

**EAST AND SOUTH ASIAN WORKSHOP ON STRATEGIES FOR ACCELERATING THE IMPROVEMENT  
OF CIVIL REGISTRATION AND VITAL STATISTICS SYSTEMS  
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**Problems and experiences in linkage and integrated use of  
different data sources of vital statistics and rates:  
Some experiences outside East and South Asia region**

Report prepared by  
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## C O N T E N T S

Sections	Headings	Page	Paragraphs
I.	Introduction	1	1 - 6
II.	Integration of data	3	7 - 9
III.	Country experiences	4	10 - 21
	References	8	

I. Introduction  
- Civil registration, Vital statistics and Population Register

1. According to the United Nations guidelines, vital statistics is the processed information on the frequency of occurrence of certain vital events, such as live births, deaths, foetal deaths, marriage, divorce, annulment, judicial separation, adoption, legitimation and recognition, along with the relevant characteristics of the events themselves and the persons concerned. The civil registration is "the continuous, permanent, compulsory recording of the occurrence and characteristics of vital events as provided through a decree or regulation, in accordance with the legal requirements of the country". The purpose is to store information and to retrieve it when needed for legal, administrative, statistical and other uses. Civil registration records, when they are reliable and nearly exhaustive, become the most important single source of vital statistics for these vital events. The United Nations has recommended that the first priority in collecting information for vital statistics should be given to births and deaths, and then to marriages and divorces. It also recommends that information on foetal deaths should be collected even though this item has a lower priority. Other items have lower importance than these in a registration system. Some events of demographic importance such as migration and naturalization, are not usually subject to civil registration. Information on these may be derived from population registers or other records.

2. A household or a population register is also the result of a type of registration. More than thirty years ago, in 1962, the UN Secretariat submitted a document titled "Methodology and Evaluation of Continuous Population Registers" to the United Nations Statistical Commission during its Twelfth session. The definition of a population register given in that document has remained substantively the same during the last thirty years. It "is an individualized data system, that is, a mechanism for continuous recording, and/or coordinated linkage, 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 time intervals".

3. A population register should have a legal basis. It is "built up from a base consisting of an inventory of the inhabitants of an area and their characteristics, such as age and sex", different types of vital events and sometimes level of education and occupation with continuous updating of this information. Thus, it is "the result of a continuous process, in

which notifications of certain events, recorded originally in different administrative systems, are automatically linked to a population register on a current basis". The unit of registration is the individual and in some cases, the changes referring to one individual may change the current characteristics of another individual. Sometimes the data are available for individuals who are identifiable as members of the same family or household. Therefore, the organization of the data in population registers may be done individually as in Nordic and some other European countries, or familywise as in Korea and Japan, or householdwise as in China. Because of the information contained therein is documented under government authority, the population registers have important legal and administrative uses. But the data can be fruitfully utilized for producing vital statistics on a continuous basis. It is said however that this is possible if a country also has a strong statistical system.

4. Population registration activity may be centralized at the national level, or decentralized at the local level of counties or provinces. However, even when there is a central office of registration, for smooth administration of the work a country very often has an established network of local registration offices that cover the entire territory. In Finland and Norway the central population registration office administers authority over the local offices, whereas in Denmark and Sweden the county offices have this power. Only in a small country with a small population, a totally central population registration system can operate well without problems. It is said that Kuwait manages the centrally located registration activity.

5. Beside civil registration and population registers, there are alternative sources which often provide an important basis for production of vital statistics, "both in developed countries where civil registration is already operating fairly efficiently, and in the developing countries where registration is, in the majority of cases, still seriously inadequate". It is important to note that while the basic data such as the number of births or deaths may be obtained from registration records or some other sources, the vital statistics obtained from the processed information may be based on several sources of data. In order to produce the statistics, the linkage of records from different sources and integration of the data are essential.

