Abstract

Interactive Spatial Decision Support System for Collaborative Planning

Human health is inextricably linked with environmental factors. Many urban cities in Europe, including the city of Dortmund, are facing environment related health challenges. The contexts or urban settings themselves play significant roles in shaping the health of the urban population (Galea et al., 2005; Galea & Vlahov, 2005). These aspects can be classified into three categories: mechanisms related to the urban physical environment, the social environment and the availability of and access to health and social services.

With the second wave of environmental justice research, more researchers are now interested in the ‘triple jeopardy’ - social, environment and health inequalities (Pearce et al., 2010). Understanding persistent and increasing spatial inequalities in health at urban or intra city level is gaining increased attention from geographers, epidemiologists and public health researchers. These geographical differences in health have been attributed to the cumulative effects of disparate exposures to multiple environmental factors (both salutogenic factors e.g. green space and pathogenic factors e.g. air pollution, noise pollution), and are not just due to the exposure of a single environmental factor or lifestyles and behaviours of individuals.

Delivering robust explanations for the growing spatial inequalities in health and addressing these inequalities for improving health outcomes across the social spectrum have been realized as equal concern for both spatial planners and public health practitioners alike (Marmot et al., 2010; Marmot et al., 2008). Yet, there are some indications on disengagement of these two professions when it comes to uptaking health into each phase of spatial planning decision making process (Barton & Tsourou, 2000; Cave & Molyneux, 2004; Crawford et al., 2010; Wanless, 2003). To counteract this barrier, enhancement of common knowledge, generation of common and shared understanding among these two professions through collaboration, deliberation, and dialogue have been advocated by researchers (Northridge & Freeman, 2011; Rydin et al., 2012).

Spatial Decision Support Systems (SDSSs) are developed as technology based systems to support decision makers in spatial decision making processes that are complex and ill-structured, and for which human cognitive memory and analysis abilities are often insufficient (Sugumaran & Degroote, 2010). Such systems designed for collaborative spatial decision-making processes have been appraised for supporting collaboration, deliberation and dialogue amongst diverse stakeholders and for ultimately improving the quality of decision-making processes (Gudes, 2012). The state-of-the-art on SDSS shows that there are abundant technology-based SDSS in the field of spatial planning (for instance Eom et al. (1998) conducted the survey of DSS applications on various fields). Yet, the development and use of such systems for supporting collaboration between spatial planners and public health practitioners in relation to spatial inequalities with respect to urban health are still separate realms.

Therefore, this research attempts to make a contribution to that apparent void by developing an Interactive Spatial Decision Support System (ISDSS) for addressing environment related spatial inequalities with respect to urban health. Further, the research attempts to evaluate its usability to support the integration of urban health into collaborative spatial planning and decision making processes. This research is a part of a larger project, Jufo-Salus II “city as a healthy living place regardless of social inequality”.

System Development Life Cycle steps (SDLC) consisting of different steps as requirement analysis and conceptual framework development, system design, implementation, testing and evaluation, will be used to develop three support systems in three phases. These are for providing support during problem
exploration, spatial assessment of cumulative effects of exposures to multiple environmental factors and for supporting collaborative spatial decision making processes through planning games.

The first application within ISDSS is conceptualized as Interactive Spatial Understanding Support System (ISUSS). Spatial Understanding Support System as a notion emerged in 90s to emphasize the importance of problem structuring paradigm rather than problem solving paradigm for resolving NIMBY (Not-In-My-Backyard) problem. This concept was first proposed by Couclelis (1991) who claims that the greatest challenge lies in finding out what is really going on and why, before deciding on solving the problem. Therefore, any conceptual and technical tools that help planners, geographers to understand the situation has been termed as SUSS. Since its emergence it has been accredited in few works (Couclelis & Monmonier, 1995; Horita, 2000; Jankowski & Stasik, 1997; Moore, 1997) during 90s and the beginning of 2000s as a technology based system working on top of a GIS platform.

Following the problem structuring paradigm of the SUSS, this research envisages ISUSS as a technology based system for supporting collaboration between spatial planners and public health professionals for identifying decision problems to be addressed in relation to environment related spatial inequalities in health. Consisting of mainly three objectives-problem exploring and identifying decision problem, capturing and storing tacit knowledge and bringing common and shared understanding, these objectives will be supported with tools and methods within ISUSS. Further, the system will be tested and evaluated amongst the stakeholders using “touchtable” as an interactive medium in a workshop. The result from the workshop as a decision problem will then be addressed by subsequent applications within ISDSS.

**Keywords**: spatial inequalities, urban health, collaboration, cumulative effects, Interactive Spatial Decision Support System, spatial planning, public health, Spatial Understanding Support System

**References**


