Public Health Aspects' Assessment Tool for Urban Projects, According to the Urban Health Approach

Stefano Capolongo, Maddalena Buffoli, Erica Isa Mosca, Daniela Galeone, Roberto D'Elia and Andrea Rebecchi

Abstract As part of the CCM2017 project titled "Urban Health," this paper describes the experience of developing and testing a multi-criteria, quali-quantitative assessment framework for Public Health aspects. The tool aims to evaluate urban transformation and regeneration actions, according to Urban Health strategies.

Keywords Urban health · Public health · Healthy urban planning and design strategies · Evaluation tool · Multi-criteria analysis

1 Introduction

Planning and management actions in urban contexts provide several opportunities for the protection and promotion of Public Health. Indeed, health conditions depend especially on environmental, economic and social factors (Fehr and Capolongo 2016), which are influenced by a correct design and management of the living environment. The concept of *Urban Health* has been introduced since the beginning of 2000, based on the definition of *Healthy City* which refers to the "*urban contexts able to support and improve constantly the physical environment and the social context, encouraging the development of economic and social resources, allowing people to mutually support each other in the development of daily life activities*." (WHO 2016). From this concept derives the *Urban Health* strategy, which refers to the relationship between health promotion, disease prevention and the different interrelations with urban factors (Talukder et al. 2015). Indeed, *Urban Health* represents a complex issue as the actions aimed at improving the living conditions

S. Capolongo (✉) · M. Buffoli · E. I. Mosca · A. Rebecchi
Architecture, Built Environment and Construction Engineering—ABC Department, Politecnico di Milano, Milan, Italy
e-mail: stefano.capolongo@polimi.it

D. Galeone · R. D'Elia
Direzione Generale della Prevenzione Sanitaria, Ministero della Salute, Rome, Italy

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of cities depend not only on the health sector, but also on urban planning decisions, as well on social, welfare, and education programs (Galea and Vlahov 2005).

In this regard, the *Erice 50 Charter* entitled *"Strategies for Disease Prevention and Health Promotion in Urban Areas"* by D'Alessandro et al. (2017b) defines ten goals useful to designers and policy makers, aimed to support the design of *Healthy Cities.* One of the most important goals for local government is the promotion of urban planning interventions that address citizens' healthy behavior and lifestyles (Capolongo et al. 2011; World Health Organization 2017).

Furthermore, the emerging environmental, social, and economic criticisms of the last years have given rise to a need for more specific objectives aimed at achieving *Salutogenic Cities* (Capolongo et al. 2018). In particular, the new objectives for healthy design and urban planning strategies have been defined, such as environmental and social sustainability of urban areas; adaptation to climatic changes and cities' urban resilience (Hickman and Banister 2014); new responses to the population's needs (Croucher et al. 2012; Active Living Research 2015).

In this regard, the support of urban planning becomes an important task to promote and protect different aspects as the health, wellbeing, and social inclusion of individuals who are directly influenced by their relationship with the built environment. Processes of validation, monitoring, assessment and formulation of strategic decision-making processes, through the application of mathematical tools and systems, are the basis of city regeneration actions as well as urbanized territory governance and *Public Health* promotion (Capolongo et al. 2016). Multi-criteria evaluation tools, updated with innovative strategies to reach *Urban Health* purposes are, therefore, needed in order to support planners and designers to achieve a healthier scenario. However, tools which evaluate how the design of cities can have an impact on people's health are still difficult to compare and apply, and they are primarily focused on quality and urban sustainability, neglecting the direct and indirect *Public Health* implications.

For this reason, the research starts from the current need to investigate the most recent and common urban quality evaluation tools, in order to understand which of them adopt performance criteria with direct or indirect relationships with *Urban Health*.

Within this context, the paper describes the advancements in the development of a multi-criteria evaluation tool based on a set of performance criteria (Capolongo et al. 2015). The tool was developed by an interdisciplinary working group which includes researchers from the DABC and DAStU Departments of the Politecnico di Milano and technicians from the Health Prevention Department of the Local Health Authorities (LHA) of Milan (Capolongo et al. 2013). The evaluation tool was developed with the main purpose of providing support to guide urban transformation and fostering the elaboration of strategic decisions on new planning interventions (Coppola et al. 2016). In addition, it is also aimed at monitoring advancements by evaluating changes over time. However, after the application of the tool, the need of extending its scale of intervention, from a local to a national level, defines the basis on which to review and improve the assessment tool, which is carried on by the DABC of the Politecnico di Milano and by the LHA of Bergamo, thanks to the funds of the National Center

for Disease Prevention and Control CCM2017 regarding the project titled "*Urban Health: good practices for health impact assessment of urban and environmental redevelopment and regeneration interventions*." (CUP: C42F17000330001).

