National Consultation on GIS Mapping of Health Facilities and Services in India

31st August – 1st September, 2009

Indian Habitat Centre, Gulmohar Hall, New Delhi

Ministry of Health & Family Welfare, GOI,

WHO Country Office for India,

International Institute of Health Management Research (IIHMR), New Delhi

TABLE OF CONTENTS

INTRODUCTION

The National Rural Health Mission (NRHM) has time-bound quantifiable goals to be achieved through specific road maps with appropriate linkages and financial allocations for strengthening the health infrastructure. Consequently, there is a need for basic health and population related data at the disaggregated level for micro-level planning and program implementation. A continuous flow of good quality information on inputs, outputs and outcome indicators, is essential for monitoring the progress of NRHM at closer intervals. A web based Health MIS (HMIS) Portal was launched in October, 2008 to facilitate data capturing at the District level. The HMIS Portal has led to faster flow of information from the district level and consolidation of Reports at the State and National level. The web based application is being further expanded to capture data from the facility level and incorporating GIS initiatives.

Geographic Information System (GIS) is an information system for capturing, storing, analyzing, managing and presenting spatially referenced data (linked to location). Several initiatives are presently underway across the country to undertake GIS mapping in the health sector. However, information regarding these GIS initiatives remains largely fragmented and unavailable at a single point.

The Ministry of Health & Family Welfare and the World Health Organization Country Office for India, in collaboration with the International Institute of Health Management Research (IIHMR), New Delhi organized a National Consultation on GIS Mapping of Health Facilities and Services in India on 31st August-1st September, 2009 at the India Habitat Centre, Lodhi Road, New Delhi.

OBJECTIVES

The scope and opportunities of exploiting GIS in the area of public health are many and to illustrate, it can be used for mapping of health institutions and services available – both in the public and private sector, monitoring utilization of services, mapping the geographical distribution and spread of diseases etc. During the preliminary discussions in conceptualizing this Consultation, it was observed that several initiatives are presently underway in India on the use of GIS mapping in the health sector, however, these initiatives are fragmented. The consultation is an attempt to bring together stakeholders from the Central Ministries / Departments, State Governments, Development Partners, private sector and academia to share their experiences.

The broad objectives identified for the consultation were:

- To review the current status of GIS in health sector in India
- To review the health data sets at various levels for GIS mapping
- To identify the resources for GIS mapping

The consultation on GIS was thus expected to bring together the generators of information as well as its users with a view to review and share experiences and engage in a constructive dialogue to address issues concerning GIS mapping of Health Services and facilities in India. The consultation also sought to help map the various initiatives underway in this area. One of the outcomes envisaged was identification of practical options to take this initiative forward through a participatory and informed manner so as to meet the challenges in the health sector.

RESOURCE PEOPLE AND PARTICIPANTS

The consultation was designed to bring together the generators of information as well as its users and provide an opportunity to share experiences across different Ministries, programmes as well as departments within the health sector, state governments, private sector and other stakeholders.

Resource persons from the following institutions implementing GIS in health sector were identified:

- National Informatics Centre (NIC)
- Urban Health Resource Centre (UHRC)
- Indian Institute of Remote Sensing (IIRS)
- Registrar General of India (RGI) & Census Commissioner
- Jansankhya Sthirtha Kosh (JSK)
- Central Bureau of Health Intelligence (CBHI)
- Karnataka Health System Development & Reform Project (KHSDRP)
- Bhaskarcharya Institute for Space Applications and Geo-informatics (BISAG), Gujarat
- NRHM Kerala
- NRHM Orissa
- ESRI India
- IBM Technologies
- Vayam Technologies.

Participants included representatives from different Ministries like Women & Child Development, Statistics & Programme Implementation, Rural Development, Human Resource Development and organizations under MoHFW like NICD, etc. International organizations like DFID, UNDP, UNICEF, World Bank etc. were also invited to share their experiences in relevant programs in India and other countries. Participating companies from the private sector included ESRI India, Deloitte, Google India, Ranbaxy, GTZ etc. Educational institutions like Maulana Azad Medical College, Safdarjung & VMMC, AIIMS, IIT Delhi etc. were also invited to contribute to the discussions with core health and education related perspectives. There were other researchers and academicians from organizations working in the GIS arena like JICA, Army Medical Corps, UNIGIS and eHealth.

SCHEDULE FOR THE CONSULTATION

The consultation was divided in three sessions:

- Setting the GIS scope and framework
- Exploring the applications of GIS in health sector in India
- Sharing state experiences with GIS implementations in health.

