EDITORIAL

Emerging issues in applications of Geographic Information systems to data in Public Health Systems in India

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Geographic Information System [GIS] related applications are emerging as powerful technological tools in integrating and analyzing data related to human health in the spatio-temporal context. However, despite their potential, due to various challenges associated with GIS technology, they have not been optimally used to address the public health problems due to various challenges associated with GIS technology. Database reliability, dependability and accessibility constitute the major challenge in India. It is important to find effective ways to utilize information in data banks storing individual based health related information for public health diagnosis. Various dimensions of data bank include event based health information; sample based environmental data, location based data on health systems and health service providers and area based data on communities and populations. As a variety of stakeholders are collecting various portions of these data; maintaining completeness, uniformity and high quality of data can be major challenges. The standardized data file formats must be developed to store, collate, retrieve and integrate geo-spatial and bio-medical data sets. The community of users actively using geo-databases should be encouraged to give candid and constructive feedback to the database managers to enable them to improve.

Experts in public health and GIS should develop and recommend standard templates for spatial and non spatial attributes related to human diseases for generalized use and scales that are required to be used at the micro and macro levels. The national health system and the national health programmes have their own databases. Additionally countrywide surveillance data is being systematically collected by the Integrated Disease Surveillance Programme (IDSP) (1). Although it has expanded in terms of scale and improved in its quality, there is much to be improved to make it more consistent and uniform. Additionally, there is a large volume of data available on clinical trials and clinical, epidemiological, socio-behavioral and social science research in the public domain. Unfortunately, the data collection procedures have not left any space for linking those effectively with geo-spatial data. National standards for reporting disease conditions of public health significance is a real time need to be clearly framed for the analysts to provide timely inputs to the programme managers creating scope for implementing timely interventions.

The base maps developed based on country-wide and regional data feeds do not follow unique, uniform and standard projection parameters. It is important to improve this practice and the map symbolization for the commonly observed disease conditions which should be clearly

elaborated by the public health map designers. Lot of conflicts exist regarding boundary issues in demarcation of revenue villages, census villages and panchayat villages. Although the primary health care system in India is one of the best in the world, polygon feature digital mapping for the health systems is almost non-existent. Thus tracking of epidemics and deciding absolutely clear boundaries for programme implementation can become challenging. If the primary health centers, community health centers and rural hospitals are properly defined in terms of digitally defined maps, it would be possible to utilize GIS data more effectively for planning and implementing disease prevention and control strategies in the peripheral areas. The GIS technology might also be useful to map referral services from peripheral centers providing primary care to apex hospitals providing tertiary care both in the private and public sectors. It might be helpful in identifying the nearest and appropriate places for referral, of neonates, delivering women, cases of cardiovascular emergencies and people affected by natural disasters and accidents etc. [2, 3]. Periodic mapping of the risk factors and behaviours identified in large scale sample surveys like NSS and NFHS in different population sectors and that of various disease conditions as well as disease specific and age specific mortality statistics can be considered as more advanced applications of GIS [2, 3].

Geographical Information Systems is not merely thematic mapping. All GIS users should develop the skill of building complex geo-statistical models and effectively use them as a decision support system. Agencies and organizations that have collaboration with foreign universities find it relatively easy to acquire data even up to micro level using RADARSAT through the foreign resources. Getting satellite data is not cost effective and time efficient in India. This scenario should change in the years to come [4].

Another critical aspect that needs some consideration is data ownership. The availability of data does not necessarily allow its free utilization. The GIS users should be mindful of the copyrights and other intellectual property rights of the data owners. Adequate sensitization of GIS users in this area regarding procedures to be followed to acquire and use data is a major priority.

All future GIS Software must have features and facilities that would have abilities for exploratory data analysis, cluster detection methods, space-time analysis and modeling tools. An ideal GIS software should be reliable, acceptable and user-friendly, cost effective, precise, flexible and having a built in mechanism of documentation. Even many of the open source software do not yet have good documentation back up facilities.

Even with challenges around, the number of GIS users in India is increasing and more and more centers are getting initiated in this area of GIS and public health. Development of mentorship and training programmes, dissemination of findings of innovative research that has employed spatial analysis, interdisciplinary collaboration and creation of forums for constructive debate and discussion oriented to problem solving can lead to a significant improvement in research undertaken in this area in future.

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