Doctoral Thesis: Generate a Geographic Information System (GIS) to support the management of the plans for monitoring food and waters in public health.

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Abstract: A geographic information system (GIS) is a system composed of computers, programs, methods, people and institutional aspects to collect, store, analyze geographic data and generate information to support decision making. Likewise these systems provide analytical support for the planning, programming and evaluation of activities and interventions in different sectors, according to the theme that is trying to investigate. These tools have been gradually constituted in a great support for the analysis of the health situations, due to the advantage of the management of information georeferenced in high volumes and with great speed, which allows it is processing with techniques statistics and informatics. The technological advances in SIG, offer the opportunity to explore the spatial distribution of the illnesses and/or the events of health, as well as to establish their association with the exhibition or in environmental context, and also it is possible to relate different attributes that can influence the occurrence of the event, of diverse illnesses or of situations of inequality in health (1).

The geographical distribution of problems of health or of components of the system they acquire such importance, which estimates that approximately 80% of the information needs for those who take decisions or define politics in the local governments, is related to a geographical place (2). This is why the use of GIS enables: an easy update of the information contained in every layer or coverage, the interactivity choosing the most suitable layers for the spatial analysis of the interrelation between factors of risk and effects in health, an agile, versatile and easy use in situations of emergency, crisis or alerts in public health, with the immediate incorporation of the information that is generated in every moment, facilitating perceptibly the decision making (3).

The Subsecretary of Public Health, organism dependent on the Ministry of Health, has as mission assure the right all the persons to the protection in health, exercising the regulatory, normative and inspection functions that to the state of Chile compete, to contribute to the quality of the government properties and access to sanitary environmental politics of way participating, that allow the supported improvement of the health of the population, especially of the most vulnerable sectors, in order to advance in the fulfillment of the sanitary targets of the decade (4). Within the organization's organizational chart, there is the Division of Healthy Public policies and Promotion (DIPOL), which establishes national food and water surveillance programmes each year. These are implemented by the various ministerial regional secretariats of health, through the sample of food or water indicated and its delivery for chemical analysis or microbiological analyzes, in the various laboratories of the network of

public health, to verify compliance with the requirements laid down by the legislation in force. However at the national level is not counted with a single database centralized of all

information obtained from the monitoring plans implemented, which often hampers the process of analysis of the data obtained, either by its high volume or the delay in consolidating everything obtained.

At the national level, much information is generated from the surveillance plans, which are mostly georeferenced, which is often only represented as a point on the map, indicating only location, but which is not analyzed in conjunction with other layers of information, by means of spatial analysis methodologies, that allow to establish models of risk, to determine causes of pollution or associated health problems and thus optimize the use of assigned resources.
The present investigation is of national character, but in a first stage data obtained from the metropolitan region of Santiago (Chile) will be used, from the samples taken in the different communes that compose it and focused on the geographic information technologies, for later to establish a standard methodology, which will be replicated in the other regions. It takes as a target to generate a geographical information system (GIS) of support to the management and decision making of food and water surveillance plans in public health, which allows not only to create, organize and manipulate graphic and descriptive databases, but to apply multicriteria analysis of the information.

The methodology of work will be to define a minimal structure of record for the conformation of a database, from the information obtained from the plans of vigilance, with the object of: **a)** to develop an algorithm for the downloading, processing and integrating satellite images and database by means of a model; **b)** to perfom modeling of the factors of risk for food and water contamination from the information of the database and satellite images; and **c)** to apply the methodology developed in the different food and water monitoring programmes.

Finally, the study will generate a system of geographic information in health, that can be used as: **a)** a system of centralized and updated registration of the information of the surveillance plans, which can be downloaded; **b)** contain different layers of information that allow multicriteria analysis of causes of disease or pollution; and **c)** to serve as a support in decision making for the optimal utilization of human, physical and economic resources.

Available means: The plan of the thesis will be carried out inside the frame of a project established by the undersecretary of public health, in order to give fulfillment to the targets of the decade related with: to protect the health of the people against risks sanitary, through the diagnosis and mapping of risk and optimize the operation of the undersecretary of public health, through the design and implementation of modern management models based on evidence, generation of reliable information systems and effective, and the development and standardization of the capabilities and critical processes, to guide the development of ministerial policies and management decisions, and add value to end users, maximizing the impact and efficacy of the processes. The means available for its execution are: institutional computer, which meets minimum requirements for satellite image processing, QGIS: geographic information system (GIS), free code for Linux platforms, Mac, Microsoft, Android; Digital Library of territorial information of the regional secretary of health of the metropolitan region, support of the Department of Food Nutrition of the Undersecretary of Public Health.
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