and de jure situations of 426 households in the city of Namur were compared in order to quantify the extent of discrepancies in the specific case of an urban environment with highly mobile inhabitants (Lallemand, 1996). Among the households interviewed at the selected addresses, 7% differed in detail from the administrative information recorded. These discrepancies were mainly due to the slowness of the administrative procedure for recording changes of address. This type of error does not concern the composition of a household but solely its place of residence at a given time. Within households, the discrepancies largely concern young people because of under-reporting of changes of address when they leave home to study or to live permanently elsewhere (6% of the survey households). Where couples have separated, the change(s) of address involved may be reported late or not at all (12% of lone-parent households). The same applied to older adults moving to a retirement home or to live with children (30% of these cases). Likewise, the cohabitation of two single individuals may also go unrecorded, a situation that concerns 22% of these individuals.

Our experience on the ground shows that most of the discrepancies between actual and administrative status are due to negligence or delay. However, some individuals deliberately misreport their situation for reasons of financial gain, and the administrations concerned have various ways of dealing with such cases. The impact of these errors on the production of demographic statistics is limited, however, because the number of cases is relatively small and second, because many of these situations are only temporary. There is nonetheless a risk of over-estimating the number of people living alone and therefore under-estimating the number of cohabiting unmarried persons.

### *The relationship between census and population register*

In most countries, the first population register was established on the basis of a census. They range from Belgium in 1846 to Austria in 2001. Since continuous updating of the register raises reliability problems due to the poor recording of changes of address, the census was used to update the register periodically. In practice, when registers were handwritten, new copies were made after each census, a task also made necessary by the arrival of new persons and by the changes in existing households.

Following register computerization and improvements in their reliability, the use of censuses – whose reliability is, by contrast, decreasing – to update

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(13) The 3B survey recorded respondents' family, occupational and migration histories.

the registers has declined. Indeed, in a number of countries the roles have been reversed and the population register is now used to help run the census. Quetelet (1851) predicted that, thanks to the population register, the Belgian census of 1846 would be the last, and his dream is finally coming true.

Since the 1960s, when population registers first used a personal identification number, some have argued that population registers should replace traditional censuses. During the 2010-2011 census wave, the extent to which population registers were used to organize censuses in Europe varied from country to country (Table 2). In the Nordic countries, the census was based solely on data taken from the central population register and other administrative databases. In the Netherlands and Belgium, the situation was similar, but the absence of certain data made it necessary to use existing statistical surveys or new ones held specifically for this census. In many countries, the population was enumerated and demographic data were collected on the basis of the central population register. A census questionnaire containing these pre-encoded demographic data was used to collect all the non-demographic information

**Table 2. Forms of central population register used for the 2010-2011 censuses by country**

Link between register and census	Countries
The census is taken <b>entirely</b> from administrative databases (central population register and other registers)	Austria, Denmark, Finland, Iceland, Norway, Sweden
The census is taken <b>partly</b> from administrative databases (central population register) and existing or ad hoc statistical surveys	Belgium, Germany, Netherlands, Slovenia
The census uses <b>only</b> the central population register for the population count	Czech Republic, Estonia, Italy, Latvia, Lithuania, Poland, Spain, Switzerland
<b>No link</b> between the central population register and the census	Bulgaria, Hungary, Luxembourg, Romania, Slovakia

and at the same time correct any errors in the pre-encoded data. In the final group of countries, the census was held in the traditional manner, with a door-to-door population count and the administration of a full questionnaire to collect all the required data.

#### **IV. Transfer of demographic data from the register to statistical offices and production of demographic statistics**

In every country studied, the national statistical office has some form of access to the data in the central population register, if it exists (Tables 3 and 4).

National statistical offices have implemented a range of original initiatives for producing demographic data from administrative sources, central population registers especially (Thygesen, 1995; Statistics Norway, 1996; Wismer, 2003; Statistics Finland, 2004; Wallgren and Wallgren, 2006).

With respect to births and deaths, the central register can be used to record these events in the person’s municipality of residence and not the actual place (hospital or clinic) where the birth or death occurred. The central register thus provides an opportunity to link all demographic events concerning a single

**Table 3. Ways in which the central population register is used to produce demographic statistics by country**

	Statistical office contributes to population register improvement	Frequency of data transfer	Statistical office receives individual data	Type of data transferred	First year individual data concerning population stock were transferred	First year individual migration data were transferred
Austria	Yes	Quarterly	Yes	Identifiable	2002	2002
Belgium	No	Daily	Yes	Identifiable	1989	1989
Bulgaria	Yes	Monthly	Yes	Identifiable	–	1980
Czech Republic	No	–	No	Aggregated	–	–
Denmark	Yes	Weekly	Yes	Identifiable	1971	1973
Estonia	Yes	Monthly	Yes	Identifiable	2002	2001
Finland	Yes	Weekly	Yes	Identifiable	1975	1975
Hungary	No	Monthly	Yes	Anonymized	–	1984
Iceland	Yes	Other	Yes	Identifiable	1953	1953
Latvia	Yes	Monthly	Yes	Identifiable	2000	2002
Lithuania	Yes	Daily	Yes	Identifiable	2001	2001
Luxembourg	Yes	Monthly	Yes	Anonymized	1979	1987
Netherlands		Other	Yes	Aggregated	1995	1995
Norway	Yes	Daily	Yes	Identifiable	1996	1996
Poland	No	Quarterly	Yes	Identifiable	–	1990
Romania	No	Monthly	Yes	Identifiable	–	1996
Slovakia	No	–	No	–	–	–
Slovenia	Yes	Quarterly	Yes	Identifiable	1985	1985
Spain	Yes	Monthly	Yes	Identifiable	1996	1996
Sweden	Yes	Daily	Yes	Identifiable	1968	1968

**Note:** Statistical data collection from central population registers changes very quickly. The information obtained in our survey may not reflect changes introduced since 2010.



individual rather than considering them separately, and opens the way to producing statistics on the entire population. When a population sample is used, such statistics can only be obtained by means of retrospective surveys and event history data.