2 Methodology

Urban Health is characterized by a plurality of social and qualitative aspects derived by the relation between the built environment and its influence on *Public Health* and wellbeing. For this reason, *multi-criteria analysis* (Roy 2013) is adopted by the current research to systematically and scientifically develop the tool. This approach allows for both the analysis of the full range of aspects relating to a project and the simultaneous comparison of heterogeneous measures for evaluating a complex situation (Department for Communities and Local Government DCLG 2009). Furthermore, a *performance-based approach* characterizes the assessment method, aimed to overcome the traditional prescriptive regulations by means of the achievement of objectives based on urban quality. Finally, the direct contribution of experts in analyzing and evaluating projects was an essential component to guarantee new evidence-based knowledge. For this reason, LHA technicians were involved in both the tool development and the updating by means of brainstorming, aimed at discussing the most important criticisms emerging from the hygienic–sanitary evaluation of urban plans and projects (Capasso et al. 2018; Gola et al. 2017).

The research is developed through different phases, shown in the diagram (Fig. 1); after defining the main objectives to consider, a collection of best practices was supported by a literature review aimed to investigate the current and existing studies on urban quality evaluation methods and tools. A set of criteria was selected among the analyzed studies, fixing the basis for the development of the tool's framework and the evaluation method (Capolongo et al. 2016). The multi-criteria evaluation tool was applied and tested to have feedback on its effectiveness in two cities of the Lombardy region: in Milan since 2011 and for one year in Lecco. The reliability of the instrument was confirmed, while the applicability of certain evaluation criteria was considered critical. For these reasons, the tool is currently under review for an update and improvement of its criteria and performance scales, thanks to the funds provided by the CCM2017 project.

The on-going review will foster the possibility to apply the tool from local to national level and to increase public awareness regarding the relationship between *Public Health* and urban quality according to the *Urban Health* strategy (Rebecchi et al. 2016).

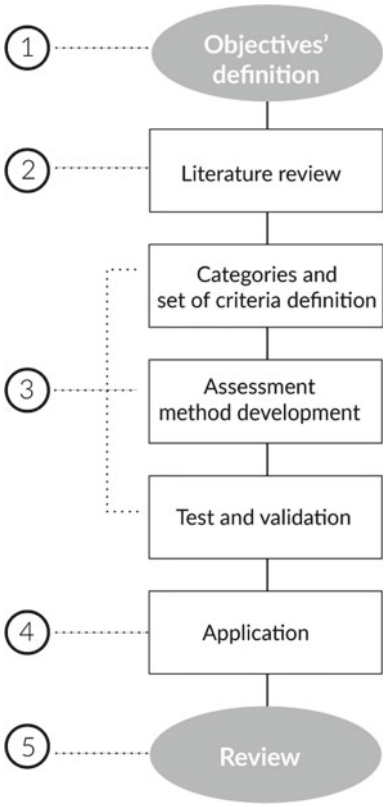

Fig. 1 Methodology flow chart (authors' elaboration)

3 Results

A significant number of European initiatives, aimed at measuring the level of sustainability and urban quality using different sets of criteria, based on a variety of factors such as environmental, social, and economic issues were found. For this reason, the literature review was useful to collect data for the categories and criteria for the tool's development.

Articles were selected from online databases by using specific keywords. The studies, selected and compared by means of eligibility criteria, have been used to include or exclude articles from the analysis.

Specifically, the literature review considered the following projects and tools:

- Indicatori Comuni Europei. Verso un profilo di sostenibilità locale. Ambiente Italia.
- Progetto Città Sane. Comune di Milano.
- A healthy city is an active city: a physical activity planning guide, Who Europe.
- Healthy City Project Technical Working Group on City Health Profiles, City Health Profiles.

- The Urban Audit. Toward the Benchmarking of Quality of Life in 58 European Cities. European Commission.
- Audit Commission Local Quality of Life Indicators supporting local communities to become sustainable. A guide to local monitoring to complement the indicators in the UK Government Sustainable Development Strategy, Office of the Deputy Prime Minister.
- Ecosistema Metropolitano, Ambiente Italia, Provincia di Milano.
- Green Building Tool—GBTool.
- Protocollo Itaca per la valutazione della qualità energetica ed ambientale di un edificio, Istituto ITACA.
- Progetto S.I.S.Te.R.

