Scope and Limitations of Data Sources for the Study of the Vulnerability of Health within the Framework of Rights

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Summary

Vital statistics are the main source of information for identifying the health situation of a population. However, *it is less frequent that they offer information for the study of vulnerability of health (approached from the point of view of the implicit risk in the social determinants of health), and, furthermore, that they fulfill international technical requirements and standards*. Vital statistics suffer from different types of errors impeding the analysis of certain problems, or, of certain population groups or geographical areas.

The aim of this work is to *carry out a first approximation to the problem by studying up to what point vital statistics can fulfill the purpose of providing adequate information for the study of vulnerability of health. A specific case study is considered: information on social gradients in the death data of two selected Argentinean jurisdictions (City of Buenos Aires and the Province of Chaco), during the years 2000-2005.*

1. The Right to Health and its Interrelations

The Universal Declaration of Human Rights establishes in Article 25 the *right to welfare and health of individuals and their communities* (1948).[2] We are almost ten years into the twenty-first century and still much remains to be done in this area.

First of all, it has been maintained that the fulfillment of the right to health includes, among other factors, the sufficient provision of goods ensured by adequate medical care and basic social services. Secondly, it is important to bear in mind that the exercise of the right to health and welfare of people not only relates to these guarantees, but also, and as the Declaration points out, to the assurance of *economic, social and cultural rights* to work and education (Office of the United Nations High Commissioner for Human Rights – World Health Organization, 2008). Consequently, health and welfare of the people are complex phenomena, and respond to multiple factors.

Recently, it has been point out that the achievement of the right to health not only includes the provision of basic social services and medical care, but also requires tackling the so called **social determinants of health**: "*This right [to health] obliges governments and others to act – to take steps that increase all individuals' chances of obtaining good health. The realization of this right, however, will take not just access to health care but action on the social determinants of health*" (WHO, 2007).

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[1] - Paper presented at XXVI IUSSP International Population Conference (Marrakesh 27 September – 2 October, 2009).

[2] - The International Agreement on Economic, Social and Cultural Rights (1966) also recognizes health as a Human Right.

The factors that condition the way in which people live and work, with greater or lesser impact on health, are referred to as *the social determinants of health* (Vega, Solar and Irwin, 2005). Among these, it is worth distinguishing *structural factors*, that act indirectly on health (such as education, income, ethnicity and sex), from *intermediate factors,* that are related to the conditions of food supply, housing, work and environment of the people. These factors influence health producing ways of life that can be more or less healthy.

The structural and intermediate determinants of health operate within the broader socio-political context of a population, giving rise to inequalities and, consequently, to a greater or lesser susceptibility to health. In all societies where the context is unfavorable to a particular social group, weather in terms of ethnic or gender discrimination, poverty or difficulties of access to education, it is very probable that, for this particular group, also other disadvantages there exist, such as unemployment, child labor and lack of potable water, among others. Furthermore, if the access to medical care is also limited, the affected populations will be even more exposed to health risks.

2. Conceptualizing Vulnerability in the Field of Health

Vulnerability is understood as a multidimensional and multi-causal situation and process in which several factors converge: the exposure to risks, the inability to respond and to adapt of an individual, a household or a community who may be injured, wounded or damaged in view of changes or permanence of external and/or internal situations that affect their welfare and exercise of rights (CEPAL/CELADE, 2001; CEPAL/CELADE 2002).

According to this definition, speaking about vulnerability involves identifying its three basic components (risks, response capacities and adaptive skills), and indicating its likely future performance in communities, households or individuals through empirical analysis. However, only risks can be described as population variables whereas the remaining components require the study of diverse factors, mostly dependent on the case being considered (CEPAL/CELADE, 2002).

Accepting this approximation as valid in the field of health, *which factors must be identified as risks within the framework focused on the social determinants?* In short, the risk factors are related to the *social gradient, stress, developmental problems during the first years of life, social exclusion, work related problems, unemployment, lack of social support, addictions, poor or insufficient food supply and means of transport* (Marmot y Wilkinson, 2003).

3. On Advantages and Limitations of the Data Sources

Studying vulnerability of health implies, in the first place, the identification of the social determinants of health. Few questions need be formulated: 1) – *Which data sources provide information on the social determinants of health?* 2) – *Which technical requirements should these data sources fulfill in order to be utilized in studies referring to vulnerability of health?*

3.1. Social Determinants of Health in Data Sources

In accordance with the theoretical framework of the Health Metrics Network (HMN, 2006), *health data sources* are classified in two groups: data based on population and data based on health services.[3]

The first group of health data sources is made up of *population and housing censuses, vital statistics*[4] *and population surveys.* Additionally, other less frequent means of information collection are included: environmental surveys and vector control surveys.

The second group is composed of all the data that has its origin in the *health service system, and in its administrative and operative activities* (for example, information on mortality and morbidity of the users, supplied medicine, availability of services etc.) The information if further classified into three types of registers: 1) – Health state, 2) – Services granted, and 3) – Administrative. Surveillance systems of acute or chronic diseases, individual patient registers and cancer registers are included in the first group. The second group includes hospital or outpatient services. Finally, the third group corresponds to the availability of human resources, infrastructure and financial resources.