6. To understand the process of linkage and integrated use of various records, it is necessary to identify the other probable sources of primary (unprocessed) data beside those from the registration system, that is, civil registration records and household/population registers in a country. These are population censuses and demographic sample surveys. The latter may be a single-round retrospective survey, a multi-round survey or a dual-records system that combines the registration procedure with the sample survey for estimating the number of vital events.

One would note that while the registration records provide a continuous flow of data, these other sources describe periodic situations at points of time.

## II. Integration of data

7. "An integrated population registration and vital statistics system means that vital statistics are produced on a population registration basis." Where the principal objective of maintaining the population register is the production of vital statistics, then the task becomes easy if the population registration office is located as a part of the statistical service of the country. The activity then becomes a routine work item of the statistical programme. The agency responsible for the registration of vital events, is also responsible for the updating of the register and the compilation of vital statistics. In Hungary, for example, the State Population Registration Office operates under the supervision of the President of the Hungarian Central Statistical Office. The same arrangement prevails in Norway and Bulgaria too.

8. While the compilation of vital statistics based on the registration records becomes easy if the location of the two activities is under a single authority, a major difficulty is encountered in the handling of confidential medical data on births, deaths and foetal deaths, especially in connection with diagnosed diseases. Most countries now have statistical laws stipulating the confidentiality of statistical information, and legal provisions may not allow collection of certain individual information for registration purpose whereas it may be useful for compiling vital statistics. The individual information may be provided by the informant or taken from the medical certificate and other documents presented at the time of registration. That is why it may become problematic when only one type of form is used to suit both purposes. So far as the work of filling out forms, this is expected to be simple and also time-saving, since the local registrar has to complete only one form. As an attempt to preserve the confidentiality, in some countries the registration form and the statistical report are kept as two separate documents. It is easier to maintain the confidentiality at the initial reporting stage in this case. However, problems may arise when linkage is needed after some adjustments are made in the registration form at a later date.

9. This last point in connection with two forms needs further elaboration. The statistician is not interested in individual details, but needs them to produce the totals or proportions or ratios etc summarizing these details. However, almost always a subsequent change in some characteristic(s) in the registration form needs to be followed by adjustments in the individual

statistical report also. Therefore, it may be necessary to keep the statistical reports in a way that they may be identifiable, if needed, without any ambiguity even when they may contain all the confidential medical or other information. In connection with the procedures and risks in government microdata linkage, Alexander points out that "imperfections in record matching can occur for a number of reasons, and mechanical linkage of two files on the basis of identifying numbers alone will seldom be reliable" 1/. It is obvious that this identifiability violates the confidentiality. Alexander says that "special procedures for disclosure avoidance are usually required ... in studies ... of persons classified with unusual medical diagnoses" and, "when there is a possibility of identifying an individual, regardless of the statistician's intention to submerge the individual records into grouped data, efforts must be made to guard against the risk of disclosure". In fact, this concern about the violation of confidentiality and the "possible abuses of record linkage was one of the factors that led to the enactment in 1974 of the Privacy Act, a law that limits the sharing of identifiable personal information among federal agencies, especially for statistical purposes, and requires strict accountability for any such sharing" 1a/.

### III. Country experiences

10. The technique of linking records from different sources relating to the same persons is extensively used in Denmark, relying almost exclusively on administrative records. The linkage is done through a Person Number. Every municipality in Denmark keeps a local population register. The register contains information about all persons living in the municipality. It has the identifying information on each person, such as, name, date of birth, place of birth, and occupation in addition to address, family situations and nationality. Every individual is obliged to report any change of address directly to the registration office. The municipality administration updates the registers on the basis of information received from various government offices on births, deaths, marriages etc. The system was introduced in 1924. A computerized central register covering the whole of the Danish population was created in 1968. It was then that a permanent and unique identification number for every citizen was introduced. This is known as the Person Number.