The sessions were moderated by Mr. Sunil Nandraj and Ms Anagha Khot from the WHO Country Office for India. The presentations were followed by a panel discussion where the participants put forward their questions and concerns. Based on various inputs emerging from these discussions, a series of steps were proposed for further action.

AGENDA

National Consultation on GIS in Health Sector

(MoHFW in collaboration with WHO, IIHMR)

Venue: Gulmohar Hall, India Habitat Centre, Lodhi Road

31st Aug - 1st Sep 2009

AGENDA

Day 1 : August 31, 2009 (Monday)		
Time	**Agenda**	**Resource Person**
0930-1000	Registration	
1000-1010	Welcome Remarks	Dr. V.K. Singh, Director, IIHMR, New Delhi
1010-1020	Inaugural Address	Mr. P.K. Pradhan, AS&MD (NRHM), MOHFW, GOI
1020-1030	Opening Remarks and Setting the Strategic Context of the National Consultation	Dr. V. K. Malhotra, ADG (Stats), MOHFW, GOI
1030-1040	GIS Mapping in the Health Sector: Issues and Concerns	Dr. S. J. Habayeb, WHO Representative to India
1040-1045	Vote of Thanks	Dr. Rattan Chand, CD (Stats), MOHFW, GOI
1045-1100	Tea/Coffee Break	
Session I: Geographical Information System (GIS): Scope and Framework Moderator: Shri Sunil Nandraj		
1100-1105	Expectations from the Consultation	Mr. Pravin Srivastava, Director (Stats), MoHFW
1105-1130	GIS Overview Indian Context	Dr. Mukund Rao, COO, ESRI India
1130-1200	National GIS framework and its utilization for mapping applications	Dr. (Mrs.) Vandana Sharma, Head, Remote Sensing & GIS Division, NIC
1200-1230	GIS mapping - use of remote sensing	Dr. P. L. N. Raju, In-Charge Geoinformatics Division, IIRS
1230-1300	Gujarat: Geo-Spatial Infrastructure & Health Information (initiatives in State of Gujarat and affordability, accessibility & adaptability of GIS	Mr. T.P. Singh, Director Bhaskarcharya Institute for Space Applications and Geo-informatics
1300-1400 Lunch		
1400-1430	Application of GIS in Health Sector	Prof. Sundeep Sahay, NHSRC
Session II: GIS in India: Applications in Health Sector Moderator: Shri Sunil Nandraj		
1430-1500	Use of GIS applications in Health Sector	Mr. Sanjeev Gupta, IBM

1500-1530	Application of GIS for Development of Public Health Care Delivery Planning in India	Ms Preeti Upadhyay/ Shalini Shikla, Jansankhya Sthirtha Kosh
1530-1600	Q & A session on presentations	
1600-1615 - Tea/Coffee Break		
1615-1645	From Vision to Action towards Better Health Service Planning: Difficulties & prospects'	Dr. Shikha Dixit Urban Health Planning & Mapping Consultant Urban Health Resource Centre, New Delhi.
1645-1700	Panel Discussions	Chair: Dr VK Malhotra, ADG
Day 2 : September 1, 2009 (Tuesday)		
Session III: State Experiences in Health GIS Moderator: Shri Sunil Nandraj		
Time	**Agenda**	**Resource Person**
1000-1015	Summary of discussions/Takeaways from Day 1	Technical team, IIHMR, Delhi
1015-1045	GIS activities in Census	Dr AP Singh, Mapping Division, RGI & Census Commissioner
1045-1115	"HEALTH GIS -KARNATAKA" Health related GIS initiatives in Karnataka,Challenges in implementation	Dr. B.G.Prakash Kumar Deputy Director (SICF/HMIS KHSDRP)
1115-1130 - Tea/ Coffee Break		
1130-1200	Integrating GIS in health care planning: Government initiatives in Orissa State	Ms. Mithun Karmakar, GIS Consultant, NRHM, Orissa
1200-1230	Geospatial Kerala Health Information System (G-KHIS)	Ms. Bindu P.R. State Data Officer, NRHM, Kerala
1230-1300	GIS Mapping Of Govt. Health Facilities in India	Mr. Anoop Kumar, JD, CBHI
1300-1400 Lunch		
1400-1430	Presentation by Vayam Technologies - GIS Applications in Health	Dr. Ruma Shukla, Vayam Technologies
1430-1530	Panel Discussion: Wrap up and possible next steps	Dr. Tarun Seem, Director, NRHM Mr. Pravin Srivastava, Director M&E, Mr. Sunil Nandraj, WHO Dr. V.K. Singh, IIHMR
1530-1535	Vote of Thanks	

INAUGURAL SESSION

The events for the two day national consultation on GIS mapping of health facilities and services in India commenced by an inaugural addresses delivered by various dignitaries from the healthcare arena. Mr. P.K. Pradhan, AS& MD (NRHM), MOHFW; Dr. V.K. Malhotra, ADG (Stats) MOHFW; Dr. S.J. Habayeb, WHO Representative to India; Dr. Rattan Chand, Chief Director (Stats), MOHFW; and Surgeon Rear Admiral Dr. V.K. Singh, Director IIHMR New Delhi shared their views on the subject and set the context of the conference.

