

Action planning for healthy cities: the role of multi-criteria analysis, developed in Italy and France, for assessing health performances in land-use plans and urban development projects

Pianificazione urbana per città sane: sistemi di valutazione multicriteriale, elaborati in Italia e Francia, per includere gli aspetti sanitari nei piani e progetti urbani

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ABSTRACT

In the last decades a growing attention has been paid to the relationship between urban planning and public health. The introduction of the social model of health has stressed the importance of the determinants of health such as socioeconomic, cultural, and environmental conditions, in addition to living and working conditions. Starting from the assumption that urban planning plays a crucial role for enhancing healthy lifestyles and environments, the paper describes two different approaches to include health issues into land use plans and urban development projects. Two different evaluation tools, defined according to the Italian and French legal framework, have been compared in order to find out whether they could be considered as an innovative answer to the instance of creating a more effective cross field of work and training among urban planners and public health professionals.

Keywords: public health, urban planning, multi-criteria analysis, environmental impact assessment, strategic environmental assessment

RIASSUNTO

Negli ultimi anni si è diffusa una crescente attenzione alla relazione tra pianificazione urbana e salute pubblica. L'introduzione del modello sociale di salute ha spostato l'attenzione sui determinanti della salute, intesi più in generale come le condizioni socioeconomiche, culturali e ambientali, oltre alle condizioni di vita e di lavoro. A partire dall'ipotesi, ampiamente condivisa, che la pianificazione urbana giochi un ruolo decisivo nella promozione di stili di vita sani, il presente contributo propone due differenti approcci incentrati sull'inclusione del tema della salute nei piani urbanistici e nei progetti di sviluppo urbano. Due sistemi di valutazione, definiti in riferimento al contesto legislativo italiano e francese, sono stati messi a confronto con l'obiettivo di verificarne la capacità di rispondere in modo innovativo all'istanza di costruire un ambito trans-settoriale di ricerca e lavoro sul campo tra urbanisti ed esperti di igiene pubblica.

Parole chiave: salute pubblica, pianificazione, analisi multicriteriale, valutazione d'impatto ambientale, valutazione ambientale strategica

INTRODUCTION

Urban health is a complex and cross-sectorial issue. Actions aimed at enhancing the quality of physical forms and the living conditions of cities depend not only on health policies,¹ but also on urban planning decisions, as well on social, welfare, and education programmes.^{2,3}

A healthy city is one that is continually creating and improving physical and social environment and expanding community resources, which enable people to mutually support each other in performing all the functions of life and in developing their maximum potential.⁴

Starting from the Rio Conference (3rd-14th June 1992), that firstly highlighted the role of cities in addressing healthy and sustainable development, the European policy framework for health and wellbeing,⁵ called Health 2020, stresses the relevance of a social model of health. It reaffirms the importance of urban development strategies grounded on a comprehensive acknowledgement of the determinants of health,^{6,7} contrasting with the traditional medical one.

Within this context, urban planning should be considered as a form of risk prevention and health promotion,⁸ as it could promote healthy lifestyles⁹ by a transport system that encourages pedestrian and cycle accessibility, a functional organisation of the city that ensures autonomy to each of its part, a design of green and open areas responsive to all citizens' needs and addressed to support recreation, wellbeing, and social interaction.¹⁰⁻¹⁴

Given the importance of the living environment as a determinant of health, the need to take health considerations into account in both urban development projects and land-use plans is relevant.^{15,16} The environmental impact assessment (EIA) and the strategic environmental assessment (SEA) procedures are a lever in this perspective.¹⁷⁻¹⁹ These procedures were initiated in the United States at the beginning of the 1970s. They were taken up at European level through several EU directives starting from 1985, which were transcribed in the legislation of each Member State at varying paces. The EIA and SEA procedures were developed in response to the sustainable development in-

stances and health considerations were progressively taken into account since the mid-1980s. The 1985 EIA Council Directive 85/337/ECC specified that the effects of a project on “human beings” are to be assessed (Art. 3) and the Recital 11 of this directive specifies that «the effects of a project on the environment must be assessed in order to take account of concerns to protect human health, to contribute by means of a better environment to the quality of life [...]». Therefore, according to the European legislation on EIA, the entities in charge of the projects, including urban developing projects, have to carry out an analysis which comprises:

- a description of the the project;
- information on the initial state of the environment;
- an assessment of the potential impacts of the project on environment and human beings;
- a presentation of the measures planned in order to avoid, reduce or compensate these impacts;
- a non-technical summary.