Central population registers can also be used to produce migration statistics, whether of local, domestic or cross-border movements (Termote, 1973; Courgeau, 1988; Poulain, 1995; Bilsborrow et al., 1997), and this is another key advantage. Any migration can be noted via the changes of residence reported by individuals and recorded in the central population register. Only register data can be used in this way to describe migratory movements and trends. This obviously has definite advantages, but registers are by no means perfect data sources, particularly for international emigration. A given individual's movements can be correlated so that their length of presence in a place of residence can be calculated and any departures and returns identified. For international migration, known periods of presence and absence from the host country can be used to apply international recommendations for identifying the various categories of international migrants on the basis of length of stay.<sup>(14)</sup> Statistics on international migration are indisputably the least reliable. It is not unusual to find coverage rates below 50%, an extremely low percentage that is explained by the circumstances of emigration, and often by the fear of losing advantages linked to being registered in one's home country. This lack of reliability is easy to see by comparing emigration figures with the immigration figures of the corresponding host countries (Poulain, 1993).

A central register makes it possible to continuously monitor population movements by correlating changes in the population stock with entry and exit flows. The status of a population and its socio-demographic structure can be determined at any time and not merely after a census. Population change can be estimated all the time and not only annually, as was the case before computerization when local population registers were used. Central register data can be used to describe population status and change for all the municipalities in a country at the same point in time, in a standardized and consistent manner.

Central registers also provide a means to track families and households. In the Nordic and Baltic countries, the identity of parents is one of the variables recorded, provided this information is given on the birth certificate. This is not the case in Austria or in Belgium where filiation is not included in legal data.<sup>(15)</sup> On the other hand, information about a person's spouse given on the marriage certificate is recorded in all the countries studied. All

(14) The United Nations recommendations for the collection of international migration statistics (United Nations, 1998) define these figures on the basis of a criterion of at least one year's presence or absence from the reporting country.

(15) This information is in fact provided on a list of supplementary data that is only accessible locally or nationally with special authorization from the relevant ministry to those individuals on whom this information has been collected by one of the municipalities in which they have resided.

Table 4. Individual characteristics transferred from the central population register to the statistical office by country

	Personal identifier	Family name, given names		Birth		Sex	Citizenship		Information on ethnic origin	Civil status	Occupation	Educational level
		Date	Place	Current	Previous							
Austria	X	-	X	X	X	X	X	-	-	-	-	-
Belgium	X	X	X	X	X	X	X	X	-	X	X	-
Bulgaria	X	-	X	X	X	X	X	-	-	X	-	X
Czech Republic	-	-	-	-	-	-	-	-	-	-	-	-
Denmark	X	X	X	X	X	X	X	-	-	X	-	-
Estonia	X	-	X	X	X	X	X	X	X	X	-	X
Finland	X	X	X	X	X	X	X	-	-	X	X	-
Hungary	-	-	-	X	-	X	X	X	-	X	-	-
Iceland	X	X	X	X	X	X	X	-	-	X	-	-
Latvia	X	X	X	X	X	X	X	-	X	-	-	-
Lithuania	X	X	X	X	X	X	X	X	X	X	X	X
Luxembourg	-	-	-	X	-	X	X	-	-	X	-	-
Netherlands	X	-	-	X	-	X	X	X	-	X	-	-
Norway	X	X	X	X	X	X	X	-	-	X	-	-
Poland	X	-	-	X	-	X	X	-	-	X	-	X
Roumania	X	-	-	X	-	X	-	-	X	X	X	-
Slovakia	-	-	-	-	-	-	-	-	-	-	-	-
Slovenia	X	-	X	X	X	X	X	-	-	X	-	-
Spain	-	X	X	X	X	X	X	-	-	-	-	X
Sweden	X	X	X	X	X	X	X	X	-	X	-	-

Table 4 (cont'd). Individual characteristics transferred from the central population register to the statistical office by country