Mr. P.K. Pradhan, AS & MD(NRHM), discussed in detail India's current healthcare challenges and emphasized the critical role of GIS in overcoming the same. GIS, as an advanced decision making tool, could help in better need based planning for the healthcare services that would result in high impact interventions not just at the national level but also at the district and bock levels. He pointed out that the knowledge gap needs to be addressed which would mean GIS sensitization of management till the panchayat level and capacity building to ensure availability of technical manpower. He hoped that the consultation will help prepare an action plan for further development of GIS in health sector in India

Dr. V. K. Malhotra, ADG (Stats), laid the foundation for further technical discussions on GIS in the coming two days by touching upon various prerequisite for successful GIS implementation in health sector. He emphasized the importance of building robust databases where the data collected is validated to produce accurate analyses. GIS converts statistical data in visual form hence enhancing decision making. Various applications of GIS like analyzing disease progression trends, forecasting epidemics etc. were also mentioned.

Dr. S. J. Habayeb, WHO Representative to India, discussed role of GIS in planning public health resources, roads, utilities etc. GIS finds applications in advocacy, risk assessment, hazard mapping, and disaster management also. He also touched upon various issues with GIS like privacy, proprietorship, security concerns, costs, issues of standardization, affordability. Recognizing India's competence in technological arena, Dr. Habayeb said that the need of the hour was to use IT effectively and ensure its availability and accessibility for further advancement of GIS in healthcare sector in India.

Dr. V.K. Singh, Director IIHMR, welcomed the gathering of distinguished professionals from the health field, and stressed the importance of using GIS for taking Indian health care to the next level. He remarked that it was indeed a dichotomy that GIS technology was used in pizza delivery but not for development of health services in India. It was observed that it was the right time to move past the knowledge and resource blocks on the subject of GIS and that this consultation would bring forth a roadmap for the future developments in the GIS in the Public Health arena.

Dr. Rattan Chand, CD (Stats), while concluding the inaugural session, thanked the eminent speakers for laying a fitting foundation for the course of events for the two day consultation. He reiterated the need of GIS implementation in health care sector in India.

SESSION 1

GEOGRAPHICAL INFORMATION SYSTEM (GIS): SCOPE AND FRAMEWORK

EXPECTATIONS FROM THE CONSULTATION

MR. PRAVIN SRIVASTAVA,
DIRECTOR (STATS), MOHFW

Mr. Pravin Srivastava, Director (Stats), laid out the expectations from the consultation at the beginning of Session I. The participants were briefed about the developments in the current Health Management Information System (HMIS), its key features, current status, working and challenges ahead. One of the main challenges identified was integration of HMIS with GIS.

GIS is expected to play a pivotal role in developing community health surveillance, mapping health care networks, managing health resources, population density, socio-demographics, Health & human services etc. It can be used as a tool for analysis and decision making for evidence based planning of health services, and facilitate in preparation of Health Plans and Policies. It was expected that the Consultation would achieve breakthrough in formulating the road map for future developments in healthcare GIS and would also help in better decision making in health sector through identification of challenges in implementation, learning's from implementers and stakeholders and emerging developments. It was further envisaged that the integration of GIS would further strengthen the HMIS backbone by Socio-economic-demographic-environmental overlay which would facilitate in Epidemiological Analysis, Managing Health and Human Services in the best possible manner.

GIS Overview Indian Context

Dr. Mukund Rao,
COO, ESRI India

ESRI India (NIIT GIS Limited) is a leading GIS Solutions company that provides end-to-end GIS based solutions. This presentation focused on providing an overall view of GIS in the Indian health context and exploring various technologies and applications that can be utilized for the improvement of health services in India.

Building Databases, building Applications and Delivery of Services form the foundation of GIS technology. Emphasizing on the importance of designing database as a critical step towards developing quality databases, Dr. Rao welcomed data standardization initiatives of NIC and Department of Space.