Furthermore, the most recent available neighborhood-level certification protocols were also included in the review. Starting from 46 selected studies, the eligibility criteria allowed researchers to reduce the analysis down to the following seven protocols: for America,

- LEED-ND. For Europe, the English protocol
- BREEAM for Communities, the French protocol
- HQE UPD, and the German protocol
- DGNB. For Asia, the Japanese protocol
- CASBEE UD and the protocol of members of the Persian Gulf
- GSAS. Finally, for Oceania, the Australian protocol
- GREEN STAR COMMUNITIES. All these tools were analyzed and compared in order to collect criteria that will form the evaluation framework of the instrument.

The multi-criteria evaluation tool, based on a set of performance criteria and aimed to promote *Public Health* purposes from the quality of the built environment, was developed in this way.

3.1 The Multi-criteria Evaluation System

The literature review, together with various brainstorming activities and focus groups with the technicians of the LHA of Milan, has allowed us to identify the 206 most frequently used criteria using the tools found in the literature, and to support the development of a new evaluation system.

The final assessment framework (Fig. 2) is formed of six thematic issues (environmental quality and wellbeing; waste; energy and renewable resources; mobility and accessibility; land use and functional mix; quality of urban landscape) and a set of 23 criteria, as Fig. 2 synthetizes.

Each criterion was developed in a specific evaluation data-record that includes the expected output to achieve, its impact on health (Oppio et al. 2016), a performance evaluation on both neighborhood and urban scale, a selection of best practices supported by pictures, notes and references.

Thematic issues	*Criteria*
1 Environmental quality and wellbeing	1 Air 2 Noise 3 Water 4 Ionizing radiations
2 Waste	5 Solid waste management 6 Liquid waste management
3 Energy and renewable resources	7 Energy consumption and monitoring 8 Passive technical systems for sustainability 9 Active technical systems for sustainability
4 Mobility and accessibility	10 Distances to parks and local services 11 Public transport system 12 Availability of pedestrian and bicycle paths 13 Links between existent mobility system and new settlements
5 Land use and functional mix	14 Functional and social mix 15 Urban density 16 Filtering areas 17 Protection of sensitive users 18 Hazardous and nuisance activities
6 Quality of urban landscape	19 Quality of outdoors areas 20 Urban equipment 21 Visual comfort 22 System of urban green areas 23 Parkings for inhabitants

Fig. 2 Assessment framework (elaboration by the authors)

In order to measure the achievement's level of the qualitative criteria, constructed attributes (Bouyssou et al. 2000) were used. The performance values are expressed with a qualitative score rating from 0 (inadequate performance) to 3 (good practice).

The current performance evaluation scale represents the basis of the evaluation report, as well as a guidelines manual for designers and urban planners with regards to Public Health (Table 1). Each score, defined by teams of experts, is explained through a reference judgment that points out the requirements that are mandatory for reaching the highest score. Since the score achieved by each thematic issue is given by the average of the scores gained in each criterion, the performance values of plans/projects are defined according to one of the following ranges:

- negative ($0 \leq$ performance value ≤ 1.5);
- critical ($1.5 <$ performance value ≤ 2.25);
- good ($2.25 <$ performance value ≤ 3).

The results of the tool are provided by different graphic means (Fig. 3) that underline strengths and weaknesses of the urban development proposals under evaluation. In particular, a spider diagram shows the score achieved by each thematic issue, while three histograms show: the overall score of the urban plan/project; the scores of the thematic issues and the score achieved by each criterion (Capolongo et al. 2015, 2016).

Table 1 Performance judgments for environmental quality and wellbeing on a neighborhood-level for a healthy urban planning tool (elaboration by the authors)

Issues	Criteria	Performance values
Air	Presence of pollution sources, coexistence of the following strategies – Location of sensitive users in protected areas and far from the pollution sources – Strategies for limiting emissions at source and/or reducing the diffusion of pullutants	Good
	Presence of only one of the strategies listed above Absence of the strategies listed above	Critical not sufficient
Noise	Presence of noise sources, introduction of the following strategies – Location of sensitive users in protected areas and far from the noise sources – Strategies for limiting noise at source and/or reducing the noise transmission from fixed or mobile sources	Good
	Presence of only one of the strategies listed above Absence of the strategies listed above	Critical not sufficient
Water	Coexistence of the following strategies – Efficient water supply system – Reducing waste and saving drinking water	Good
	Presence of an efficient water supply system Absence of the strategies listed above	Not sufficient critical
Ionizing radiations/non ionizing radiations	Presence and/or absence of possible sources of ionizing/not ionizing radiations, coexistence of the following strategies – Location of sensitive users and users with residence time higher than 4 h away from ionizing/non ionizing radiations; absence of sensitive users close to power lines – Strategies aimed to remove or to mitigate ionizing/not ionizing radiations	Good
	Presence of only one of the strategies listed above Absence of the strategies listed above	Critical not sufficient

3.2 Validation and Development

The evaluation tool was applied in the Lombardy region by the LHA of Bergamo, Milan, and Lecco with the aim of evaluating the procedure to be able to extend its use in other contexts. In particular, the application took place in Milan since 2011 and it is still in use, and for one year the tool was tested in Lecco. From these analyses, although the reliability of the instrument was confirmed, the applicability of a number of evaluation criteria was considered critical or limited by a lack of information.