In addition, the EU Directive 2001/42/CE has forced every Member State to introduce the strategic environmental assessment (SEA) into their land-use and urban development plans. The SEA also comprises the elements listed above. Nevertheless, none of the procedures uses evaluation tool of health performances.

Competent authorities responsible for environmental considerations must have an opportunity to give their opinion on these assessments.²⁰

THE HEALTH ASSESSMENT IN ITALY

The Italian law has adopted the European Directive on EIA, that makes this kind of evaluation compulsory for high potential impact projects, as listed in Appendix 1 of the EU Directive 97/11/CE. Furthermore, the hygiene and health requirements of construction projects are subjected to a mandatory examination by the Local Health Authorities (LHA) according to national and regional laws. The opinion of the LHA is crucial for approving the project under investigation.^{21,22} The EU Directive on SEA has been adopted by the Italian Environmental Law (D.Lgs. 152/2006) for the sustainability plans evaluation at a regional and urban scale. In addition to the SEA, specific laws have been defined with the aim of assessing the hygiene and health performances of urban plans. Lombardy Region (Northern Italy), by the Regional Law (RL) No. 12 of 2005 (Urban planning law), has introduced the hygiene and health evaluation of urban plans and the development of projects by the LHA. The positive opinion of the LHAs is taken into high consideration, even if it is not mandatory for the plan approval. In Lombardy Region, urban plans are subjected to a twofold evaluation: on one side, they are evaluated within the SEA procedure (ex ante, in itinere, and ex post evaluation); on the other side, their health and hygiene performances are estimated by the LHAs before the town planning authorities’ approval. This non-mandatory evaluation supports the Municipalities’ decisions about approval, additional documents request or deny.