The need of developing a national health GIS was stressed as GIS, by integrating the geographical component to various health indicators, can help in developing better health services. It can be used for analysis of disease vulnerability, health patterning and clinical management. Dr. Rao further highlighted the importance of GIS in public health policy, planning and research. Using GIS maps and graphs improves the decision makers' understanding of the community health situation and thus empowers them to design effective interventions. Other applications like GIS for hospitals, resource management were also discussed.

Various case studies were illustrated where GIS has been employed like malaria research, AIDS, asthma. GIS has also been used for surveillance of disease spread in cases of cholera, avian influenza etc.

Health being a geographic issue finds many solutions in GIS applications and it was suggested that a National Health GIS would empower users at various levels namely government, hospital and community with effective decision making information.

NATIONAL GIS FRAMEWORK AND ITS UTILIZATION FOR MAPPING APPLICATIONS

DR. (MRS.) VANDANA SHARMA,
HEAD, REMOTE SENSING & GIS DIVISION, NATIONAL INFORMATICS CENTRE (NIC)

National Informatics Centre (NIC) of the Department of Information Technology provides the network backbone and e-Governance support to Central and State Governments, assisting them in implementing Information Technology Projects. Dr. Sharma's presentation provided information on the National GIS framework and various GIS initiatives supported by NIC.

GIS is used for capturing, storing, and managing geographical data which can help in presentation and analysis of data for a geographical location. National GIS has been conceptualized as a service across the nation to strengthen systematic integration of data from different sectors for spatially enabled decision making. Various data sharing and access models were discussed where GIS is used as a tool to add value to an existing MIS and provide a range of web geo services. It was mentioned that in the present system has the base framework database required to build up the GIS system. It can facilitate in standardization of databases and act as a dissemination engine to integrate the healthcare data with GIS. It was informed that NIC has Software Data Interfaces at NIC State Units for updation and value addition to Enterprise GIS Setup.

It was reiterated that GIS is relevant to healthcare as it can establish relationship between many complex health factors like population, environment, economic and social factors. JSK GIS initiative was cited as an example.

The key GIS implementations has been in dissemination using Enterprise GIS Architecture, for Health, Election Management, Emergency Planning and Response system, Value Added services for operational MIS services.

The concluding remark mentioned various challenges that lie ahead in GIS implementation like data availability / quality barriers, cultural and organizational barriers, making GIS tools cheaper and easier to learn and use. The NIC extended its full support to the Ministry's initiative in rolling out GIS for the Health sector.

GIS MAPPING - USE OF REMOTE SENSING

DR. P. L. N. RAJU

IN-CHARGE GEO-INFORMATICS DIVISION, INDIAN INSTITUTE FOR REMOTE SENSING (IIRS)

IIRS is an institute for remote sensing and geographical science with a goal to develop a mechanism from pixel to policy through human capacity building in natural resource management. This presentation by IIRS enabled participants to understand the importance of remote sensing in GIS as well as in health care services in general. Practical application of remote sensing and GIS in public health was discussed with various case studies.

An example cited in this context was Investigation of TB Clusters in Dehradun city using GIS and Spatial Scan Statistics. This would initiate intensified case finding activities, further promotion of general health and hygiene, improving nutritional status of the community, compulsory BCG immunization of the children, and better coordination of government and private sector in the hotspots detected by the study.

Further it was discussed that Spatial Information System & Location Based Services (LBS) has power of several integrate services such as GIS, Wireless GIS & Mobile GIS. LBS have proven to be useful as people need information related to their position. Such information is especially important when there is an emergency situation.

Dr. Raju pointed out the need for capacity building in the GIS arena and the role that IIRS can play in this regard. It was concluded that the RS, GIS, GPS and with the support of health data can be used to model for disease surveillance and control. These also help us to understand changing environment / climate scenarios and its impact on Public Health.

GEO-SPATIAL INFRASTRUCTURE & HEALTH INFORMATION

MR. T.P. SINGH
DIRECTOR, BHASKARCHARYA INSTITUTE FOR SPACE APPLICATIONS AND GEO-INFORMATICS (BISAG), GUJARAT

BISAG is Gujarat State level nodal agency to facilitate the use of spatial and geo-spatial technologies for the planning and developmental activities. In his session Sh. Singh discussed on the Implementation of mapping in healthcare facilities and services by Government of Gujarat. Collaborative efforts of various concerned department have emerged in strong partnership for growth & development of health facilities in Gujarat.

