The use of Geographic Information Systems (GIS) in the study of health inequalities. Its application in North-eastern Argentina

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Geographic Information Systems (GIS) deals primarily with the relationship between societies and their environment and differentiation of spatial areas. Hence, nowadays, it has become a primary tool in the analysis of locations, distributions, associations, interrelationships and spatial developments (Buzai y Baxendale, 2006).

While GIS was developed some decades ago, its use in the field of public health is recent. Specifically its use is associated primary with the determination of the health situation in an area, the identification of high-risk health groups, the planning and programming of activities and control and evaluation of de interventions (OPS, 2006).

An antecedent to this topic is the "Programme of Health Situation Analysis" (HDA) of the Division of Health and Human Development of the Pan American Health Organization (PAHO), which since 1995 has established a technical cooperation project in order to facilitate and disseminate the use and development of GIS and provide technical assistance for its implementation in epidemiology and public health (GIS-Epi) "in response to the requirements of health services in the countries of the americas" (OPS, 2006)

It is imperative to emphasize that health is the starting point of the whole process of health planning and simultaneously becomes the result which allows the evaluation of that process. Moreover, it is necessary to, the consider health as a dependent variable, conditioned by at least:

• human Biology: biological factors are inherent to the physiology of the body and less subject to change as other factors,

• lifestyle: individual and societal behaviour,

• environment, its physical (climate, water availability, soil elements, etc.), social (pollution, social organization, housing, irrigation work, etc.). and psychological;

• the organizational system of health care: financial, human and material resources available for health care. It includes public and private services.

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Given the presence of these four determinants, Pineault and Daveluy (1988:6-8) distinguishes between two different models of inquiry to establish the diagnosis of the situation of the population health

The first model is based on public health and epidemiology and involves biological factors and those related to lifestyles. The second model - used in this research - is based on the Social Sciences, and enables the recognition of possible actions to pursue in order to improve the health status.

The diagnosis of the health situation of a population is a procedure that permits the knowledge know and analysis of the situation of the health groups community or population, in order to identify or diagnose problems and health needs, and their causes. This must be part of a process that should not conclude until the solution of the identified problems is achieved. (Pineault and Daveluy, 1989)

The implementation of this model requires the consideration of different variables that define socio-demographic attributes (age, sex, living conditions), population (distribution, density, mobility), availability of health services and the analysis of health indicators (mortality, life expectancy, etc.). This model is useful in the analysis of the population health conditions in connection with their demographic, social, economic features and the availability of the existing medical and professional equipment, in the establishment of the main determinants of the health inequalities and in the development of a classification of spaces with homogeneous characteristics in order to provide information for policy development improve the population health conditions

In this paper, the geographical area of study comprises the provinces of Chaco, Formosa, Corrientes and Misiones, all located in Northeastern Argentina. The four jurisdictions cover an area of 289,699 square kilometers and a population of 3,367,518 people according to the last national census of 2001. They conform one of the most marginal regions of the country, not only from the geographical perspective but also from the economic, cultural and social perspective.

The statistical information used belongs to different sources and agencies according to the requirements of the topics discussed.

To pursue the socio-economic and demographic analysis the data used come from the National Census of Population and Housing 2001 from Argentina.

The data concerning the health conditions of the existing population and sanitary facilities were provided by the Directorate for Health Statistics and Information from the Ministry of Health of the Nation.

To process the data were applied different techniques that allowed the synthesis of information for its comparison, interpretation and geographic location on the space.

First the standardization of variables required the conversion of the data to the same unit of measurement to make them comparable. Subsequently quantitative techniques such as spatial analysis of multivariated analysis, factor analysis and cluster analysis were used in order to obtain a spatial typology of the health conditions of the population studied.

This paper shows the importance and usefulness of working with multivariated analysis and quantitative techniques to build spaces that serve as models of socio-spatial behavior.

Besides the analysis of the variables used enabled the definition of sectors that combine differently socio-demographic attributes, population and the availability of health services. Thus, it revealed the existing inequalities in health and defined the priorities in each of these sectors.

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