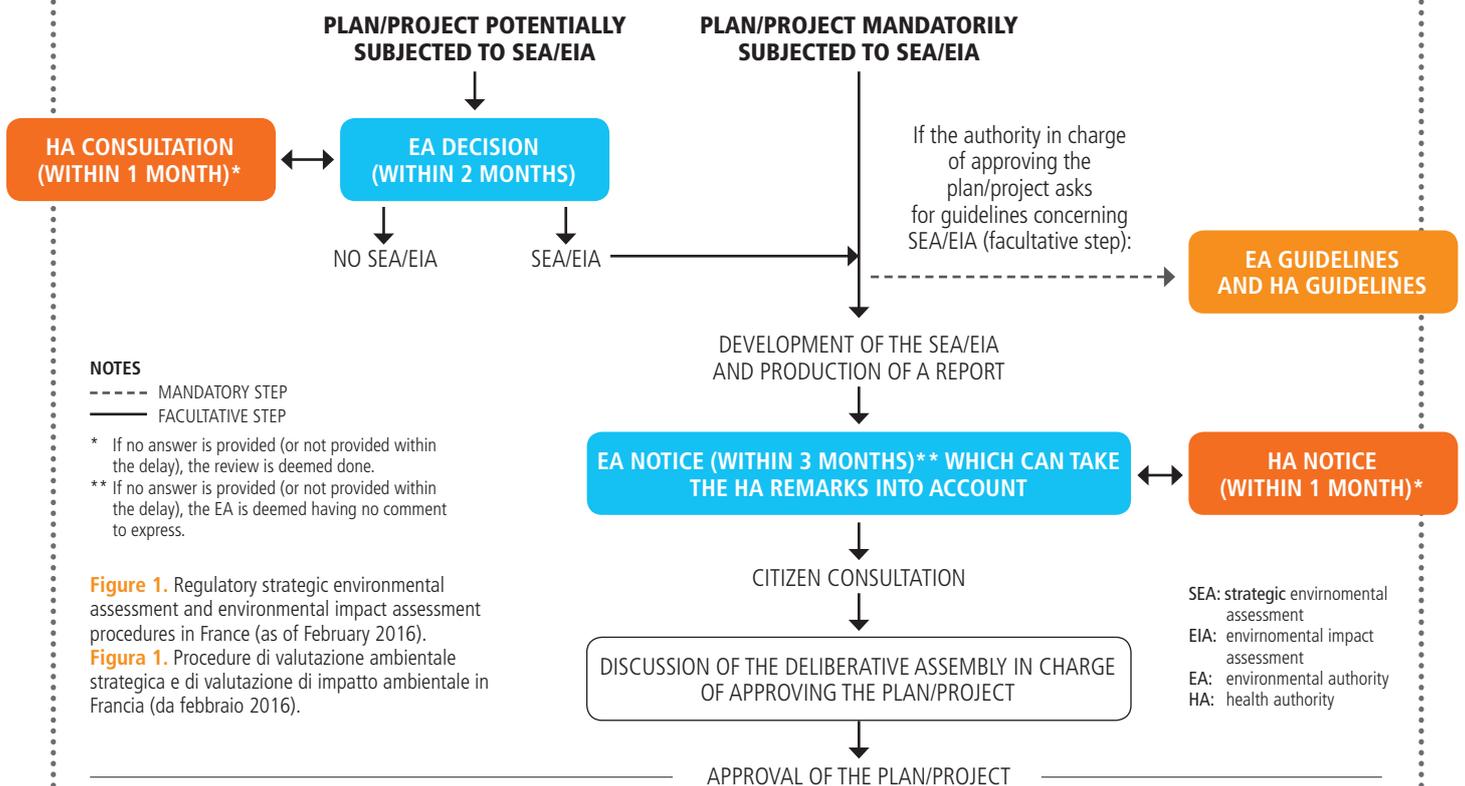


Figure 1. Regulatory strategic environmental assessment and environmental impact assessment procedures in France (as of February 2016).
 Figura 1. Procedure di valutazione ambientale strategica e di valutazione di impatto ambientale in Francia (da febbraio 2016).

THE EIA PROCEDURE IN FRANCE

As soon as 1976,²³ the French legislation required plans and projects to respect environmental considerations, and project impacts on the environment had to be analysed. Throughout the years, this assessment became more and more thorough with the transcription of EU directives. However, it was only in 1996²⁴ that health considerations started being taken into account in the EIA procedure applied to projects: the assessment had to include a health dimension. The corresponding legislation concerning plans (SEA), such as land-use plans, was increasingly implemented during the 2000s.

In France, the SEA and EIA procedures are, respectively, mandatory for plans and projects most likely to have an impact on environment and health: it is the case of most land-use plans and urban development projects. After the assessment is completed, the Environmental Authority (EA) reviews it and releases a notice, which contains the EA feedback on the quality of the assessment and on the inclusion of environmental and health considerations in the plan/project. In order to do this, the EA is required to consult a designated Health Authority (HA). The EA can take the HA remarks into account in its own notice. In the following step of the regulatory process, only the EA notice is made available to citizens for consultation. It is then discussed in the deliberative assembly in charge of approving the plan/project. In France, these SEA and EIA procedures are the only regulatory opportunity to analyse the plan/project impacts on health.

OBJECTIVE

The objective of this paper is to compare two health assessment tools developed in Italy and in France. These tools have been developed in order to help health agencies to analyse and evaluate the integration of health issues within land-use plans and urban development projects. This comparison aims to highlight differences and common aspects considering the two different legal contexts.

DESIGN

THE EVALUATION TOOL DEVELOPED BY POLYTECHNIC INSTITUTE OF MILAN (IT) FOR LOCAL HEALTH AUTHORITIES: THE HEALTHY URBAN PLANNING TOOL (HUP TOOL)

In the last twenty years several evaluation systems have been experienced in the field of regional and urban planning, such as the strategic environmental assessment, the environmental impact evaluation, the urban and social impact assessment, and the health and hygiene performance evaluations according to some regional laws.

Within this context, the Lombardy Region – with the Law No. 12/2005 – has asked to the LHA to provide a hygiene

and health evaluation of urban plans, that are acknowledged as responsible for health issues into urban plan approval procedures (Decision of the Regional Council – DGR No. 8/6053 of 05.12.2007). The opinion of the LHA should be delivered within 60 days starting from the plan submission to the town planning authorities. The goal of LHA involvement is to provide town-planning authorities with hygiene and health suggestions to address adequate actions aimed at enhancing public health and well-being. The innovation and effectiveness of regulations and hygiene and health performance evaluation have been restricted by the lack of a unique and objective methodology. Given this regulatory and law framework, an interdisciplinary working group (researchers of ABC/DASU Departments of Polytechnic Institute of Milan (Politecnico di Milano) and technicians of the Prevention Department of the LHA of Milan) has defined a multi-criteria evaluation tool, called Healthy Urban Planning Tool (HUP Tool), based on a set of performance criteria²⁵ in order to:

- support planners and designers in the achievement of health goals;
- overcome the traditional prescriptive regulations in favour of a performance and proactive approach.