According to the theoretical framework, the sources that provide information on health determinants are *censuses, vital statistics, surveys* and *health status registries* (HMN, 2006). A series of investigations (Nolen et al, 2005; Bonnefoy et al, 2007a y 2007b) detail the virtues and disadvantages of each one of them as sources of information for the study of the social determinants of health:

a) – *Censuses*. For Bonnefoy et al (2007b), censuses are an important source of information on the social determinants of health since they prove data on sex, household composition and education that can be combined with the information on household characteristics and general life conditions. Likewise, an added value of this source is represented by the availability of contextual variables that may be useful when monitoring small areas. Finally, it is worth mentioning that in many countries censuses are the only available data source and they have the particularity of covering the entire population of a nation.

However, even though population censuses are a significant source of information of the mayor part of the structural determinants of health, in very few cases they provide information on health or income (Bonnefoy et al, 2007a; Bonnefoy et al, 2007b). Apart from the limitation to reflect these variables, Nolen et al (2005) indicate that censuses can very rarely serve as a base for linking data with other sources of information, which would permit to widen their potentialities for the study of health inequalities. Consequently, the authors recommend that censuses include the indicators needed for the study of small areas, an additionally, that they were carried out more regularly and transparently.

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[3] - Other data sources that, even though left outside the classification detailed here, may provide information on health, namely, clinical essays and longitudinal community studies (HMN, 2006).

[4] - Even though important conceptual differences between “vital registries” and “vital statistics” exist (see United Nations, 2005; Setel el al, 2005), in this study, the term “vital statistics” is used to refer to both the registration system and the results, in terms of statistical information. An equivalent of the term vital statistics as understood here would be “statistical registry of vital events”.

b) – *Vital statistics*. This data source is the main instrument for monitoring the health system. It provides fundamental information on births and deaths by age and sex and by cause of death.[5] Moreover, it is often a complete data source, similar to censuses, that permits the analysis of all the areas of a country, including the smallest ones.

As for the study of the determinants of health, birth registers provide information on sex and age, and often on education, occupation and place of residence. For births it is possible to obtain indicators of great importance such as birth weight, assistance at birth and adolescent fertility, that may be analyzed together with the before mentioned socioeconomic variables. As regards for deaths, cause of death, which is an important variable in the analysis of the health situation, can be studied the same way (Bonnefoy et al, 2007a y 2007b).

For Nolen et al (2005), the main disadvantage of this source is its coverage: in some countries, not all the population is covered by the system. Thus, registers should be expanded to all countries, and the inclusion of information on causes of death, birth weight and gestational age should be ensured in those countries that do not include these variables. Moreover, small-area identifiers and variables that allow socioeconomic characterization should be also included.

c) – *Population-based surveys*. This source includes health surveys, epidemiological and longitudinal studies and small-area studies (Bonnefoy et al, 2007a). The best known surveys are the Demographic and Health Surveys (from ORC Macro), the Multiple Indicator Cluster Survey (Unicef), the World Health Surveys (WHO), the Demographic Surveillance Systems (INDEPTH) and the Core Welfare Indicators Questionnaire (World Bank).

For Nolen et al (2005), population-based surveys are an especially useful data source for the study of inequities in health, since they include a greater number of variables related to the socioeconomic context than what censuses do. In addition, these surveys allow the characterization of population groups that are rarely reached by other data sources, such as children that have never attended school, or people who do not have access to health care, among others (Bonnefoy et al, 2007b).

However, these important advantages are offset by limitations of diverse nature: irregular administration that does not allow tracking changes over time, differences in questions across countries that do not permit making comparisons between them and limited sample sizes that do no allow going in depth into the analysis of social variables (Nolen et al, 2005).

d) – *Other health registers*. According to Nolen et al (2005), administrative health registers – such as school enrolment or immunization coverage – are rarely used for the analysis of health differences. However, when equity stratifies are available, the

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[5] - The set of vital events includes: births, deaths, fetal deaths, marriages, divorces, adoptions, legitimations, paternity recognitions, marriage annulments and judicial separations (United Nations, 2001). However, for the purposes of the analysis of the health situation and its social determinants, this investigation focuses solely on births, deaths and fetal deaths.

information results of great utility, given the availability of information that is rarely available, such as attention at birth.

The same authors consider that administrative data require considerable improvements in general, and in particular, in expanding coverage to ensure the inclusion of the total population.

3.2. Production Process of Statistical Information, Invalidating Factors and Guiding Principles

According to Giusti and Massé (2003), statistical information can be understood as a product and a result of a production process shaped by different stages that entail actions that determine the adequacy of the information, both in conceptual and empirical terms.