	Residence			Migration				Other identifiers					
	Locality	Address	Date of address change	Previous locality	Date of immigration	Date of immigration	Date of emigration	Country of destination	Expiry date of residence permit	Spouse	Father	Mother	Household
Austria	x	x	x	x	x	x	x	-	-	-	-	-	x
Belgium	x	x	x	x	x	x	x	-	-	x	-	-	x
Bulgaria	x	-	x	x	-	-	-	-	-	-	-	-	-
Czech Republic	-	-	-	-	-	-	-	-	-	-	-	-	-
Denmark	x	x	x	x	x	x	x	-	-	x	x	x	-
Estonia	x	x	x	x	x	x	x	x	x	x	x	x	-
Finland	x	x	x	x	x	x	x	-	-	x	x	x	x
Hungary	x	-	x	x	-	-	-	-	-	-	-	-	-
Iceland	x	x	x	x	x	x	x	x	x	x	x	x	x
Latvia	x	x	x	x	x	x	x	x	-	x	x	x	-
Lithuania	x	x	x	x	x	x	x	-	-	x	x	x	-
Luxembourg	x	-	-	x	-	x	-	-	-	-	-	-	-
Netherlands	x	x	x	x	x	x	x	-	-	x	x	x	-
Norway	x	x	x	x	x	x	x	x	x	x	x	x	-
Poland	x	-	x	x	x	x	x	-	-	-	-	-	-
Roumania	x	-	x	-	-	-	-	-	-	-	-	-	-
Slovakia	-	-	-	-	-	-	-	-	-	-	-	-	-
Slovenia	x	x	x	x	x	x	x	-	-	-	-	-	-
Spain	x	x	x	x	x	x	x	-	-	-	-	-	-
Sweden	x	x	x	x	x	x	x	x	-	x	x	x	-

Note: Statistical data collection from central population registers changes very quickly. The information obtained in our survey may not reflect changes introduced since 2010.

this information can be used to identify family nuclei and to produce statistical tables describing them.

The concept of household can also be identified from data in the central register. In the Nordic countries, all the people living at the same address are considered to be part of a single household, defined therefore by the household-dwelling concept.<sup>(16)</sup> For this purpose, it is necessary to have an accurate land registry of separate dwellings. In Belgium, by contrast, the household is recorded as such in the register, together with identification of a reference person and the relationship between that person and all the others in the household. Consequently, all members of a single household live at the same address, but it is still possible for a single address to house more than one separate household.

In most countries with central registers, statistics on households and family nuclei can be produced, distinguishing, for example, their size, their type and the characteristics of their members (Harmsen and Israëls, 2003). Similarly, individuals can be characterized by their household situation, which can be tracked continuously.

## V. New opportunities for demographic analysis

A central register makes it possible to bring together all the events involving a given individual, exhaustively for the entire population. This is an undeniable advantage and enables users to produce longitudinal statistics that until now were obtained through retrospective or multi-wave surveys. The time limit is the time taken to record information in the register. The demographic trajectories of spouses can be compared, along with those of their parents and children in order to reveal their degree of interaction. The opportunities for producing new statistical data are innumerable, as pointed out by Verhoef and van de Kaa (1987) and Myrskylä (1999), and we propose some practical examples of how central register data can be used for demographic analysis.

The first phenomena to be analysed on the basis of central register data were migration and migration trajectories. Using a sample of data from Norwegian registers, Baccaïni and Courceau (1996a, 1996b) reconstructed the migration trajectories of two specific cohorts and linked them to the migrants' demographic (fertility, nuptiality) and economic (employment, occupation, income) characteristics. They also developed multilevel analysis in the social sciences with extensive use of these register data (Courceau and Baccaïni, 1998). In Belgium, identical data have been used to link the successive migrations

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(16) The United Nations Economic Commission for Europe's recommendations (UNECE, 2006) distinguish between the "housekeeping unit" defined as persons living in the same dwelling with joint board and the "dwelling household". The "housekeeping unit" concept is used in the Belgian central register, unlike the Nordic countries, which are unable to assemble data concerning the housekeeping unit of household members and use the "dwelling household", comprising all the people occupying a single dwelling unit.

of a single individual, calculate the period of residence in a given dwelling and identify return migration (Eggerickx et al., 2000). Similar analyses have been made more recently in Austria using data from the central population register that has been operating since 2002 (Marik-Lebeck and Wisbauer, 2010). In the Netherlands, Michielin et al. (2008) calculated the distance between parents' and children's places of residence and its impact on their spatial mobility. To that end they used the successive places of residence of parents and their children and the filiation information recorded in the register. The effect of a couple's divorce or separation in terms of subsequent spatial mobility has also been studied in the Netherlands by Feijten and van Ham (2007) and in Sweden by Mulder and Malmberg (2011). This research looked at which of the former spouses retained the marital home and how far away the other moved, whether to an urban or rural place of residence, and to what type of dwelling. In Sweden, Malmberg and Pettersson (2007) analysed the distance between children and their elderly parents, which is an important variable for planning the care needs of older adults.

Register data are also extensively used for research into international migration and the integration of migrants. As Nørredam et al. (2011) have shown for Denmark, various registers can be matched with the population register for a wide range of studies on migrant health, employment and education. In Belgium, a typology of migrants has been developed comprising country of birth, nationality at birth, current nationality and duration of stay in the host country (Eggerickx et al., 2000). Various groups of migrants have thus been compared in terms of both demographic and socioeconomic characteristics (Deboosere and Gadeyne, 2005).

Most register-based studies of fertility and marital history have been conducted with a view to analysing differential survival. Unlike censuses and surveys, central registers can be used to track people's survival up to the time of death. Martikainen et al. (2005) examined the impact of marital status on survival and cause of death for Finnish cohorts of men and women aged over 30, controlling for the number of children and two socioeconomic indicators. On the basis of Norwegian data, Grundy and Kravdal (2010) analysed the impact on male and female mortality of age at first birth and parity, while distinguishing different causes of death. Later, Kravdal et al. (2012) studied the impact of the marital history of men and women born since 1935 and their number of children on their survival during the period 1980-2008. Drefahl (2010) used the Danish data to reveal the impact of age difference between spouses on their survival. The information from censuses and surveys on individuals' living arrangements is continuously available from register data. These can be used to compare mortality risks by living arrangement, comparing, for example, those living alone, those living in a private household with other people and those living in an institution (Koskinen et al., 2007; Drefahl, 2012; Herm, 2012). The higher mortality risk of people in institutions has been

analysed from Belgian data, controlling for health status (Herm et al., forthcoming).