The criteria have been selected according to different experiences of healthy cities projects and existing sets of sustainability criteria.

Several brainstorming activities and focus groups with the technicians of the LHA of Milan have supported the definition of the final assessment framework. Six different thematic issues have been investigated: 1. environmental quality and wellbeing; 2. waste; 3. energy and renewable resources; 4. mobility and accessibility; 5. land use and functional mix; 6. quality of urban landscape; each one divided into the following criteria: • air; • noise; • water; • ionizing and non-ionizing radiations (environmental quality and wellbeing); • solid waste management; • liquid waste management (waste); • energy consumption and monitoring; • passive technical systems for sustainability; • active technical systems for sustainability (energy and renewable resources); • distance to parks and local services;²⁶ • public transport system; • availability of pedestrian and bicycle paths; • links between existent mobility system and new settlements (mobility and accessibility); • functional and social mix; • urban density; • filtering areas; • protection of sensitive users; • hazardous and nuisance activities (land use and functional mix);²⁷ • quality of outdoor areas; • urban furniture; • visual comfort; • urban green areas; • parking areas (quality of urban landscape).

In order to support the assessment of urban plans and projects with reference to their health effects on public health and to address planning and design processes to

ISSUES	CRITERIA	PERFORMANCE VALUES
Air	Presence of pollution sources, coexistence of the following strategies: <ul style="list-style-type: none"> location of sensitive users is protected areas and far from the pollution sources; strategies to limit emissions at source and/or reduce the diffusion of pollutants 	Good
	Presence of only one of the strategies listed above	Critical
	Absence of the strategies listed above	Not sufficient
Noise	Presence of noise sources, introduction of the following strategies: <ul style="list-style-type: none"> location of sensitive users is protected areas and far from the noise sources; strategies to limit noise at source and/or reduce the noise transmission from fixed or mobile sources 	Good
	Presence of only one of the strategies listed above	Critical
	Absence of the strategies listed above	Not sufficient
Water	Coexistence of the following strategies: <ul style="list-style-type: none"> efficient water supply system reducing waste and saving drinking water 	Good
	Presence of an efficient water supply system	Critical
	Absence of the strategies listed above	Not sufficient
Ionizing radiations/ non-ionizing radiations	Presence and/or absence of possible sources of ionizing/non-ionizing radiations, coexistence of the following strategies: <ul style="list-style-type: none"> location of sensitive users and users with residence time higher than 4 hours away from ionizing/non-ionizing radiations; absence of sensitive users close to power lines; strategies aimed to remove or to mitigate ionizing/non-ionizing radiations 	Good
	Presence of only one of the strategies listed above	Critical
	Absence of the strategies listed above	Not sufficient

Table 1. Performance judgements for environmental quality and wellbeing at neighbourhood level of Healthy urban planning tool (HUP Tool) (authors' elaboration).

Tabella 1. Guidizi prestazionali per la componente qualità ambientale e benessere dell'Healthy Urban Planning Tool (HUP Tool) alla scala di quartiere (elaborazione degli autori).

encourage healthy lifestyles, each criterion has been described by an assessment factsheet that specifies the goal it drives to achieve, its impact on health, a performance evaluation scale tuned with reference to a benchmark, a selection of best practices supported by pictures, notes, and references. The performance values are expressed with a qualitative score that goes from 0 (inadequate performance) to 3 (good practice). Each score is explained by a reference judgement that points out the requirements that are mandatory to meet for reaching the highest score. The performance benchmark represents the minimal acceptable performance, as defined by regulations and laws. The achievement of the highest score depends on performances that are considerably in advance of current practice. Teams of experts define what this performance target has to represent according to the target that is potentially achievable following the current practices.

Such a performance evaluation scale can be considered the basis of the evaluation report delivered by the LHA of Milan, as well as a companion guide for designers and planners (table 1).

The overall score of each plan/project is given summing the score achieved at each level of the 6 thematic issues, which is in its turn given summing the score achieved at the lower level of each criterion. As the score achieved by each thematic issue is given by the average mean of the scores gained

in each criterion, the performance values of plans/projects are defined according to one of the following range:

- negative ($0 \leq \text{performance value} \leq 1,5$);
- critical ($1,5 < \text{performance value} \leq 2,25$);
- good ($2,25 < \text{performance value} \leq 3$).