The stages of the data production process can be summarized in: 1) – planning, 2) – design and development of the conceptual and methodological framework, 3) – implementation and collection of information, 4) – evaluation, 5) – processing of information, elaboration of tabulations and analysis, and 6) – diffusion of information.

At any stage of the process, there are data *invalidating factors* that transform into *error sources*. Consequently, mechanisms that impede the effect of the invalidating factors should be taken into consideration during the production process. The sources of data error refer to: 1) – the moment at which they are produced; 2) – the type of invalidity they were produced by; 3) – invalidity produced by the informant; 4) – invalidity produced by the human resources; and 5) – failures in the data obtained (Giusti y Massé, 1997).

Prevention or reduction of the errors implies assuming a series of *guiding principles or technical requirements* that the data obtained should fulfill in order to be considered information appropriate for use (Giusti y Massé, 2003). From user's point of view, the quality of statistical products is defined in terms of how well the data satisfy the needs. Speaking of the study of social determinants of health, different organizations specialized on the issue (HMN, 2006; MEKN, in Bonnefoy et al, 2007a and 2007b) have suggested a series of principles or criteria that data sources should fulfill. They are summarized as follows:

1- Thematic coverage: data sources must include a sufficient amount of information on the health of a population, including social determinants of health.

2- Representativeness: data from different sources must be representative of the study population and/or of the events they characterize (births, deaths, diseases, etc.). Two aspects must be considered: coverage and completeness. The first refers to the extent to which population groups within a country, or the events, are adequately covered by the data source.[6] The second one indicates the degree at which population groups within a country, or the events, that are covered by the data source, are counted correctly.

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[6] - This difference applies to certain data sources – such as civil registration – and excludes others – such as censuses – that are universal by definition.

3- Quality: the information on population, or the events to which the data source refers, has been captured in objective and precise terms. It is common to divide this condition into two components that characterize the information obtained: reliability and validity. The first concept is strictly related to the idea of consistency that can be either external or internal. In the first case, data is reliable when the repetition of the measuring process produces the same results. In the second case, data is reliable when it fulfills certain expectations: adjustment with respect to certain levels or the absence of changes in time. Finally, data is valid when it describes accurately the event it pretends to measure.
4- Punctuality: This criterion assumes that the data has been elaborated, published and disseminated with the speed necessary to satisfy the needs of the users of the information.
5- Accessibility: This principle is defined by the ease at which users can access the data, considering different means of support (databases, publications, internet, Cd, etc.)
6- Disaggregation: This principle refers to the availability of data stratified by certain fundamental variables (sex, age, socioeconomic characteristics, geographical or administrative division, ethnicity, etc.).

These criteria can be related to the above mentioned stages of the data production process, and consequently, it is possible to concentrate the evaluation on the moment at which the errors most probably take place.

4. Objectives, Methodology and Data Sources

4.1. Objetives

Vital statistics are, by definition, the main source of information for identifying the health situation of a population. However, *it is less obvious that they offer information for the analysis of vulnerability of health (approached from the point of view of the implicit risk in the social determinants of health), that, furthermore, fulfills the most important technical requirements and standards*. It is well known that vital statistics suffer from different types of errors impeding the analysis of certain problems, or, of certain population groups or geographical areas (United Nations, 2005).

The aim of this work is to study up to what point vital statistics can fulfill the purpose of providing adequate information, in technical terms, to the study of vulnerability of health considering a specific case: the social gradients in the death data of two Argentinean jurisdictions (City of Buenos Aires and the Province of Chaco), during the years 2000-2005.

4.2. Methodology

In accordance with the objectives and central ideas of the theoretical framework of the present study, the utilization of an exploratory and descriptive research design is considered appropriate. The research proposal is organized around a demographic approach, in which the evaluation of the secondary data, the estimation of a series of indicators and their analysis and interpretation are tied together.

The study of the information on social gradients in the death data of the selected populations is carried out according to the dimensions, variables and indicators detailed in table 1. In the first place, *three dimensions referred to the production process of death statistics are established: 1) – Collection of information, 2) – Data analysis and assessment, and 3) – Presentation and diffusion of the results*. The six *optimization criteria* detailed before (thematic coverage, disaggregation, punctuality, accessibility, representativeness and quality) are regrouped and for each one of them specific indicators accompanied by their respective baselines are defined.[7]

Finally, on the basis of the analysis of the responses obtained in each case, an *evaluation based on the following scale is carried out*: a) – Adequate, b) – Regular, c) – Unsatisfactory, and d) – Unknown. Even though the final evaluation of each variable results from the analysis of quantitative indicators, it is, however, of subjective character, and is only valid as a first approximation to the problem.

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[7] - Baselines were established according to criteria ad hoc, mostly based on common requirements of the variables.

