From Geographic Information to a Health Atlas – an Introduction

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A map is a complex illustration which can neither be replaced by tables nor words. Maps establish geographic relationships. Our application of mapping technology, for instance, not only allows us to illustrate the location of a health facility (HF) but also to signify the distance from a village to the next HF or an alternative service-provider. For its ability to represent reality in all of its complexity, a map is superior to any other presentation of data. Maps allow us to better evaluate situations and therefore optimise decision-making.

Today a map represents just one outcome of a larger process of interaction with data. We begin with the idea to relate data to a region. The question at this stage is always "Where is what?". This question then expands to include: "How much is where?", "How much of something exists?", etc. Such complexity undermines our ability to rely upon a single map. New paths have been forged over the last decades to address nuanced questions. So-called geographic information systems (GIS) are powerful systems that help answering the above questions by establishing spatial relationships. A map is then replaced by a complex system of spatial relationships.

With the aid of GIS, which are based on modern IT-foundations, all data can be collected, processed, saved, analysed, and visualised in one integrative system. Not only can maps be edited to answer a multitude of questions but also all data can be analyzed with powerful tools and new variables can be derived. Thus all data gains additional value. An example is the creation of buffers shown in the district maps on pages 64–69. A buffer of 5 km was drawn around each HF, in order to reveal the regions that lie outside the 5 km distance.

The Idea of the Health Atlas

The idea to create an atlas was first discussed at the final workshop of the project "Introduction of Health-GIS in TGPSH supported Mbeya Region in Tanzania" in Mbeya City in September 2009. Most of the participants were from district-level heath management teams. Participants suggested a printed atlas as a means to bring together all digital data collected in the context of the Health-GIS Mbeya Region. A printed atlas accomplishes two primary objectives: The Health-GIS is published and therefore reaches a broader audience and all data is effectively archived. The fleetingness of digital data is replaced by the durability of the printed form. This way it will be possible to draw comparisons and to monitor progress in health care in the future.

The need for new maps in the public health sector is generally a given. As noted, maps establish a better understanding of all collected data and its spatial relationship. In this Health Atlas a detailed image of available health care of the Mbeya Region in Tanzania is drawn. Health Service Availability in 2008/2009 was visualised

Scene in hospital - Tingatinga painting

Health Atlas Mbeya Region

in part through maps with data at the HF level as well as maps of selected results on the level of the eight administrative districts: Chunya, Mbarali, Mbozi, Rungwe, Kyela, Ileje, and Mbeya district and Mbeya City.

For collecting health-related data at the HF-level, a questionnaire prepared by the MoHSW and based on the Service Availability Mapping Survey (SAM) was used during interviews. Interviews were conducted between September 2008 and June 2009 by Beuth University of Applied Sciences Berlin, UDSM and ARU under the leadership of MoHSW. The overall purpose of the project "Health-GIS Mbeya Region" was to set out the general framework for a GIS implementation programme in the rural Mbeya Region. We show that it is possible to successfully use a GIS under less industrialized conditions and, in doing so, demonstrate the value of the tool in the field of health care infrastructure. For the Mbeya Region, a Health-GIS was developed that included all types of HF and data about their infrastructure. Accordingly, the GIS is a relevant and complementary useful instrument for decision-makers at the district level of governance.

How to Use this Atlas

The Health Atlas for the Mbeya Region is divided into topographic and thematic maps. The topographic maps at the beginning give an overview of the country of Tanzania and the Mbeya Region. They are followed by thematic maps of the public health sector at the national, regional and district levels.

The district maps on pages 16–69 are the main focus of the atlas. They point out individual HF and show the current state of health care in Mbeya Region on a detailed level. The topics of the respective district maps were determined at the workshop in Mbeya City together with the participants of the districts and with the aid of the database. They include: type and ownership of the HF, service population and patients per staff, HIV services, water sources, waste disposal, source of energy, methods of sterilization, staff

housing, accessibility of health facilities. The situation regarding each of the nine topics is revealed in all eight districts. As such, comparisons can be drawn between the HF and districts by topic. One topic extends over six double pages for which one legend is used for two to three maps on each double page. The topics are supplemented by text, photographs and diagrams.