Emphasis was given on factors leading to successful implementation of system in current health care setups, like ownership and control of projects with user departments, integration of domain knowledge with geo-spatial datasets and technology through collaboration and partnership, compatibility of datasets and standardization, multipurpose and multi-hierarchical database, simple to use systems on in-house developed Software at low cost on both desktop and intranet, large scale grass root level applications, avoiding Restricted and Confidential documents in creation of the datasets to improve utilization and round the clock services.

Possible areas of collaboration were identified as training & education, awareness programmes for development and customization of a comprehensive GIS for health care and web based services. In order to provide services for large number of users at low cost In-house GIS software – PRAGATI was developed. Gujarat has set an excellent example of implementation of GIS in health care as a collaborative exercise in partnership with stakeholder departments. BISAG offered its assistance to the Ministry for training of health sector personnel on GIS based applications.

SESSION II: GIS IN INDIA: APPLICATIONS IN HEALTH SECTOR

APPLICATION OF GIS IN HEALTH SECTOR

PROF. SANDEEP SAHAY,
NATIONAL HEALTH SYSTEMS RESOURCE CENTER (NHSRC)

NHSRC, a technical support group with NRHM, provides technical support & capacity building for strengthening public health systems. Prof. Sahay discussed various challenges and approaches in implementing GIS for public health. GIS finds applications in epidemiology, health planning, disease control, interventions, monitoring. Some examples of spatial health applications were discussed like transmission of malaria, health atlases, planning for health facilities, cause and effect relationships between environmental factors and diseases, population programs etc. Prof. Sahay discussed the various constraints in successful GIS application that range from data and quality related constraints to technology and manpower issues. The various challenges and some approaches for GIS application were also discussed so that GIS applications become easy to use.

USE OF GIS APPLICATIONS IN HEALTH SECTOR

MR. SANJEEV GUPTA,
IBM

IBM global healthcare, works in developing innovations based on GIS enabling technologies for applications in healthcare sector. Mr. Sanjeev Gupta outlined the use of HMIS in hospital administration and recent developments of IT in health care in IBM perspective.

IBM developed use of Information Technology for communication in different layers of health care to create advanced Clinical Communication, intelligent nursing system, Clinical information management etc. IBM is giving priority to improve on clinical care with the use of IT, by validating usefulness, flexible automated notification based in medical roles, rules & policy, creating proper physician workflow, and also provide on time access to information for emergency.

Mr. Gupta informed the participants that IBM has made available an advanced software technology called Spatiotemporal Epidemiological Modeler that can help to predict the transmission of diseases across countries and around the globe to the open source community. The tool will aid scientists and public health officials in understanding and planning more efficient responses to health crises, ultimately providing new tools for protecting population health. At the end of the presentation, he highlighted new innovations by IBM based on GIS enabling technologies, for example, Voice Site and VoiGen.

APPLICATION OF GIS FOR DEVELOPMENT OF PUBLIC HEALTH CARE DELIVERY PLANNING IN INDIA

MS. PREETI UPADHYAY,
JANSANKHYA STHIRTHA KOSH (JSK)

The goal of JSK is to promote initiatives which leverage the strength of different economic and social sectors and reach out to needy population groups. JSK's ongoing initiatives include GIS Mapping.

Ms. Upadhayay informed the participants that JSK, in collaboration with NIC, has undertaken the GIS Mapping of every district in the country in terms of population density and distance of every village from a primary heath centre and a sub centre. A value-add is provided by the provision of ranking of every district, intra-state and inter-state on select development indices enabling the measurement of progress.

The participants were taken through various illustrations where the amalgamation of GIS Mapping and Census Data has given district and sub-district level information in visual form. The presentation brought out again the various challenges faced in the GIS arena: complexity of interface, lack of manpower and unavailability of data.

FROM VISION TO ACTION TOWARDS BETTER HEALTH SERVICE PLANNING: DIFFICULTIES & PROSPECTS:

DR. SHIKHA DIXIT,
CONSULTANT, URBAN HEALTH RESOURCE CENTRE (UHRC)

UHRC is a non-profit organization which addresses the health concerns of the poor living in underserved slum settlements in India. Dr. Dixit emphasized reiterated the tremendous scope of GIS in health where ninety percent of data have spatial component

Dr. Dixit also emphasized the four key actions with immediate effect for the better health service planning in India: rationalization of health resources, effective communicable disease control & tracking the discerning patterns, disease alerts for the local (both rural as well as urban), regional and global level and finally development of need based health plans. She illustrated with examples, the use of GIS, RS and GPS system in the field of disease management, health decision and health planning. She cited an example of the resource rationalization pilot study that was conducted in two districts (Shimla and Kangra) of Himachal Prradesh by DoHFW through GIS based health information system.