Table 1. Dimensions, Variables and Indicators

Dimension	**Variable**	**Indicator**
Collection of information	Thematic Coverage	Number of questions in statistical death reports referring to social gradients (baseline: 80 % of the ideal listing for the data source type).
Data analysis and assessment	Representativeness	Percentage of coverage of the deaths (baseline: 100 %).
		Percentage of filled death registers (baseline: 95%).
	Quality	*Validity*: Percentage of ignored cases in variables referring to social gradients (baseline: from 5 to 10 % as maximum).
		Reliability (internal): Death sex ratio according to social gradients, in the smallest administrative division (baseline: standard deviation of the ratios corresponding to the six years of the study period, not to exceed 10).
Presentation and diffusion of the results	Punctuality	Number of years passed between the statistical death reports corresponding to a calendar year, and their diffusion (baseline: 3 years).
	Accessibility	Amount of formats in which information on social gradients of deaths is diffused (baseline: two formats).
	Disaggregation	Number of social gradients that are published and/or included in data bases (baseline: 80 % of the social gradients covered in the statistical death report).

The selection of deaths as the unit of analysis is based on the fact that they affect a wider sector of a population, in terms of life cycle; unlike births (the statistical record of births directly only involves the child and mother). Moreover, they include a series of variables with high epidemiological relevance (such as cause of death), whose relation to the individual and social risk factors has been widely pointed out (Vg. Behm, 1992; Sen, 1995; Marmot, 2005).

As regards the study universe, exclusively the Republic of Argentina and within it, the City of Buenos Aires and the Province of Chaco have been considered. On the one hand, the selection of the country has to do with the fact that Argentina recently modified its statistical death report questionnaire (year 2000), in response to a series of international recommendations that establish standards with respect to contents and diagramming (Naciones Unidas, 2003). Thus, the analysis of the results can serve as a guide for countries that have recently implemented changes, or are planning to do so in the near future. On the other hand, the selection of the geographical areas is related to the fact that both are representative of opposite situations in socioeconomic terms (highest and lowest concentrations of income in the country, respectively). The comparison of the results obtained in the two jurisdictions, can result useful for countries with different socioeconomic profiles, or that count with intern disparities similar to the ones observed in Argentina.

The study period (years 2001-2005), was selected basically due to the availability of data bases, and since the time period constitutes a reasonable space of time to appreciate the changes produced since the modifications in the statistical death report form (year 2008).[8]

The conceptual definition of "*social gradient*" used in this study has been derived from Marmot & Wilkinson (2003). The authors consider as such the inadequate social and economic circumstances that affect health during the course of a person's life, and that are reflected in a *continuous social stratification of the health standard between the poor and rich population extremes*. Social gradient in health is a mirror of the material disadvantages and the effects of insecurity, anxiety and lack of social inclusion. Some examples of these disadvantages are limited education, informal employment and precarious living conditions.

To operationalize the identification of the "*social gradients*" in data sources, the classification scheme and recommendations of Bonnefoy et al (2007a y 2007b) has been used. These are based on the *highest level of education, occupation, level of income, sex, ethnic group* and *residential area*.

- Highest level of education: refers to the highest level of instruction attained. The information must be disaggregated into the following categories: elementary, lower secondary, upper secondary and tertiary education. If this classification is not possible, at least one question that determines the number of approved years of study must be included. In low and middle income countries, it is recommended to include the category "no education", and the distinction between the complete and incomplete educational levels. As far as possible, it is also suggested to include a question on literacy.

- Occupation: Refers to the usual occupation performed by the worker in the labor market. Depending on the income level of the country, two forms of capturing the information on occupation exist. In high income countries, occupation can be investigated directly as the position in the labor market, which adequately reflects his or her level of income, certain privileges, lifestyles and behavioral characteristics. In middle and low income countries, information on usual occupation generally contains biases and, thus, must be complemented with other information that makes reference to working conditions (formal or informal sector, identification of non-paid employees-, etc.).

- Income level: Monetary income per se, consumption/expenditure, or wealth/assets expressed at individual and household level.

- Sex: Distinction between male/female as a proxy of gender.

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[8] - It is worth mentioning that the study period corresponds to an economic decline and recovery, as a result of the political and institutional crises occurred in Argentina year 2001. It can not be specified at which measure the event has impact on the data sources.

- Ethnic group: Race, caste or tribe of origin or membership. Identification of ethnicity can be basically carried out using two criteria: self-identification and language. When language is used, the possibility to identify ones native language and to distinguish between monolingual or bilingual persons must exist.

- Residential area: Usual place of residence, expressed in one of the following categories: urban/rural, administrative unit (village, municipality, province, region or state), and geoclimate area, among others.

4.3. Data Sources

For the calculation of the indicators used in this investigation, databases of statistical registries of deaths provided by the Direction of Statistics and Information on Health (DEIS, for its acronym in Spanish), of the Ministry of Health of Argentina are processed.[9] It must be made clear that databases ceded by this organization, do not include variables protected by statistical secrecy, or are not coded when the data was computerized.

5. Results

5.1. Death Statistics in the Context of the Argentinean Health Information System

In Argentina, the registration of death is obligatory (universal), confidential and continuous. The Law 17622/68 and the Regulation Decree 3110/70 establish the *obligation* to respond and the *confidentiality of the data*, protected by statistical secrecy. Likewise, the article 53 of the law 8.204 of Civil Registry and Capacities guarantees the *continuity* of the registry of deaths in all of Argentina, by establishing that *all deaths must be registered within the following 48 hours of its verification* (extendable only in case of exceptional geographical distances).