In order to highlight weaknesses and strengths of the urban development proposals under evaluation and to point out corrective actions by effectively addressing health concerns, the final result of the HUP Tool is provided by different types of chart (figure 2): a spider diagram, that shows the score achieved by each thematic issue, and three kind of histograms, the first showing the overall score of the urban plan/project, the second focusing on the scores of the thematic issues, the last explaining the score achieved by each criterion.²⁸

Despite the absence of regulation that encourages the use of the tool, it is applied by several LHAs of the Lombardy Region. The strength of the tool lays in its performance and proactive approach. Differently from the typical prescriptive approach of Italian regulations, it introduces a new perspective focused on the explorative and constructive role of evaluation.

The multidimensional evaluation tool has been tested with reference to its relevance, adequacy, and applicability of the evaluation criteria in two cities of the Lombardy Region: Milan and Lecco.

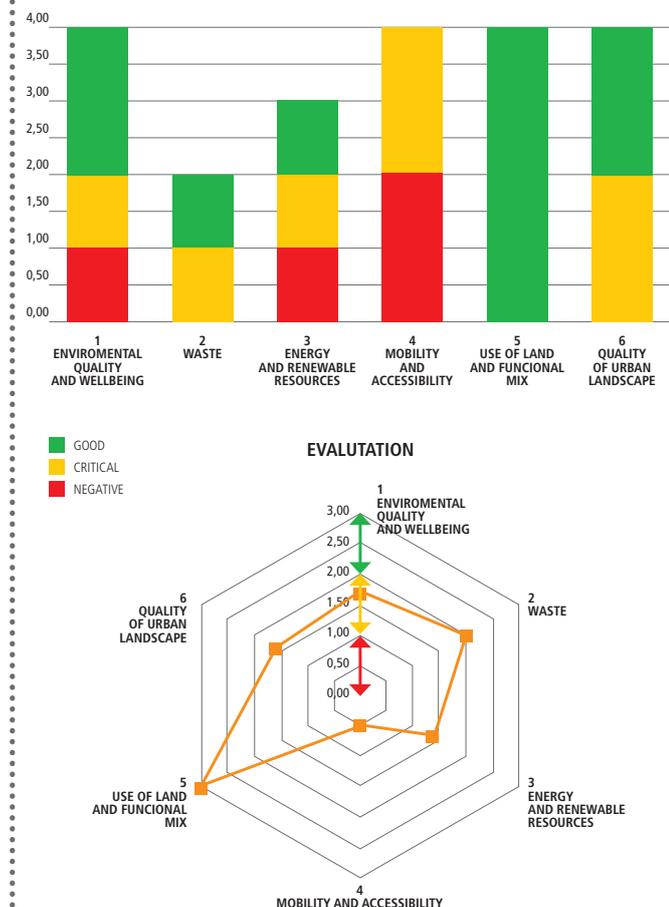


Figure 2. Output of the evaluation with HUP Tool (authors' elaboration).
 Figura 2. Grafici finali di valutazione tramite HUP Tool (elaborazione degli autori).

In Milan the HUP Tool has been introduced in 2011 and it is still in use. In Lecco it has been applied only for 1 year. To have a feedback of the effectiveness of the tool, a survey has been carried out through a short questionnaire administered to a sample of 21 technicians of LHAs who are regularly engaged in the evaluation of hygiene and health features of urban plans. The answers to the questionnaire confirm the validity and adequacy of the evaluation tool, whilst the applicability has been considered critical for some criteria. More in detail, the LHA of Lecco has found some criticalities about accessibility and public mobility system evaluation, whilst for the LHA of Milan the evaluation of «Energy and renewable resources» and of some criteria of «Quality of urban landscape» (specifically, Quality of outdoor areas, Urban furniture, Visual comfort) have been controversial for lack of information. This last finding highlights the need of rethinking 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 poten-

tial effects on public health. The development of a weighting system would improve the responsiveness of the evaluation tool to the hygiene and health issues and strengthen the effectiveness of the assessment process.

Regarding the instance of establishing operational relationships between LHAs and planners, no considerable reactions have been noticed, although the most part of the plans have been evaluated as critical, thus requiring corrective actions. On the basis of critical outputs given by the HUP Tool, the LHA of Milan has requested additional documents and project improvements in order to strengthen their effects on public health. Nevertheless, the evaluation tool is little attractive for urban planners and designers.