Register data can also identify specific household changes such as the last child leaving home, living alone after widowhood, moving to join a child's household or into an institution. Comparing Finland and Belgium, Einiö et al. (2012) examined the various demographic and socioeconomic factors affecting the move into an institution. In both countries, the residence of elderly people in institutions is relatively well recorded in the central population register, and these data, when matched with those of the census or other administrative databases, make it possible to characterize the people concerned. Comparing the occurrence of these household changes, Nihtilä and Martikainen (2008) have shown how the risk of institutionalization depends on marital history and widowhood. The impact on mortality of widowhood or institutionalization has been extensively studied (Martikainen and Valkonen, 1996; Lusyne et al., 2001; Guilbault et al., 2007).

Comparison of living arrangements at two given dates from individual register data can be used to calculate and analyse the likelihood of transition from one arrangement to another (Martikainen et al., 2008). These transition probabilities are the basic information used to make household projections with the multistate model (Surkyn et al., 2008; Debuissou et al., 2012). These data make it possible to achieve systematic matches between the results of population projections and household projections, and, indirectly, housing projections.

By matching register data with census information, differential mortality and fertility can be analysed by household situation and by the socioeconomic characteristics of the household members at the time of the census. More generally, a wide variety of events recorded during an individual's life history can be deduced from central population register data and matched with those from many other administrative registers for social security, health, employment, education, housing, etc. How do certain demographic risks vary as a function of the external parameters observed on the basis of these registers? Conversely, to what extent are certain socioeconomic risks, such as entry into poverty, influenced by an individual's demographic trajectory? These questions can be analysed with appropriate use of central administrative registers. More specifically, comparison of register data with cause-of-death or health registers provides scope for a wide range of in-depth epidemiological studies for the entire population (Herttua et al., 2007; Mäki et Martikainen, 2012; Vandenheede et al., 2012).

## Conclusion

With the introduction of central population registers, vast new potentialities were created and the production of demographic statistics entered a whole new era. In most of the countries studied, in the space of a decade, national statistical offices modified their traditional ways of producing demographic statistics by using data from central population registers. In many countries, these same registers were used as a basis for censuses in 2010-2011. This major change has many advantages, but also raises some legitimate – though not insurmountable – concerns. By basing their statistical production on the central population register, the statistical offices no longer have control over statistical production and are subject to numerous administrative rules. Obligated to accept data taken from the central register without any adjustment, the offices limit their intervention to a few small verifications and corrections while under no illusion that these reflect the actual situation. Furthermore, it is sometimes difficult for them to comply with international recommendations if doing so involves changing the administrative rules, particularly the laws on population registration.

By using data from central registers and developing statistical registers, statistical offices have considerably simplified their collection work and can now produce a wider range of demographic data, more quickly and, in theory, more cheaply. Furthermore, these exhaustive datasets can be used to produce statistics that describe the status of a population at a given point in time or the occurrence of demographic events over a chosen period. Scope for research is thus broadened not only in time but also in space, since individual data can be aggregated at any level, the only limitation, in principle, being the statistical significance of small sample sizes and respect for privacy.

Faced with this rather overwhelming task, statistical offices need to work together with researchers, who will find here a wealth of hitherto unexploited data. For demographers, the opportunities offered by this new source are many and varied, and the potential for event history analysis is broadened immeasurably. But to exploit this potential, researchers and statistical offices must have access to the individual data taken from the central population register or the statistical register. In practice, however, access is difficult and the obstacles encountered are a matter of concern to many demographers, not to mention geographers, sociologists, epidemiologists, historians, etc. As Lentzen (1982) points out, “one of the major problems arising with the computerization of files... is the potential for easier and faster interconnection and the weaving of a spider’s web around the individual”.

However, arguments that focus on the violation of personal privacy are likely to block the advance of demographic research. In this plea for optimal use of central registers, we agree with Olsen (2011) who argues that “register-based research can be done without risk of unwanted disclosure of personal

data and it involves no invasive procedures. It is a valuable gift given by the people and paid by them both as taxpayers and as donors of data, to be used for the people”.

Since high-quality registers are not found everywhere, it is important to ensure that a gulf is not created between those who have register data and those who do not. For that reason, international cooperation is essential so that, like Courgeau in the early 1990s, demographers can use the data from countries where registers exist. Again we agree with Olsen, when he says that “[P]opulation-based registers in the Nordic countries provide a valuable gift to researchers in public health and demography worldwide. It is important that all have equal access to data. If there is no guarantee of free access to data, the best researchers will not find this research area attractive.”