When death occurs, a doctor fills in a form that consists of two sections: the Death Certificate, that recollects information with legal purposes, and the Statistical Death Record whose intention is to capture data for statistical purposes (Dinardi, 2005). Some sectors of the statistical record can be completed with the help of family and friends of the dead.

Once filled, the documentation is from the local level Civil Registry delegations to the Provincial Directions of Health Statistics, to DEIS of the Ministry of Health and to the National Institute of Statistics and Censuses (INDEC, for its acronym in Spanish).

The production of death statistics is responsibility of DEIS, by INDECS assignment. DEIS also coordinates the Argentinean Health Statistics System, and the centralization of the information, providing norms with reference to collection, elaboration and analysis, according to the principles and recommendations of the Statistical Division of the United Nations Department of Economic and Social Affairs and the World Health

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[9] - The processing and calculation of the indicators is carried out considering the usual place of residence of the dead.

Organization, which clearly favors the homogeneity and comparability of the data (DEIS, 2005).

5.2. From one Extreme to the other: Characterization of the Jurisdictions under Study

The *City of Buenos Aires* is situated on the central eastern coast of Argentina. It is the country's capital and, historically, has made up the most important political, economic and cultural centre of the country. In the 2001 year Population, Household and Housing census, a population of 2995805 inhabitants (8,1 % of the national total) was registered for the city. However, the urban agglomeration of which it is a part has a total population of over 12 millions, the second in size in South America.

Some features that characterize demographically the City of Buenos Aires are: high population density (136796 inhabitants by square kilometer), the accentuated aging of the population (22,2 % of the population over 60 years), and the lowest fertility and mortality rates of Argentina (year 2001 the Total Fertility Rate was 1,84 children per woman, and life expectancy at birth 75,5 years, INDEC, 2005).

The *Province of Chaco* is located in the northeastern Argentina. The most important economic activity of the province is agriculture, historically identified with the cultivation of cotton and wood exploitation. According to the last population census carried out in Argentina, the province has 983087 inhabitants (2,6 % of the national total), of whom 20 % reside in rural areas (superior to the national average which is approximately 10 %), and 5 % belong to Wichí, Qom and Mocobí ethnic groups.

The gradual loss of the rural population to the urban centers (and sometimes towards poorer peripheral zones), represents on of the most notorious demographic features of the province, together with the highest mortality rate of the country (life expectancy at birth 70 years), and the relatively high fertility rate in comparison to the national level (Total fertility Rate of 2,85 children per women, INDEC, 2005).

The differences in the social and economic profiles of the two jurisdictions *are related in different ways to the characteristics of the Statistical Death Record*. As can be seen later on, they do not necessarily associate with the thematic coverage, disaggregation, punctuality, timeliness and accessibility of the information, but do, at varying degrees, associate with the representativeness and quality of the data.

5.3.1. Collection of Information

In this section, the results concerning the thematic coverage of the social gradients in the Statistical Death Report questionnaire used in Argentina are commented.

As commented previously, the Statistical Death Report questionnaire was modified in 1999[10], coming into effect year 2001, with some differences of implementation between the country's jurisdictions (DEIS, 2002; Mazzeo, 2004; 2005). The questionnaires are of universal application in the country, and thus, differences in contents can not be

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[10] - XV National Reunion on Health Statistics, City of Buenos Aires, July 26-30, 1999.

observed between jurisdictions. The new Statistical Death Report questionnaire has four parts:

1- *Administrative data*: Information for the internal use of the Civil Registry.
2- *Data on the death*: Information, provided exclusively by the doctor, referring to the medical assistance during death, cause of death, place and type of violent death (if corresponds), assistance during pregnancy and completion of pregnancy for dead between 10 and 59 years.
3- Data on the dead person: includes four parts that refer to: the demographic characterization of the dead; the social characterization of the dead over 14 years and under 14 years (parents), and the medical-sanitary characterization of the dead under 1 year and his/her mother.
4- *Person who filled in the form*: Identification of the respondent (doctor or other).

The third part of the Statistical Death Report questionnaire includes *interesting information for the study of vulnerability of health*. The first section provides a general demographic characterization of the dead, such as name, date of birth, date of death, age at the time of death, name and type of health establishment where death occurred, address where death occurred, normal place of residence of the dead and medical assistance provider. As can be seen, *this section of the questionnaire includes two of the variables that have been considered fundamental for the identification of social gradients: sex and place of residence.*

The second and third sections of this part of the Statistical Death Report questionnaire capture special information concerning the dead person. For those older than 14 years, information on highest level of instruction, labor situation and usual occupation is provided. For those dead before turning 14 years, the highest level of instruction, age and union status of the mother is registered. If the mother is not in a union, her labor situation and occupation are asked. If the mother is in a union, information on highest level of instruction, labor situation and usual occupation of the father is registered. The above described affirms that these two sections *capture two other variables that have not been considered fundamental for the identification of social gradients: education and occupation (and consequently, condition of activity).*

The above described inclines to evaluate how to *regulate* the thematic coverage of the Statistical Death Report questionnaire applied in Argentina, for the purposes of the study of the vulnerability of health seen from the point of view of social gradients.[11]

5.3.2. Analysis and Assessment of the Information

In this section, the results with reference to the dimensions of representativeness (coverage and completeness) and quality (reliability and validity) are commented.