11. Thygesen in 1983 reported that the establishment of the Central Population Register (CPR) avoided duplication through multiple registration and thus saved resources 2/. Some of the important features of the CPR, as he stated, are the following:

- the register is used by almost every public authority, which helps to improve the data quality;
- the person number is a secure link to other registers;

- family ties are indicated in the CPR, making automatic linking of family members possible.

12. The national statistical office Danmarks Statistik is by law entitled to collect administrative data from public authorities for the production of statistics. After the CPR was established, the first direct consequence for the statistical work, Thygesen informed, was that the annual vital statistics were reorganized in the period 1970-73, so that the CPR started providing the main part of their primary data. The medical data on births and deaths are not available in CPR, and the health authorities are still supplying these, as required for vital statistics. However, since 1970 the Central Population Register alone is used to compile population statistics with distribution by sex, age, and marital status for highly disaggregated regions.

13. The principle that the data collected for statistical work may not be disclosed to other government department or private person, if those data refer to an identifiable person, has been strictly observed in Denmark, except in case of some information on economic activity and employment.

14. It is obvious that as far as practicable, the population registers must be kept updated at all times. However, inspite of this, the register is not perfect in terms of data. The primary data based on population register may suffer from non-responses. The amount of non-responses varies from item to item, but is generally higher in data related to economic activity. The non-response problem may be handled using certain rules and utilizing other available information, or by assuming that the respondents and the non-respondents belong to the same distribution. The latter creates problems in cases where a coherent system of statistics is built up using different sources of primary data, because any adjustment procedure for one source must remain consistent with other sources so far as the total population is concerned. Even though the problem is not expected to affect in a serious way the production of vital statistics, Danmarks Statistik collects in a traditional way through interviewers or postal inquiries data similar to those obtainable from the registers. This is needed to create a basis for estimation procedures in register-based statistics as well as to assess the quality of the registration data. Obviously, the possibility of comparing register data and high-quality survey data is of particular interest when establishing rules for treatment of total or partial non-response in registers.

15. According to Jensen and Thygesen 3/, "linkage of data on different objects (persons, dwellings, enterprises, etc.) is sometimes required to make full use of administrative records. For instance, it is desirable to be able to link individual records of family members to create new information on the family; and information on persons from a population register

should be combined with information on dwellings to create housing statistics. Linkage of this kind tends to create ... methodological problems", one of which is to establish a key that provides identifiers for a particular person as well as for a second object such as a dwelling obtained from another register, since the Person Number alone is not sufficient to establish this link. The experience of Denmark shows that for a full use of administrative records that are kept on persons as units, methods of linking data to relating to different objects such as families must be explored.

16. In the Netherlands, the population statistics are collected through periodic (decennial) censuses that give the state of the population at a point of time. But there is also a Continuous Population Accounting (CPA) that provides the data for vital and migration statistics on a continuous basis. The CPA updates the population register of the country by recording vital events such as births, deaths, marriages and marriage dissolutions as well as movements (changes of permanent residence). The register refers to the resident population only. van den Breckel describes the system by noting: "A Personal Card is made out at birth for each child registered by the Local Register as a live birth. This card follows the individual during his/her life 'from cradle to grave'. All changes in the personal situation ... are entered on this card" 4/. When a person becomes the head of a family, the Personal Card also gives information about the members of the nuclear family. It is removed from the register only after death of the person and placed in a central file of genealogy.

16. In the Netherlands the population registers under CPA are complete and accurate. The local Registrars of the vital events and the population registration belong to one single unit under local administration. Checks are made during the decennial censuses to ensure accuracy of addresses recorded in the registers and the general experience is that the registers contain very few minor errors only. It proves that the CPA functions quite well in the Netherlands with a high degree of completeness and accuracy.