The maps shown in this atlas exceed the operating sheets of a GIS. They were cartographically enhanced by transferring the GIS results to graphic software. Thus, each topic could be individually designed in such a way that complex data was cartographically edited. This makes cartographic communication more efficient.

The thematic maps of the Mbeya Region on pages 70–79 show accumulated data from the eight districts which are visualised in diagrams. Topic choice here reflects topics highlighted in the district-level maps. In addition, the topic "Top Five Diseases" and "Employees in health sector" were mapped at the regional level.

At the end of the atlas on pages 80–81, general maps of Tanzania show population density and an overview of health facilities across the country.

All maps refer to the HF, which were captured by their geographical coordinates in 2008/2009 (385 HF). Some HF, which were "under construction" or it was not allowed to collect the coordinates are not represented in the maps. If it was possible to collect geographical coordinates of HF which are closed or under construction (31 HF), these are marked in the maps.

Kutoka kuwa Habari za Jiografia Hadi kuwa Atlasi la Afya - Utangulizi

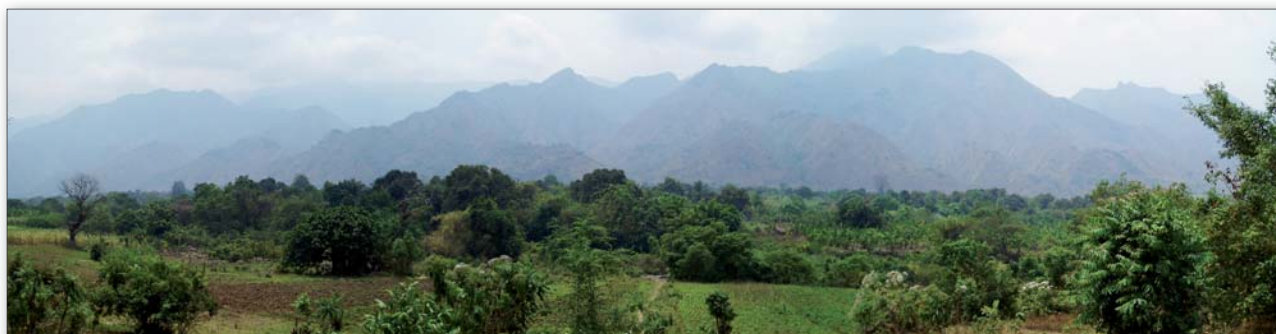*Jürgen Schweikart, Bruno M. B Masumbuko*

Ramani ni kielelezo ambacho kina taarifa nyingi na nafasi yake haiwezi kuchukuliwa na jedwali au maneno. Ramani hizi si kama zinaonyesha sehemu zinakopatikana huduma za afya tu lakini pia inaonyesha umbali wa kutoka kijijini makazi ya watu hadi ilipo sehemu ya kutolea huduma za afya au kama kuna kitu kingine chochote kile mfano wake kilicho umbali wa kawaida ambacho kinaweza kuchukua nafasi ya sehemu hiyo. Kwa sababu hii, ramani ni bora zaidi kuliko maelezo mengine yoyote yanayoambatana na takwimu kwa vile inaonesha hali halisi ya mambo mengi kwa namna ya kitaalamu. Hali hii inatuwezesha kuifanya tathmini vizuri zaidi hivyo kufanya maamuzi sahihi zaidi.

Hivi leo, ramani ni sehemu ya mlolongo wa mchakato mzima wa kufanya kazi na takwimu. Mwanzo huwepo wazo la kuhusisha takwimu na mkoa. Hii inafuatiwa na kujua kuwa "IKO WAPI?" Suala hili baadaye hukuzwa na kuwa "KIASI GANI na ni WAPI?". Na masuala mengine mengi ya namna hii. Matokeo yake ni kwamba ramani moja haiwezi kujibu maswali yote haya. Kwa hiyo katika miongo kadhaa iliopita imebuniwa njia nyingine ya kutatua changamoto hii. Mfumo wa Habari za Jiografia ya Afya ni mfumo imara unaotumia kompyuta unaosaidia katika kuyajibu maswali haya kwa kuweka mahusiano haya kuonekana kwa macho. Kwa kuanzia, nafasi ya ramani inachukuliwa na mifumo tambuka yenye kuhusanisha takwimu na sehemu husika ambyoa si rahisi kuonekana kwa macho wa kuonekana kwa macho.