The coverage of the death registry is universal in all the territory of Argentina (legally regulated). As for *completeness*, it has been considered that the country has high levels reaching 100 % of the registries during the years closest to the study period (OMS,

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[11] - As for the non inclusion of the variables related to income and ethnic group of the dead, it is worth making few explanations. In the first hand, capturing information on income is a difficult task in most socioeconomic data sources (OIT, 1998). On the second hand, the inclusion of the ethnic variable in vital event questionnaires is still a new issue and only few records of its use exist (Del Popolo, 2008).

2007). However, some recent studies *have confirmed the existence of underestimates of infant mortality which turns out to be selective in geographical terms* (DEIS/Programa Materno Infantil [PROMIN]/INDEC, 2000; Fernández, Guevel, Krupitzki, Marconi & Massa, 2008).

These studies have coincided in indicating that the *underestimation of infant mortality rates of selected areas of the province of Chaco is around 5 and 7 % during the study period*. First of all, the study realized by DEIS/PROMIN/INDEC (2000), based on direct and indirect methods, warns that in a selected set of health establishments of the province, the under reporting of infant deaths would have reached 6 % in 1999. Some time later, the study realized by Fernández, Guevel, Krupitzki, Marconi and Massa (2008), permitted to establish that for a wider set of health establishments of the province, the underestimation of infant deaths would be 5,9 %.

Even though these studies provide valid signs of the existence of an error in completeness, it is worth pointing out two details that downplay their importance. In the first place, the results of both studies are not directly comparable to the entire province of Chaco. Secondly, according to international standards, the percentages found hold little relevance as a percentage and in absolute terms as to represent a bias in the analysis of the general mortality of the province (given the small number of infant deaths).

The investigations have also been able to establish factors associated with the underestimation of the deaths. These can be summarized in ignorance in the population about the compulsory nature of the inscription, and in the inertia of the mediating institutions to detect and act upon a problem.

The connection between the underestimation and the socioeconomic status of the families who did not register a dead child is less clear, even though it could be stated that it was more frequent in large families with young a household head, or a household head occupied in informal sector, families living in precarious living conditions in marginal urban areas and with restricted access to health services.

Although the above indicated has permitted to identify the existence of underestimation of infant deaths in one of the analyzed jurisdictions, it is assumed that the representativeness of the data is not affected, which permits to conclude that the level of representativeness is *adequate*.

As regards for the *quality*, first of all, the validity of the data on social gradients of deaths is appreciated from the percentages of deaths with ignored information. Tables 1, 2 and 3 present the results having the following classification in mind: all dead, 14 years and more and younger than 14.[12]

A quick glance at the tabulations tells that *only two of the four variables referred to social gradients present adequate levels of ignored data*: sex and place of residence, collected for all dead.

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[12] - For reasons detailed later on, the tabulations include indicators elaborated from the variables included in the databases. Consequently, “labor situation” is used instead of “usual occupation”.

Table 1. City of Buenos Aires and the Province of Chaco. Percentage of Ignored in Selected Variables, for all Dead, 2001-2006.

Question *	**Jurisdiction**	Year					
		2001	2002	2003	2004	2005	2006
Sex	City of Buenos Aires	0,0	0,0	0,0	0,0	0,0	0,0
	Prov. Chaco	0,0	0,0	0,0	0,0	0,0	0,0
Department of Residence	City of Buenos Aires	5,0	4,4	6,1	6,3	5,6	6,6
	Prov. Chaco	1,6	1,1	0,7	1,0	1,1	1,4

Source: Own elaboration of databases provided by DEIS-Ministry of Health of Argentina.

For the rest of the variables, different situations exist, depending on the age and the jurisdiction of residence. Labor situation has an adequate level of ignored for those died before age 14 of both jurisdictions (table 3). However, the same does not occur when considering those died after age 14 – this information is acceptable only in the case of the city of Buenos Aires (table 2). Even more serious is the state of the variable "highest level of instruction", since the percentage of ignored data is only acceptable for the fathers of those passed away before turning 14 (table 3).

Table 2. City of Buenos Aires and Province of Chaco. Percentage of Ignored in Selected Variables, for Dead before Age 14, 2001-2006.