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## REFERENCES

- AROSENIUS E., 1928, *Bidrag till det svenska tabellverkets historia*, Stockholm, pp. V-VIII (cited by Hecht, 1977)
- BACCAÏNI B., COURGEAU D., 1996a, "Approche individuelle et approche agrégée : utilisation du registre norvégien pour l'étude des migrations", in Bocquet-Appel J.-P., Courgeau D., Pumain D. (eds.), *Analyse spatiale de données biodémographiques*, Paris, John-Libbey/INED, pp. 79-104.
- BACCAÏNI B., COURGEAU D., 1996b, "The spatial mobility of two generations of young adults in Norway", *International Journal of Population Geography*, 2(4), pp. 333-359.
- BARTHÉLEMY J., 1986-1987, "Le Registre national", *Mouvement Communal*, Bruxelles, no. 11/1986 pp. 406-410, no. 12/1986 pp. 465-470, no. 1/1987 pp. 19-23, no. 2/1987 pp. 64-66, no. 3/1987 pp. 120-122, no. 4/1987 pp. 179-182, no. 5/1987 pp. 230-233.
- BERTILLON J., 1890, "De l'organisation des bureaux de statistique en France et à l'étranger et notamment de l'organisation du registre de population dans les principales villes de l'Europe (...)", *Revue du Service de l'intendance militaire*, Tome III, 14<sup>e</sup> livraison, mars-avril 1890, 36 p.
- BILSBORROW R. E., GRAEME H., OBERAI A. S., ZLOTNIK H., 1997, *International Migration Statistics: Guidelines for Improving Data Collection Systems*, International Labour Office, Geneva, 441 p.
- BIRABEN J.-N., 1970, "La statistique de population sous le Consulat et l'Empire", *Revue d'histoire moderne et contemporaine*, 17(3), pp. 359-372.
- COURGEAU D., 1988, *Méthodes de mesure de la mobilité spatiale. Migrations internes, mobilité temporaire, navettes*, Paris, INED, Les Manuels, 301 p.
- COURGEAU D., BACCAÏNI B., 1998, "Multilevel analysis in the social sciences", *Population, An English Selection*, 10(1), pp. 39-71.
- DEBOOSERE P., GADEYNE S., 2005, "Adult migrant mortality advantage in Belgium: Evidence using census and register data", *Population, English Edition* 60(5-6), pp. 655-698.
- DEBOOSERE P., MASUY-STROOBANT G., 2012, "Utopie, science et statistiques officielles", in Schoumaker B., Tabutin D. (eds.), *Les systèmes d'information en démographie et en sciences sociales. Nouvelles questions, nouveaux outils ?*, Presses universitaires de Louvain, Louvain-la-Neuve, pp. 451-465.
- DEBUISSON M., REGINSTER I., EGGERICKX T., 2012, "Perspectives de population et de ménages pour les communes wallonnes", IWEPS, 6 p.
- DE GROOT R., 2009, "Registre de l'état civil et registres de la population : frères ennemis ou frères siamois?", Paper presented at a conference in Strasbourg on 13-14 March 2009 to celebrate the 60<sup>th</sup> anniversary of CIEC, [www.ciec1.org/Etudes/ColloqueCIEC/Colloque60ans/Traductions/5DeGrootFr/pdf](http://www.ciec1.org/Etudes/ColloqueCIEC/Colloque60ans/Traductions/5DeGrootFr/pdf) (consulted 28 November 2011).
- DESROSIÈRES A., 2004, "Enquêtes versus registres administratifs : réflexions sur la dualité des sources statistiques", *Courrier des statistiques*, 111, pp. 3-16.
- DREFAHL S., 2010, "How does the age gap between partners affect their survival?", *Demography*, 47(2), pp. 313-326.