Kwa msaada wa Mifumo ya Habari za Jiografia ya Afya inayofuata teknolojia ya kisasa ya habari, takwimu zote zinaweza kukusanywa, kuchakachwa, kutunzwa, kuchambuliwa na kuonekana kwa macho katika mfumo mmoja uliofunganishwa. Ramani si kama zinaweza kutengenezwa ili zijibu maswali mengi tu bali takwimu zote zinaweza vile vile kuchambuliwa kwa nyenzo madhubuti na mabadiliko mapya yanaweza kupatikana. Hivyo, takwimu yote inakuwa na thamani ya ziada. Mfano mzuri ni kubuniwa kwa kanda kadhaa zinazooneshwa katika ramani za wilaya kuanzia ukurasa 64-69. Ukanda wa kilomita 5 ulichorwa kuzunguka kila sehemu ya huduma za afya ambayo inaonesha yale maeneo yaliyo nje ya umbali wa kilomita 5.

Wazo la Atlasi la Afya

Wazo la kubuni atlasi, kwanza lilijadiliwa katika warsha ya mwisho ya mradi wa "Mpango wa Habari za Jiografia ya Afya kwa Mkoa wa Mbeya" katika Mji wa Mbeya mwezi Septemba 2009. Washiriki wengi walitoka katika menejimenti za afya katika ngazi ya wilaya. Hapo lilizuka wazo la kuzikusanya pamoja takwimu zote za elektroniki zilizokusanywa kwa muktadha wa "GIS ya Afya kwa mkoa wa Mbeya" katika atlasi iliyochapishwa. Wazo hili lina madhumuni mawili:GIS ya Afya linachapishwa kuwafikia walengwa wengi zaidi na takwimu zote zinahifadhiwa vizuri. Nafasi ya mtiririko wa takwimu za elektroniki inachukuliwa na ule uiliochapwa na kuweza

Livingston Mountains in Rungwe District

Health Atlas Mbeya Region

kutumika kwa muda mrefu. Kwa namna hii, itaweze-kana kufanya malinganisho na kufuatilia maendeleo ya shughuli za kutoa huduma za afya siku za baadaye.

Haja ya ramani mpya katika sekta ya afya kwa umma kwa jumla imetekelezwa. Ramani hizo inazifanya takwi-mu zilizokusanywa zieleweke vizuri zaidi pamoja na rejea zake zinazoweza kuonekana kwa macho. Katika Atlasi hii ya Afya imechorwa taswira ya wazi kabisa ya huduma za afya za Mkoa wa Mbeya nchini Tanzania.Kwa madhu-muni hayo, upatikanaji wa huduma za afya kwa mwaka 2008/2009 umetengenezwa kwa namna ya kuweza kuo-nekana kwa macho. Hii imejumuisha ramani pamoja na takwimu zinazoonesha kiwango cha huduma za afya pa-moja na ramani za matokeo yaliyoteuliwa maalumu ya viwango vya wilaya saba za kiutawala; Chunya, Mbarali, Mbozi, Rungwe, Kyela, Ileje na Mbeya (wilaya na jiji).