Question *	**Jurisdiction**	Year					
		2001	2002	2003	2004	2005	2006
Highest level of instruction	City of Buenos Aires	66,9	72,6	71,4	71,7	73,8	69,1
	Prov. Chaco	55,5	58,7	65,6	70,3	70,0	71,0
Labour situation	City of Buenos Aires	4,3	5,0	4,9	12,3	3,1	3,7
	Prov. Chaco	63,8	69,4	59,3	78,6	54,9	79,1

Source: Own elaboration of databases provided by DEIS-Ministry of Health of Argentina.

Table 3. City of Buenos Aires and Province of Chaco. Percentage of Ignored in Selected Variables, for Dead 14 Years and more, 2001-2006.

Question *	**Jurisdiction**	Year					
		2001	2002	2003	2004	2005	2006
Highest level of instruction of the mother	C. Buenos Aires	46,6	42,7	42,2	43,1	53,6	31,6
	Prov. Chaco	31,6	21,2	22,3	34,1	27,5	29,7
Highest level of instruction of the father	C. Buenos Aires	46,3	7,5	8,2	8,2	7,3	3,2
	Prov. Chaco	9,2	7,9	4,9	5,9	7,1	7,7
Labor situation (mother or father)	C. Buenos Aires	6,4	3,9	5,3	2,6	1,6	1,1
	Prov. Chaco	11,0	9,0	4,3	9,0	6,7	9,1

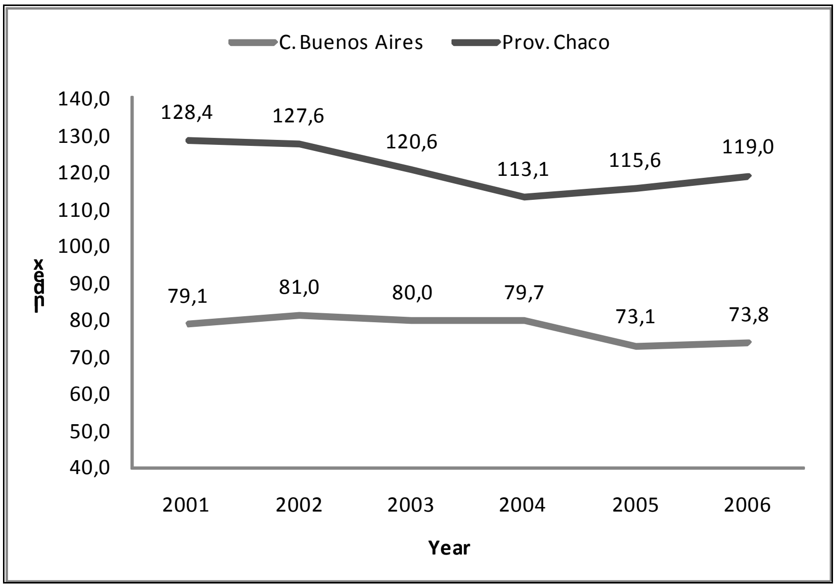
Source: Own elaboration of databases provided by DEIS-Ministry of Health of Argentina.

Obviously, a more general problem related to the respondent is observed. The persons who are entitled to complete the answers in the Statistical Death Report are the doctor and relatives or close friends of the dead. Ignorance or emotional incapacity to respond at a moment that involves the loss of a close one, seem to be factors that severely invalidate the quality of the death data in Argentina, a fact also revealed by other studies (Vieira Pinto, 1973). As Mazzeo (2003, 2005) affirms, in his evaluation of the vital statistics of the City of Buenos Aires, the problem is generalized to a great number of variables, of both social and medical-sanitary relevance. Consequently, the same author has indicated that "*the quality of the statistical death reports data [only] makes possible the minimum analysis of the mortality of the population residing in the city, that is, the composition of the deaths by age and sex*" (Mazzeo, 2005).

All the above leads to conclude, that the quality of the information on social gradients in the death data of the two jurisdictions is unsatisfactory.

For the analysis of the *internal reliability* of the variables with reference to the social gradients, death sex ratio, by calendar year and for the smallest administrative division of each jurisdiction, has been calculated.[13] On the one hand, the selection of the indicator is based on its strength to reflect constants of universal reach and of temporal invariability, when the data is correct (United Nations, 2005). On the other hand, it involves the two variables for which acceptable levels of internal validity have been observed (sex and place of residence). Graph 1 presents the results obtained for both jurisdictions during 2001-2006.

Graph 1.City of Buenos Aires and Province of Chaco. Death Sex Ratio in Smallest Administrative Divisions, 2001-2006.



Source: Own elaboration of databases provided by DEIS-Ministry of Health of Argentina.

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[13] In the city of Buenos Aires, the school district 5, and in the province of Chaco the department of San Fernando.

It is affirmed that the death sex ratios obtained for the smallest administrative divisions of each jurisdiction are coherent with the demographic characteristics of the location. Likewise, little variance from one calendar year to another is observed (standard deviation of 3,4 and 6,2 in the smallest administrative divisions of the City of Buenos Aires and the Province of Chaco, respectively), and, moreover, a downward trend in the variance is shown in both locations.