17. The Central Bureau of Statistics (CBS) in the Netherlands is in charge of production of vital statistics. Information in relevant statistical forms on births, deaths and events related to marriages with all necessary details are communicated to the CBS by the local registration offices. However, the system of population registration is organized at the municipality level. It is a decentralized system. In the sixties and seventies new processing techniques were introduced everywhere, but these procedures varied among the municipalities, some of which used advanced methods of computer processing and some others remained at a less sophisticated level. Because of lack of coordination in this area, according to van den Breckel, optimal use was not made of modern administrative techniques for the population



system. The centralization and computerization of population registration has since then increased. This has enabled the government to compile more frequently the vital statistics and other demographic statistics based on the data provided by the CPA. It should be noted however that the decennial population censuses in the country provide important data on special topics such as marriages and fertility, thus making it possible to carry out research studies in, for example, measuring differential fertility, analysing differences in the spacing patterns of births etc. In fact, van den Breckel expected that future population censuses in the Netherlands would collect data for undertaking special demographic analyses, while the CAP would provide the basic vital statistics.

18. Israel maintains a population register. Descriptions of the register's operation have been given by several authors such as Huebner (1967) 5/, Schmelz and Ben-Amram (1967) 6/and Nathan and Sicron (1981) 7/. The Israeli Population Register was set up in 1948. It is now a centrally maintained completely automated register, which is continually updated on new births, deaths, migration, marital status, address changes etc. It is an important source of demographic statistics in Israel. The flow-files which update the register on births, deaths, migration, marital status and changes of address, are the basis of the statistical data. Birth and death statistics are compiled periodically from the automated information.

19. The Population Register of Israel uses individual identification numbers. These individual numbers allow record linkage between two sets of data without involving the register 6/. It has been possible to link between the population census and independent population surveys for comparing the returns for the same individuals, to link the population census data with vital statistics at the census date to study vital events phenomena in the light of additional individual information and household data obtained in the census, and to link the data relating to the same individuals but obtained from different sources to study topics like infant mortality.

20. It has been noted however that linkage process is not always easy. Conditions according to the type of persons involved and the circumstances in which the identification numbers have to be obtained may vary and this may not guarantee the accuracy and completeness of the numbers to be used. The register suffers also from underreporting of addresses, a fact that calls for great care in using address as a link.

21. Several developing countries have maintained population registers, but many of these either suffer from imperfections or are not used to compile any statistics.

R E F E R E N C E S

Two United Nations publications:

Principles and Recommendations for a Vital Statistics System  
(1973) Series M No. 19, rev.1, and

Handbook of Vital Statistics Systems and Methods  
Vols I (1991) and II (1985) Series F No. 35

have been extensively used in the preparation of this document.

The other references numbered in the text are the following:

1. Privacy and Confidentiality Issues in Statistical Data Linkage by Lois Alexander (Paper presented at the 45th Session of the International Statistical Institute (ISI) in Amsterdam, 1985)

1a. Same as 1 above.

2. Methodological Problems Connected with a Socio-Demographic Statistical System based on Administrative Records by Lars Thygesen (Paper presented at the 43rd Session of the ISI in Madrid, 1983)

3. Linkage of Records on Objects of Different Kinds. Methodological Problems and Practical Experiences by Poul Jensen and Lars Thygesen (Paper presented at the 45th Session of the ISI in Amsterdam, 1985)

4. The Population Register: The Example of the Netherlands System by J.C. van den Breckel. Poplab Scientific Report Series No. 31, 1977.

5. The Population Register System in Israel and its Automation by Y. Huebner. Proceedings of the International Symposium on Automation of Population Register Systems, Vol. II. Jerusalem. 1967.

6. Use of Israel Population Register for Demographic Statistics by U.O. Schmelz and E. Ben-Amram. Proceedings of the International Symposium on Automation of Population Register Systems, Vol. I. Jerusalem, 1967.

7. The Use of Registers and Administrative Files for Preparing and Improving Statistical Data by Gad Nathan and Moshe Sicron (Paper presented at the 43rd Session of the ISI in Buenos Aires, 1981)