The challenges like problem with nomenclature due to unavailability of unique identification; inconsistent information; multiple stakeholders; various information channels etc. were also pointed out along with the future prospects of GIS in the application of health decision and planning. The UHRC expressed its desire to participate in the GIS activities being planned by the Ministry.

PANEL DISCUSSION: DAY 1

After the completion of two technical sessions, the floor was opened for a panel discussion headed by Dr. V. K. Malhotra, Mr. Pravin Srivastava and Mr. Vishnu Chandra. The questions/concerns that were voiced covered the following:

- **Database**: Accumulation, developing, managing, organizing of quality databases, standardization issues.
- **Usage of data**: Keeping a reality check on data analysis and ensuring compatibility of data sets.
- **Capacity building**: Requirement of trained staff for GIS implementations, short term trainings for existing staff.
- **Forging partnerships**: Promoting partnerships between various public, private stakeholders, encouraging data sharing and establishing inter agency coordination
- **Infrastructure related**: Requirements to develop infrastructure for successful implementation.
- **Cost and usage related**: GIS technology should be inexpensive and easy to use and learn.

Dr.V.K Malhotra, pointed out the importance of maintaining data quality and emphasized that development of specialized data requires coordination between various departments/ programs. He stated that data of Healthcare programmes should be generated by States as Centre can only be a facilitator for this.

Mr.Vishnu Chandra emphasized the need for the development of a framework for various GIS implementations and suggested that it could include the following components:

- Defining Framework for health GIS in the country
- Identifying requirements and stakeholders
- Setting the data standards
- Identifying requirement of various schemes
- Creating processes and workflows
- Designing framework to provide interoperability
- Use of technology in designed framework
- Delivery of services
- Sharing of data between stakeholders

The panel discussion was concluded by Mr.Pravin Srivastava who emphasized the critical role to be played by States in implementing GIS in healthcare sector to improve decision making in the health sector. States can take advantage of the public & the private GIS players in this context.

SESSION III: STATE EXPERIENCES IN HEALTH GIS

GIS ACTIVITIES IN CENSUS

DR A P SINGH,
MAPPING DIVISION, RGI & CENSUS COMMISSIONER

The Indian Census is the largest single source of a variety of statistical information on different characteristics of the people of India. DR. A. P. Singh presented the ongoing GIS activities in the census operations.

Dr. Singh informed the participants that the work for preparing digital maps of capital cities to be used in 2011 census has been initiated. The objective is to prepare a complete geographic database of each building, houses, lanes, by-lanes, road network and major landmarks features for each ward.

RGI has proposed to provide geo-referenced enumeration-block maps to the census enumerators at the time of 2011 Census. The final maps would be useful for other government agencies in conducting various surveys.

The numerous steps involved in the process were listed as under: updating town maps, finalization of hard copy maps, preparation of separate ward maps, field verification and survey, finalization of ward-wise hard copy maps, conversion into vector format, carving out census enumeration blocks and printing of maps upto census enumeration-block level for use in 2011 census.

HEALTH GIS KARNATAKA

DR. B. G. PRAKASH KUMAR
DEPUTY DIRECTOR (SICF/HMIS KHSDRP)

Dr. B.G. Prakash Kumar presented on "Karnataka Health Geographical Information System". After a briefing about the socio-economic background of Karnataka and available health facilities in the present state scenario, Dr. Kumar comprehensively discussed the need of GIS, source of data, objective, methodology, application, experience, and challenges and finally demonstrated to the use of GIS in the health care sector.

The main source of spatial data collected were NIC, Karnataka and Karnataka State Remote Sensing Application Centre for locating the map of villages, road layers and village boundaries and non--spatial data was collected from DH, TLH, CHC, PHC, Sub-centre, other health facilities. Karnataka government implemented GIS system in two phases. In the first phase creates health jurisdiction database for the entire State and the phase two integrate health jurisdiction up to PHC level with web enabled software.

Dr. Kumar explained that the main objectives are effective utilization of health infrastructure; improve efficiency in the allocation and use of health resources and the quality health services. The uniqueness of the GIS application in this state is that every level from sub centre to State level can up load the data frequently in simple formatted software.

The main challenges elaborated were on timely collection of data, quality of data and information, data gaps, frequent change of reporting format, training on formats, monitoring, validation at various levels and compatibility with survey data. Finally he demonstrated the benefit of ArcInfo GIS software and its application in different health sector.