In consequence, it can be affirmed that the requirement on internal reliability of the identifiers of social gradients of sex and place of residence is *satisfactory*.

5.3.3. Presentation and Diffusion of the Information

Finally, in this section, conclusions with reference to the analysis of punctuality, accessibility and disaggregation of the death data are commented.

In Argentina, information obtained from statistical death records is diffused one year of its occurrence, by whichever means (printed publication, online, databases), and to the set of provinces that make up the country.[14] However, from 2006 the diffusion of the results excludes deaths occurred three or more years before the registering is done (DEIS, 2008). Since deaths registered late are of secondary importance (0,7 per thousand of all deaths), the level of punctuality is considered *satisfactory*.

Access to statistical information coming from the death registers, is carried out using different means, *printed publications, digital publications and databases.*[15] DEIS is responsible for the production of a series of publications and reports that present a standardized set of data and indicators on deaths and mortality, for all the provinces of the country. Thus, accessibility to death data is assessed *satisfactory*.

Publications and databases elaborated by DEIS do not consider the totality of the disaggregations by social gradients present in the statistical death report questionnaire, a fact related to the limited quality of the mayor part of the given information. Specifically, as for the digital and printed publications, cross tabulations by sex and place of residence are included. In recent years, disaggregations by level of instruction and labor situation in some tabulations has been incorporated, but they also only refer to the national total (see, for example; DEIS, 2002, 2008). Users of the databases can get access to the disaggregations by social gradient by asking for the inclusion of the corresponding variables,[16] with the exception of occupational category as it is not computerized.

The geographical disaggregation of the information deserves an additional commentary. The statistical death report questionnaire used in Argentina includes in its third part (second section), the identification of the place of occurrence of the death and of usual place of residence of the dead, according to four identifiers. More specifically, *direction, locality, minor administrative division (department or district) and major administrative district (province)*. Additionally, in the case of foreigners it permits to

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[14] - Requirement fulfilled from year 1994 (DEIS, 2008).

[15] - Digital publications can be obtained directly from the Web page of DEIS (http://www.deis.gov.ar), whereas the databases must be solicited in writing from the institution.

[16] - Data protected by the statistical secrecy, regulated by the Argentinean Law 17622/68 and Regulation Decree 3110/70, are excluded.

inform the *country of residence* to replace the identifier of the major administrative division. It is important to point out that some provinces of the country, with the aim of monitoring the health situation of the population, provide additional disaggregations, based on other criteria (such as health program area, in the province of Chaco). This complementary disaggregation is carried out on the basis of the address and locality informed in the statistical death record form. Reasonably, the possibility to break down the information into categories ad hoc is viable only in small provinces with adequate technology and cartography.

Beyond the technical efforts of the institution responsible for the diffusion of death data, the disaggregation of the information on social gradients is published in an insufficient manner due to the limited quality of the data, which induces to evaluate how to *regulate* the results.

6. Conclusions

The study of the vulnerability of health requires specific data sources that are geographically disaggregated, of good representativeness and quality and diffused in an appropriate way and by multiple means. Although for a limited number of variables, the vital statistics on births and deaths seem, at first glance, to fulfill these requirements. However, and as has been shown by this and numerous other studies, it is possible that the information contains errors. Learning to know these errors is fundamental in order to define future measures to take, whether statistical or mathematical corrections or replacing or complementing with other data sources.

The analysis of a specific case – the information on social gradients in the death data of the city of Buenos Aires and the Province of Chaco – points out diverse and significant limitations to consider.

In the first place, the technical principle that characterizes the first stage of the production process of death data (collection of information) is barely fulfilled. Of the six variables suggested as identifiers of the social gradients necessary for the study of vulnerability, the statistical death report questionnaire covers four.

The efficacy of the list is considerably restricted when analyzing the criteria that characterize the second stage of the production process: representativeness and quality of the data. In this field notorious ambiguity is observed. On the one hand, death data has excellent coverage and good completeness, presenting few signs of selectivity by social gradient. On the other hand, and nevertheless the above mentioned, the quality of the information on social gradients is far from the standards considered adequate. When considering validity as the percentage of the ignored data in variables that refer to social gradients, it is observed that only two of them hold acceptable levels. Thus, the possibilities of analysis of important social gradients, as the ones related to education and to work, are restricted

Finally, the principles that guide the third stage of the death data production process, stress out the efforts of the responsible organization, pointing out, however, to be insufficient for the study of the social gradients in the field of vulnerability of health.

As it has been pointed out along the evaluation, jurisdictional and temporal differences are small. The finding points out that beyond the uneven economic profiles observed in Argentina, the problems found are structural and require corrective measures to be applied in the entire country. The necessity to reinforce the already existing experiences seems obvious as does the need to train the doctors in filling out of the questionnaire and making the population as a whole aware on the importance of the data for monitoring the health situation of the country.

All the above emphasizes, for the special case of Argentina, *the necessity to triangulate data from different sources* in the study of vulnerability of health, until resolving the problems here mentioned.

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