- DREFAHL S., 2012, "Do the married really live longer? The role of cohabitation and socioeconomic status", *Journal of Marriage and Family*, 74(3), pp. 462-475.
- DUPÂQUIER J., DUPÂQUIER M., 1985, *Histoire de la démographie. La statistique de la population des origines à 1914*, Paris, 462 p.
- EGGERICKX T., POULAIN M., SCHOUMAKER B. (WITH DAL L., DEBUISSON M., FOULON M.), 2000, *La mobilité spatiale de la population. Recensement de la population de la Belgique 1991. Monographie no. 2*, Brussels, Institut national de statistique, 129 p.
- EINIÖ E., GUILBAULT C., MARTIKAINEN P., POULAIN M., 2012, "Gender differences in care home use among older Finns and Belgians", *Population English Edition*, 67(1), pp. 71-96.
- EUROSTAT, DENMARK STATISTICS, 1995, *Statistics on Persons in Denmark. A Register-Based Statistical System*, Luxembourg, Office for Official Publications of the European Communities, 211 p.
- FEIJTEN P., VAN HAM M., 2007, "Residential mobility and migration of the divorced and separated", *Demographic Research*, 17(21), pp. 623-654.
- GRUNDY E., KRAVDAL O., 2010, "Fertility history and cause-specific mortality: a register-based analysis of complete cohorts of Norwegian women and men", *Social Science & Medicine*, 70(11) pp. 1847-1857
- GUILBAULT C., DAL L., POULAIN M., 2007, "Le veuvage et après", *Gérontologie et société*, 121(2), pp. 163-178.
- HARMSÉN C., ISRAËLS A., 2003, "Register-based household statistics", paper presented at the European Population Conference, EAPS, Warsaw, 12 p.
- HECHT J., 1977, "L'idée du dénombrement jusqu'à la Révolution", in *Pour une histoire de la statistique*, Vol. 1, Paris, INSEE, pp. 55-71.
- HÉLIN E., 1980, "Origine des recensements belges", in Pascu S. (ed), *Population et Société*, Vol. 4, Cluj-Napoca, Dacia, pp. 136-153.
- HERM A., 2012, "Mortality and living arrangements: Living alone, with family or in institution", Population Association of America, 2012 Annual Meeting, 3-5 May, San Francisco, <http://paa2012.princeton.edu/abstracts/122848>
- HERM A., POULAIN M., ANSON J., 2012, forthcoming, "Excess mortality risks in institution: The influence of health status", in Anson J., Luy M., (eds) *Current Perspectives in Mortality Research*, Springer. .
- HERTTUA K., MÄKELÄ P., MARTIKAINEN P., 2007, "Differential trends in alcohol-related mortality: A register-based follow-up study in Finland in 1987-2003", *Alcohol and Alcoholism*, 42(5), pp. 456-464.
- HOFSTEN E., LUNDSTRÖM H., 1976, *Swedish Population History. Main Trends from 1750 to 1970*, Urval, Stockholm, 186 p.
- INTERNATIONAL UNION FOR THE SCIENTIFIC STUDY OF POPULATION (IUSSP), 1982, *Multilingual Demographic Dictionary*, Ordina Editions, Liège, 179 p.
- JACOD M., 1995, "No hope of building comprehensive demographic and social information on population register in France", *Working Paper*, no. 19, presented at the Work Session on Registers and Administrative Records for Social and Demographic Statistics, Geneva, 23-25 January 1995, 7 p.
- JURADO A., PADILLA A., 1999, "The padron continuo", report presented at the Joint ECE/Eurostat Work Session on Registers and Administrative Records for Social and Demographic Statistics, *Working Paper* no. 28, Geneva, 3 p.
- KOSKINEN S., JOUTSENNIEMI K., MARTELIN T., MARTIKAINEN P., 2007, "Mortality differences according to living arrangements", *International Journal of Epidemiology*, 36(6), pp. 1255-1264.

- KRAVDAL O., GRUNDY E., LYGSTAD T., WIJK K., 2012, "Family life history and late mid-life mortality in Norway", *Population and Development Review*, 38(2), pp. 237-257.
- LALLEMAND C., 1996, "Analyse comparative de la situation de droit et de fait des ménages namurois", Mémoire pour le DEA en démographie, Institut de démographie, Université catholique de Louvain, 68 p.
- LEBHART G., NEUSTÄDTER CH., KYTIR J., 2007, "The new population register at Statistics Austria. Conceptualization and methodology for register-based flow and stock statistics", *Austrian Journal of Statistics*, 36(4), pp. 277-289.
- LEBOUTTE R., OBOTELA R., 1988, "Les registres de population en Belgique. Genèse d'une technique administrative et d'une source de démographie historique", *Bulletin de la Commission Royale d'Histoire*, 154, pp. 285-305.
- LENTZEN E., 1982, "Fichiers nominatifs et vie privée", *Courrier hebdomadaire du CRISP*, 948-949, 59 p.
- LÉVY M.-L., 1989, "Le numéro d'identité", *Population et sociétés*, 232, 4 p.
- LUSYNE P., PAGE H., LIEVENS J., 2001, "Mortality following conjugal bereavement, Belgium 1991-96: The unexpected effect of education", *Population Studies*, 55(3), pp. 281-289.
- MÄKI N., MARTIKAINEN P., 2012, "A register-based study on excess suicide mortality among unemployed men and women during different levels of unemployment in Finland", *Journal of Epidemiological Community Health*, 66(4), pp. 302-307.
- MALMBERG G., PETTERSSON A., 2007, "Distance to elderly parents: Analysis of Swedish register data", *Demographic Research*, 17(23), pp. 679-704.
- MARIK-LEBECK S., WISBAUER A., 2010, "Binnenwanderung in Österreich 2008", *Statistische Nachrichten (Bevölkerung)*, 2, pp. 106-115.
- MARTIKAINEN P., VALKONEN T., 1996, "Mortality after the death of a spouse: Rates and causes of death in a large Finnish cohort", *American Journal of Public Health*, 86(8), pp. 1087-1093.
- MARTIKAINEN P., NIHTILÄ E., MOUSTGAARD H., 2008, "The effects of socioeconomic status and health on transitions in living arrangements and mortality: A longitudinal analysis of elderly Finnish men and women from 1997 to 2002", *Journal of Gerontology B (Social Sciences)*, 63(2), pp. S99-109.
- MARTIKAINEN P., MARTELIN T., NIHTILÄ E., MAJAMAA K., KOSKINEN S., 2005, "Differences in mortality by marital status in Finland from 1976 to 2000: Analyses of changes in marital-status distributions, socio-demographic and household composition, and cause of death", *Population Studies*, 59(1), pp. 99-115.
- METHORST H. W., 1936, "The new system of population accounting in the Netherlands", *Journal of the American Statistical Association*, 31(196), pp. 719-722.
- METHORST H. W., 1938, "The new system of population accounting in the Netherlands", *Journal of the American Statistical Association*, 33(204), pp. 713-714.
- MICHELIN F., MULDER C., ZORLU A., 2008, "Distance to parents and geographical mobility", *Population, Space and Place*, 14(4), pp. 327-345.
- MULDER C., MALMBERG G., 2011, "Moving related to separation: Who moves and to what distance", *Environment and Planning A*, 43(11), pp. 2589-2607.
- MYRSKYLÄ P., 1999, "New statistics made possible by the use of registers", Report presented at the Joint ECE/Eurostat Work Session on Registers and Administrative Records for Social and Demographic Statistics, Geneva.
- NATIONAL CENTER FOR HEALTH STATISTICS (NCHS), 1980, "The person-number systems of Sweden, Norway, Denmark and Israel", *Data Evaluation and Methods Research*, Series 2, 84, Maryland.