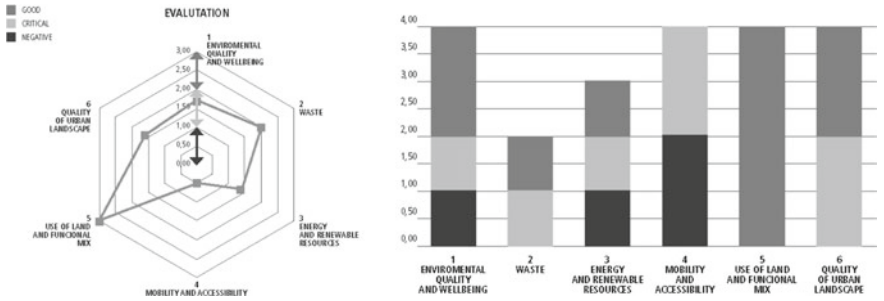

Fig. 3 Output of the evaluation through the different graphic means of the assessment tool (elaboration by the authors)

These results highlight the need to update certain criteria according to the new requirements of the *Urban Health* strategy (D'Alessandro et al. 2017a), and to introduce new ones, for instance regeneration of the abandoned areas and the contaminated site (ground and underground); geological, hydrogeological, and seismic risk prevention; social equity; universal design and design for all (European Institute for Design and Disability—EIDD 2004).

In particular, the last criteria refer to social wellbeing, since healthy cities are considered inclusive places, where planning and policy-making incorporate the views, voices, and needs of all communities (WHO 2016). This concept is assumed by the design for all strategy defined in 2004 by the European Institute for Design and Disability (EIDD), aimed to achieve cities where people diversity, social inclusion and equality represent the main drivers for Urban Health promotion (Mosca et al. 2019). Design for all's purpose is to develop functional and comfortable environments that can be used independently by the greatest number of users as possible, overcoming the concept of architectural barriers. The purpose is to provide the same experience of the space, even with various solutions, to different people, regardless of their abilities, disabilities, age, sex, and culture. The application of design for all concerns the involvement of a plurality of stakeholders (both experts and final users) from the beginning of the design process. This strategy is fundamental in order to understand and satisfy the physical, sensorial, and cognitive needs of the individuals by means of a prescriptive approach (Mosca et al. 2019).

Considering these new criteria, concerning the relationship between people's wellbeing and the quality of built environments, a review of the tool to make it more flexible and efficient in practice is required. After the update of the criteria, the following step will be to modify the performance scales and benchmarks of some criteria according to different territorial features. Furthermore, the outcomes of the survey suggest assigning different weights to the criteria in relation to their potential effects on *Urban Health*.

For these reasons, the tool is currently under review in order to update and improve its criteria and the performance scales by means of a project of two years (2018–2020) entitled "*Urban Health: good practices for health impact assessment of urban and environmental redevelopment and regeneration interventions*." funded by the CCM, as previously mentioned.

The research team is coordinated by the Lombardy region (national proponent) and involves four Italian regions: Lombardy (LHA of Bergamo and ABC Department of the Politecnico di Milano); Piedmont (LHA3 of Turin and SCaDU, the regional epidemiology unit); Tuscany (LHA of Tuscany Nord Ovest); Apulia (LHA of Taranto).

The current review will foster the possibility of applying the tool from a local to a national level, and to increase public awareness regarding the connection between *Public Health* and urban quality according to the *Urban Health* strategy.

4 Conclusions

The review process both highlights the responsiveness of the evaluation tool to the current *Urban Health* issues and strengthens the effectiveness of the assessment process. Thus, in light of the most recent goals and requirements (D'Alessandro et al. 2015, 2016) the criteria review will provide several possibilities to expand the influence of the urban quality assessment tool from the local to national scale.

Furthermore, the overall contribution of the instrument includes, as one of its main objectives, increasing public awareness about the link between urban quality and *Public Health*, fostering the opportunities for a more effective relationship and training among designers (urban planners and architects) and *Public Health* professionals. Indeed, the instrument aims to be adopted both for supporting the assessment task of technicians of the LHA and as a guide for designers and planners in the design of interventions concerning social and healthy environments. The project funded by CCM2017, therefore, could be the opportunity to demonstrate new insights from the current review of the tool.

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