INTEGRATING GIS IN HEALTH CARE PLANNING: GOVERNMENT INITIATIVES IN ORISSA STATE:

MS. MITHUN KARMAKAR,
GIS CONSULTANT, NRHM, ORISSA

Ms. Mithun Karmakar presented the success story of using GIS integrated approach with Remote Sensing and GPS, in health care system for tracking disease pattern, spread, monitoring and implementation of various health programmes in Orissa.

Ms. Karmakar narrated wide application of GIS in Orissa health system which is used by public health administrators and professionals, including policy makers, statisticians, epidemiologists, regional and district medical officers. She also gave some comprehensive example for using GIS to finding out geographical distribution and variation of diseases, analyze spatial and temporal trends, identify gaps in immunization, map populations at risk and stratify factors etc.

It was identified that there is an opportunity to use GIS for resource mapping at various level of planning like state, district and block levels. Orissa is a very vulnerable state in the terms of climate change, difficult terrain land and vulnerability of diseases. GIS helped block wise village level mapping of health institutions for all 30 districts, planning for vulnerable population, institution wise delivery status, location of blood banks and availability, operationalization of FRU, CEmONC & BEmONC Institutions in different areas.

Participants were informed about the significant improvement in Orissa in the use of GIS in urban health sector. One case cited was of the year 2007 when diarrhea took the shape of an epidemic in a block of Rayagada district leading to 51 deaths and affecting more than 5000 people. In order to prevent recurrence of such epidemic a detailed action plan by the Health Department was prepared in which GIS based analysis (undertaken by NRHM Orissa) played a significant role in identifying the vulnerable villages and preventive steps to be taken to counter the occurrence of diarrhea.

GEOSPATIAL KERALA HEALTH INFORMATION SYSTEM (G-KHIS)

BINDU P.R.
STATE DATA OFFICER, NRHM, KERALA

The theme of the presentation was the application of GIS by NRHM, Kerala in various aspects of health. Ms. Bindu P.R. started by giving a brief overview of the presentation. The requirements for designing the Web GIS were mentioned like designing of spatial layers and identification of non spatial data based on the analysis required from the healthcare GIS. Web GIS can enable the mapping of health facilities and associated resources, analysis of facilities and resource distribution, disease surveillance and managing emergencies.

The participants were given a brief description of Spatial Technologies like Remote Sensing, Geographic Information System & Global Positioning System along with their application areas. Various GIS application areas like land use management, water harvesting etc. the case study of health facility mapping in Kerala was discussed.

Ms. Bindu next discussed the applications and advantages of the GKHIS which is an in house built Web GIS Software customized to the requirement of Health Department and NRHM. It enables overlaying various spatial layers like road network, drainage, health institutions etc for well analyzed decision making information. The participants were introduced to the concept of virtual GIS where the virtual view functionality of G-KHIS overlays & displays Health Institutions of Kerala on the globe.

Major challenges identified were cost of the GIS software and requirement of quality epidemiology information, emphasis on adding spatial dimensions to existing MIS. Ms. Bindu pointed out that the scope for future fir GKHIS can be still higher by adding relevant spatial layers to health providing higher resolution spatial data and linking of qualitative information.

GIS Mapping Of Govt. Health Facilities in India

ANOOP KUMAR

JOINT DIRECTOR, CENTRAL BUREAU OF HEALTH INTELLIGENCE (CBHI)

CBHI mentioned that they have created a website for mapping of health facilities which was launched in 2004-05 and were able to capture data on about 200 types of government health facilities ranging from Sub-Centres to Medical Colleges. It was stated that this activity was undertaken in collaboration with NIC and WHO. It was also mentioned that the project is still ongoing and the states are verifying the data and thus has not been displayed in the public domain. The participants were concerned about the rationale for undertaking similar projects for mapping of government health facilities by two organizations in the Ministry namely JSK and CBHI. They were also concerned about the utility of a standalone GIS application without any underlying database to support decision making on a regular basis. It was suggested that this activity may be revisited and aligned with the requirements of the Ministry.

GIS APPLICATIONS IN HEALTH

DR. RUMA SHUKLA
VAYAM TECHNOLOGIES

Dr Ruma Shukla presented on how Vayam technology has implemented GIS in Healthcare. The presentation started with a brief description about Vayam technology and its rich experience in the field of healthcare such as development of Strategic Information Management System (SIMS) for National AIDS Control Organization and its GIS integration etc.

Vayam technology's work on the various aspects of healthcare, including health facilities resource gap analysis and planning, availability of other health facilities coverage, spatial planning of health facilities etc was discussed. Dr. Shukla put emphasis on the use of GIS in all the above mentioned activities because of its dynamic and modular nature, ability to generate spatial themes, visualization and analysis of data in an innovative and effective way.