- NICOLAÏ E., 1906, "Rapport sur les registres de population", *Bulletin de l'Institut international de statistique*, 15(2), pp. 314-351.
- NIHTILÄ E., MARTIKAINEN P., 2008, "Institutionalization of older adults after the death of a spouse", *American Journal of Public Health*, 98(7), pp. 1228-1234.
- NØRREDAM M., KASTRUP M., HELWEG-LARSEN K., 2011, "Register-based studies on migration, ethnicity, and health", *Scandinavian Journal of Public Health*, 39 (Suppl. 7), pp. 201-205.
- OLSEN J., 2011, "Register-based research: Some methodological considerations", *Scandinavian Journal of Public Health*, 39(3), pp. 225-229.
- ORGANIZATION FOR SECURITY AND COOPERATION IN EUROPE (OSCE), 2009, *Guidelines on Population Registration*, Warsaw, 55 p.
- POULAIN M., 1993, "Confrontation des statistiques de migration intra-européennes : vers une matrice complète ?", *Revue européenne de démographie*, 9(4), pp. 353-381.
- POULAIN M., 1995, "Mesurer les migrations à l'aide d'un registre de population : quelle comparabilité européenne ?", in Duchêne J., Wunsch G. (eds.), *Collecte et comparabilité des données démographiques et sociales en Europe*, Chaire Quetelet, Academia, L'Harmattan, Louvain-la-Neuve, pp. 553-571.
- POULAIN M., 2010, "Le registre de population belge", in Eggerickx T., Sanderson J.-P. (eds.), *Histoire de la population de la Belgique et de ses territoires*, Chaire Quetelet, Presses Universitaires de Louvain, Louvain-la-Neuve, pp. 83-116.
- POULAIN M., RIANDEY B., FIRDION J.-M., 1992, "Data from a life history survey and the Belgian population register", *Population, An English Selection*, 4, pp. 77-96.
- POULAIN M., PERRIN N., SINGLETON A. (eds.), 2006, *THESIM Towards Harmonised European Statistics on International Migration*, Presses universitaires de Louvain, 744 p.
- QUETELET A., 1851, "Rapport au Ministère de l'Intérieur sur la tenue des registres de population", *Bulletin de la Commission centrale de statistique*, Bruxelles, 4, pp. 212-239.
- RANDERAAD N., 1995, "Negentiende-eeuwse bevolkingsregisters als statistische bron en middel tot sociale beheersing", *Tijdschrift voor Sociale Geschiedenis*, 21, pp. 319-342.
- REDFERN P., 1989, "Population registers: Some administrative and statistical pro's and con's", *Journal of the Royal Statistical Society*, A 152(1), pp. 1-41.
- RIANDEY B., 1996, "Démographie, statistique et vie privée", *Population*, 51(2), pp. 439-458.
- ROSENTAL P.-A., 2003, *L'intelligence démographique. Sciences et politiques des populations en France (1930-1960)*, Paris, Odile Jacob, 365 p.
- SELTZER W., ANDERSON M., 2001, "The dark side of numbers: The role of population data systems in human rights abuses", *Social Research*, 68(2), pp. 481-513.
- STATISTICS FINLAND, 2004, "Use of registers and administrative data sources for statistical purposes", *Best Practices of Statistics Finland*, Helsinki, 65 p.
- STATISTICS NORWAY, 1996, "Inventory of the main administrative sources and registers being used for statistical purposes by countries in the ECE Region", *Conference of European Statisticians, Work session of November 1996*, WP 5, 42 p.
- SURKYN J., WILLAERT D., DEBOOSERE P., 2008, "New household projections for the Flemish region in Belgium: 2006-2031 (2051)", Paper presented at the 35<sup>th</sup> CEIES Seminar on new family relationships and living arrangements. Demands for change in social Statistics. Central Statistical Office, Warsaw, 24-25 January 2008, 15 p.
- TERMOTE M. G., 1973, "Statistiques migratoires directes : le registre de population", *Migrations intérieures. Méthodes d'observation et d'analyse*, Actes du IV<sup>e</sup> colloque national du CNRS, Caen, Paris, pp. 157-164.

