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Contribution of Geospatial Technology in Tropical Medicine and International Health Applications

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Abstract

Better geospatial technologies leads to an accurate evaluation of health problems at different scales, especially in tropical diseases as malaria, dengue, among others vector/water-borne diseases. We have been integrating different sources information in a GIS, including information from GPS. These geospatial technologies have changed form to aboard problems in tropical medicine and international health. Epidemiology in tropical diseases has been changed in its way to see it. These applications in Venezuela are limited to research and academic institutes, but certainly, in few years they will be widely used in control and government health agencies in whole country.

Key Words

GIS, GPS, tropical medicine, international health, epidemiology, public health, malaria.

Introduction

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Beginning the 1960s management of geospatial information was empirical, but certainly improving technologies in informatics and software development, including wide use of internet at 1980s and globally in the 1990s, these tools growth up since Computer-Assisted Design (CAD) to Geographical Information Systems (GIS) [1]. A paradoxical benefit of War was its need to have more geospatial information to strategic planning of attack and defense that leads to improve geospatial information technologies. A side link of these developments and improvements was its use in health applicated systems. With a better spatial resolution in remote sensing have been an accurate evaluation of public health problems at different scales, especially in tropical diseases as malaria [2,3], dengue, American trypanosomiosis, leishmaniosis, onchocercosis, among others vector- and water-borne diseases. In this sense, we have been integrating different sources information in a GIS, including information from Global Positioning Systems (GPS). These geospatial technologies have changed the point of view and form to aboard problems in tropical medicine and international health.

Methodology

GIS is as technological system that integrate information from different sources (files ASCII, raster and vectorial data [4], TDM [4], GPS data, etc.). There are many software to work with GIS today (ARC info, EMRS, Genamap, GIS Atlas, etc; Map Info, Epi Map and AutoCAD, among other, are not real GIS but may be used as GIS software). The scale is very relevant in the use of these technologies according that selected scale (all information needs to be in same scale). Our works (in malaria) have been generated in a 1:100,000 scale (large vision). GIS are based on models of entity-relation and this means that many elements and its attributes could be georeferenced. This is the best form to management of spatial heterogeneity that impacts on many public health and tropical diseases highly endemic in countries as Venezuela. This information has real pertinence on epidemiological description of these environment-disease-health complexes (which implies large volume of

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information and rapid response according data) for a real and appropriate design of disease control programs and strategies. Recently applications of these technologies have contributed to a better management of these diseases as malaria, dengue, leishmaniosis, among others. Objective of this report is describe how these technologies in the field of geospatial information contribute to a better assisted-decision management and measures for planning and control.

Results

We generated many layers in some geographic areas of Venezuela: population, villages, malaria cases, breeding sites, hydrology and viality, among others. Since this spatial analysis through overposition technology we found association between some investigated elements, as location of malaria incidence, malaria risk in population villages, distance between highly risk areas and health care centers, epidemiological information on route of foreign patients with malaria, seasonal change according environmental but social behavior. All these information contribute to better management in prevention, diagnosis and treatment as well as entomological measures for improves vectorial control. Meterological also contribute in this planning when weather events prediction helps in preventive designs [5]. In a holistic form all these contribution helps in a significant form to improve life quality in all studied areas.

Discussion

Epidemiological information about tropical diseases and health in tropics has been changed in its way to see it since improvements in geospatial technology. Now these applications in Venezuela are limited to research and academic institutes, but certainly, in few years they will be widely used by technological transfer processes in control and government health agencies in national, regional and local offices.

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