Katika kukusanya takwimu zinazohusiana na afya ili kujua viwango vya vituo vya huduma za afya, imetumika hojaji kuhusu huduma zinazopatikana na pia umetumi-ka upimaji wa maeneo wakati wa mahojiano yaliyofa-nyika kati ya Septemba 2008 na Juni 2009 na zoezi hili limeendeshwa na BHT Berlin, Chuo Kikuu cha Dar es salaam, Chuo Kikuu cha Ardhi chini ya uongozi wa Wiz-ara ya Afya na Ustawi wa Jamii. Madhumuni ya jumla ya mradi huu, "Mfumo wa Habari za Jiografia ya Afya kwa Mkoa wa Mbeya" yalikuwa ni kuweka mfumo wa jumla wa mpango wa utekelezaji wa Mfumo huu wa Habari za Kijiogrfia ya Afya katika sehemu za vijijini za Mkoa wa Mbeya. Tunaonyesha kuwa inawezekana kuutumia kwa ufanisi Mfumo huu wa Habari katika hali za kawaida ili kuonyesha thamani ya teknolojia hiyo katika uwanja wa miudombinu ya utoaji wa huduma za afya. Mfumo wa Habari za Jiografia ya Afya ulianzishwa na kujumuisha aina zote za vituo vya huduma za afya na takwimu juu ya miundombinu yake. Kadhalika, mfumo huu ni zana muhimu kwa wenye kufanya maamuzi katika ngazi ya wilaya.

Namna ya kuitumia atlasi hii

Atlasi ya Afya kwa mkoa wa Mbeya limegawanyika katika ramani za maeneo na za mada husika. Ramani za maeneo ambazo zipo mwanzo zinatoa picha ya jumla ya nchi ya Tanzania na Mkoa wa Mbeya. Zinafuatiwa na ramani za mada husika za sekta ya afya kwa umma katika ngazi ya taifa, mkoa na wilaya.

Ramani za wilaya zilizopo ukurasa 16-69 ndizo zili-zolengwa hasa na atlasi hii. Ramani zinaonesha vituo vya huduma za afya na kuonesha hali ya hivi sasa ya huduma za afya kwa uwazi kabisa. Mada za ramani za wilaya hu-sika ziliandaliwa katika warsha iliyofanyika Mbeya mjini ikihusisha menejimenti za afya katika ngazi ya wilaya: Mada hizo zilihusisha umiliki wa kituo; idadi ya wagon-jwa wanao hudumiwa na kituo; uwiano wa wagonjwa na watumishi; huduma za UKIMWI; vyanzo vya maji; utu-paji wa taka; chanzo cha nishati; namna ya kuua vijidu-du; nyumba za watumishi; namna ya kuzifikia huduma za afya. Hali zote nane zinaoneshwa kwa kila wilaya moja moja katika kila mojawapo ya mada tisa. Kwa namna hii, inawezekana kulinganisha baina ya Kituo cha Hudu-ma za Afya na wilaya kwa mujibu wa mada. Mada moja ina ukubwa wa kurasa sita zilizounganishwa mbili mbili ambazo maelezo ya mojawapo hutumiwa kwa ramani mbili hadi tatu kwa kila ukurasa uliounganishwa kuwa kurasa mbili. Mada hizo zimeongezewa matini, picha na michoro.

Ramani za mada husika za Mkoa wa Mbeya zilipo ukurasa 70-79 zinaonesha takwimu zilizokusanywa na kulimbikizwa za wilaya nane ambazo zinaonekana katika vielelzo. Uchaguzi wa mada unafuatia mada za ramani za wilaya. Zaidi ya hilo, mada isemayo "Magonjwa Makuu Matano" imeamuliwa katika ngazi ya mkoa.

Ramani zinazoonekana katika atlasi hili zinazidi zile za Mpango wa Habari za Jiografia ya Afya. Zimefanywa kuwa bora zaidi kiramani kwa kuhamishia matokeo ya Mpango wa Habari za Jiografia ya Afya katika miunzi ya michoro. Kwa hiyo, kila mada inaweza inaweza kuten-genezwa pekee kwa namna ambayo takwimu za namna mbali mbali zinaweza kuhaririwa kiramani. Hii inyafa-nya mawasiliano ya kiramani kuwa ya uhakika zaidi.

Mwisho wa atlasi ukurasa 80-81 ramani za jumla za Tanzania zinaonesha idadi ya watu kwa kila eneo fulani na hali ya vituo vya huduma za afya katika nchi.