- THYGESEN L., 1983, "Methodological problems connected with a socio-demographic statistical system based on administrative records", *Bulletin de l'IIS*, Vol. L, Book I, pp. 227-242.
- THYGESEN L., 1995, "The register-based system of demographic and social statistics in Denmark – an overview", *Statistical Journal of the United Nations Economic Commission for Europe*, 12(1), pp. 49-55.
- UNITED NATIONS, 1998, *Recommendations on Statistics of International Migration, Revision 1*, United Nations, New York, 96 p.
- UNITED NATIONS, 2001, *Principles and Recommendations for a Vital Statistics System, Revision 2*, United Nations, New York, X + 187 p.
- UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE (UNECE), 2006, *Conference of European Statisticians Recommendations for the 2010 Censuses of Housing and Population*, New York and Geneva, 213 p.
- UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE (UNECE), 2007, *Register-based Statistics in the Nordic Countries, Review of the Best Practices with Focus on Population and Social Statistics*, New York / Geneva, 51 p.
- UTNE H., 1999, "Population and housing censuses in Norway towards a register based solution", Report presented by Statistics Norway to the Joint ECE/Eurostat Work Session on Registers and Administrative Records for Social and Demographic Statistics, Geneva, 1-3 March 1999.
- VANDENHEEDE H., DEBOOSERE P., GADEYNE S., DESPIEGELAERE M., 2012, "The associations between nationality, fertility history and diabetes-related mortality: A retrospective cohort study in the Brussels-Capital Region (2001-2005)", *Journal of Public Health*, 34(1), pp. 100-107.
- VASSENDEN K., 2003, "The Norwegian population statistics system", Report presented at the 14<sup>th</sup> Nordic Demographic Symposium, NORDIC 2001, updated in October 2003, 31 p.
- VERHOEF R., VAN DE KAA D. J., 1987, "Population registers and population statistics", *Population Index*, 53(4), pp. 633-642.
- WALLGREN A., WALLGREN B., 2006, *Register-based Statistics. Administrative Data for Statistical Purpose*, Chichester, UK, John Wiley & Sons, 247 p.
- WATSON I., 2010, "A short history of national identification numbering in Iceland", *Bifröst Journal of Social Science*, 4, pp. 51-89.
- WISMER K., 2003, "Use of registers in social statistics in Denmark", Reported presented to the Expert Group Meeting on Setting the Scope of Social Statistics, UNSD, New York, May 2003, 12 p.

### Michel POULAIN, Anne HERM • CENTRAL POPULATION REGISTERS AS A SOURCE OF DEMOGRAPHIC STATISTICS IN EUROPE

Since their origins in seventeenth-century Sweden, population registers have been kept at local level, and computerization has now made it possible to establish national registers in most of the 30 European countries analysed in this article. As a result of these registers, the production of demographic statistics has entered a new era, with many advantages but also ethical controversies. New questions arise, such as the definition of residents, double counting and data confidentiality. This article describes and compares the operational principles of central registers in various countries, and how individual data are extracted in order to produce demographic statistics. It is now possible to regularly monitor the individual demographic trajectories of the entire population at national level, and to reveal interactions between the demographic behaviours of individuals in a single household. Given the many opportunities afforded by longitudinal analysis, support from researchers would be particularly beneficial, and efforts must be made to facilitate access to individual data.

### Michel POULAIN, Anne HERM • LE REGISTRE DE POPULATION CENTRALISÉ, SOURCE DE STATISTIQUES DÉMOGRAPHIQUES EN EUROPE

Depuis leur origine en Suède au XVII<sup>e</sup> siècle, les registres de population sont tenus à l'échelle locale, et c'est l'informatisation qui a permis la mise en œuvre d'un registre centralisé de population dans la majorité des 30 pays européens analysés dans cet article. Avec l'introduction de ces registres, la production de statistiques démographiques est entrée dans une ère nouvelle, présentant de nombreux avantages mais provoquant également des débats de nature éthique. De nouvelles questions apparaissent, notamment sur la définition des résidents, les problèmes de double enregistrement et la confidentialité des données. Cette étude décrit et compare les principes de fonctionnement du registre centralisé dans différents pays et la façon dont les données individuelles en sont extraites afin de produire les statistiques démographiques. Il est maintenant possible, de façon régulière, de suivre les trajectoires démographiques individuelles de l'ensemble de la population à l'échelle nationale ou de mettre en évidence certaines interactions entre les comportements démographiques des personnes d'un même ménage. Face aux nombreuses possibilités qu'offre l'analyse longitudinale, le soutien des scientifiques est plus que souhaité pour autant qu'ils puissent avoir accès aux données individuelles.

### Michel POULAIN, Anne HERM • EL REGISTRO DE POBLACIÓN CENTRALIZADO, FUENTE DE ESTADÍSTICAS DEMOGRÁFICAS EN EUROPA

Desde sus orígenes en la Suecia del siglo XVII, los registros de población son administrados a escala local, y es la informatización la que ha permitido la creación de un registro centralizado de población en la mayoría de los 30 países europeos analizados en este artículo. Con la introducción de estos registros, la producción de estadísticas demográficas ha entrado en una nueva era, la cual presenta numerosas ventajas pero provoca también debates de naturaleza ética. Aparecen cuestiones nuevas, en particular la definición de residente, los problemas del doble registro y la confidencialidad de los datos. Este artículo describe y compara los principios de funcionamiento del registro centralizado en diferentes países, así como el modo en que los datos son extraídos para producir las estadísticas demográficas. Es posible ahora seguir, de manera regular, las trayectorias demográficas individuales del conjunto de la población a escala nacional, o poner en evidencia ciertas interacciones entre los comportamientos demográficos de las personas de un mismo hogar. Frente a las numerosas posibilidades que ofrece el análisis longitudinal, el apoyo de los científicos es más que deseable siempre y cuando puedan tener acceso a los datos individuales.

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**Key words:** Population register, Europe, demographic statistics, demographic analysis, event history analysis.

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