Further in the presentation she explained the various applications of GIS and the pilot project held in four districts (Lakhimpur, Sonbhadra, Deoria, Mainpuri) of Uttar Pradesh for health resource mapping. In Disease surveillance system Vayam Technology has used GIS in understanding the trends of diseases in the above four districts of UP. Dr. Shukla also talked about the usage of GIS in Health disaster management.

For developing Urban Health Information System the GIS is integrated in a manner to locate the various health facilities of the city, in planning out the resources, emergency analysis, resource analysis and the example of Lucknow city was illustrated in this context.

PANEL DISCUSSION DAY 2

Panel discussion at the end of Day 2 was headed by Mr. Pravin Srivastava, Dr. V.K. Singh and Mr. Sunil Nandraj. Some of the questions/concerns that were voiced are as under:

- There was a need to capture data from the private sector to present a complete picture of the situation of health facilities in India. In this context a framework could be established to facilitate the capture of private sector data.
- As there are several GIS applications in operation in various states, a framework for interoperability across systems needs to be developed. This would facilitate State Governments to adapt the same based on their specific requirements within the overall framework.
- A need was expressed to capture and display information available on say, chemist shops, blood banks, labs, medical colleges etc which would be available with various regulatory bodies or governmental agencies. The States can start the process for streamlining these disparate available databases till such time an organized data channel is evolved.
- It was agreed that the intellectual property rights for such health related information remains indigenous and displayed in the public domain to the extent feasible.
- The NIC agreed to extend full cooperation and support to the Ministry of Health and Family Welfare for integrating the existing HMIS with the GIS interface available with NIC.

CONCLUDING REMARKS & RECOMMENDATIONS

The National Consultation concluded by summarizing the outcomes achieved as listed below:

- Review of current status of GIS in health sector in India
- Review of data available and required at various levels for GIS mapping
- Identifying the resources available and required for GIS mapping
- Mapping of various initiatives underway across the country in health GIS
- Identifying possible options to take this initiative forward in a collaborative manner
- Identifying resources for knowledge sharing on the subject
- Learning best practices models through various states that are implementing GIS
- Gaining update on availability of relevant technology (both proprietary and open source) for GIS
- Identifying various challenges and their possible solutions in the GIS arena like capacity building in developing databases, improving efficiency of the health system through optimization of public and private health infrastructure and human resources, agencies who have invested resources in GIS.

The Consultation also felt that it was important to form a forum for evolving the framework with representatives from various sectors like central, state governments, private companies, NGOs, and researchers & academicians working in GIS. A few organizations like IIHMR Delhi, JICA, Vayam Tech, UNIGIS, eHealth and independent researchers volunteered to be a part of such a forum.

At the concluding session of the National Consultation on use of GIS in the Health sector, the deliberations were summarized into key recommendations.

The National Consultation **recognized**

… that Health Management Information Systems (HMIS) and Geographical Information Systems (GIS) are important tools for improved decision making in the health sector and that these are **public goods;**

… that these tools are to be used for improving efficiency of the health system through optimization of public and private health infrastructure and human resources;

… that capacity building in developing databases (spatial and non-spatial) remains a challenge in the health sector;

… that the efforts and resources (manpower, time, and finances) made by various agencies in the public and private sector in GIS could be effectively utilized in establishing a National framework on GIS;

And thus **recommended that**

1. A National GIS framework for the health sector be developed by forging and fostering partnerships (governmental, non-governmental, private, IT firms etc) to
    a. Ensure integration and synergizing the GIS based initiatives which are already underway so that they are interoperable with the national initiatives
    b. Establish convergence in the use of information across inter- sectoral areas like water, sanitation, hygiene, transport infrastructure, etc
    c. Evolve and adapt Data Standards for HMIS, GIS and nomenclature (HL-7 etc)
    d. Roll out health intelligence and GIS capabilities across levels for public good
    e. Establish a directory of GIS resources sharing resources and knowledge
    f. Using cost-efficient and simple GIS tools & techniques

2. The framework needs to incorporate capacity building and visibility of GIS applications through institutional arrangements so as to continuously popularize use of Information Technology tools like HMIS and GIS to the end user (public) and community at large

3. The work already done on GIS based applications in the health sector to be shared in the Public domain so as to promote transparency and accountability on the governmental and non-governmental systems.

4. Evolve a Community Health Surveillance System for Disease tracking / outbreak analysis. Continuously monitor level of health protection and prevent the occurrence of disease in population.

******End of Report*****