THE ANALYSIS TOOL DEVELOPED BY EHESP (FR) FOR REGIONAL HEALTH AGENCIES

In 2011²⁹ new entities, the Regional Health Agencies (RHA), are designated as the HAs for most plans and projects, including land-use plans and urban development projects. Their mission is to give a feedback to the EA regarding the inclusion of health considerations in the EIA report. The French Ministry of Health, therefore, commissioned the School for Higher Studies in Public Health (École des hautes études en santé publique, EHESP) to design a methodology in order to help RHA agents to carry out this task.

The elaboration of this methodology was led by EHESP researchers in coordination with the French Ministry of Health and with the support of an interdisciplinary working group composed of urban planning professionals, environmental health professionals, RHA agents, and academics. This research project resulted in a publication, containing: • clarification of major concepts; • a reference tool applicable to any plan/project and usable by any actor; • the analysis tool specifically designed for RHA agents. As the development of the research project went on, it was decided that this RHA analysis tool would be specifically dedicated to urban development projects. An adaptation of the RHA tool to land-use plans is currently being developed. The RHA tool is composed of an analysis matrix (an Excel file) and leaflets dedicated to each determinant of health to take into account in the analysis. The selected determinants of health are the following: • outdoor air quality; • water quality and management; • soil quality and management; • soundscape; • waste management; • electromagnetic fields management; • adaptation to climate changes and energy management; • mobility/transportation management and accessibility to amenities; • housing and urban design. For each determinants of health, criteria are detailed. Each leaflet sums up helpful information on each determinant: list of related documents (prescriptive or not), regulatory

INPUT DATA		ASSESSMENT (TEMPORARY IMPACTS)				ASSESSMENT (PERMANENT AND CUMULATED IMPACTS)			REVIEW				
1	2	3	4	5	6			7	8	9	10		
Determinant of health	Assessment criteria	Initial state of the environment	Temporary impacts	Measures taken to avoid, reduce, compensate temporary impacts	Characterization of temporary impacts and measures taken			Permanent and cumulated impacts	Measures taken to avoid, reduce, compensate permanent and cumulated impacts	Characterization of permanent and cumulated impacts and measures taken			Comments and recommendations
					-	0	+			-	0	+	
1. Outdoor air quality	Sources of emission of air pollutants (mitigation)												
	Quality of outdoor air (preservation and improvement)												
	Olfactory nuisances (mitigation)												
	Allergenic species (reduction)												

Table 2. Extract of the analysis matrix (FR tool) «Table No. 2 – Outdoor air quality». **Tabella 2.** Matrice di analisi (tool francese) «Tabella n. 2 – Inquinamento dell'aria».

thresholds, and indicators the RHA agent can lean on. The Excel matrix is organized around 11 tables. The first step (the first table of the 11) is to report the main characteristics of the territory, as well as the important health issues to take into account.

The following tables (from the 2nd to the 10th) are dedicated to a determinant of health each, detailed in several assessment criteria (table 2).

For each determinant, the agent proceeds to report the initial state of the environment, allowing him to appreciate the thoroughness of the assessment report and to highlight the critical aspects of the territory.

The third step is to report the list of temporary impacts of the projects (during the construction period) and to report the measures to reduce, avoid or compensate them. The agent can make further recommendations, if needed. Finally, the agent can characterise, for each criterion, the quality of the assessment report and the inclusion of health considerations in the project according to three levels: negative, null or positive. The fourth step follows the same analysis process applied to permanent and cumulated impacts. A final column list comments and recommendations regarding each determinant. Having previously characterised the inclusion of each criterion in the report and in the plan/project, the agent has highlighted both critical and positive aspects, which helps him/her to formalise comments and recommendations for each determinant of health. In the end, the agent can put the considerations concerning each determinant into perspective (table 11 of the Excel matrix).

After being tested with students and professionals, the tool was widely released in 2014, accompanied by a note of the French Ministry of Health to all RHA where he encourage the use of this method as well as to consult the whole publication.³⁰

The tool requires a period of familiarisation. Several professional training sessions have been conducted, an online course including a real case study was created, and some RHAs have set up group work sessions around this online course. During the first few applications of the tool, the agent will spend more time than usual writing health notices. However, agents who have overcome this phase report that it was a positive investment of time and that they now proceed at a much faster pace.

The tool was built in a way that each agent can adapt it in order to fit his/her constraints. This is the reason why the matrix was distributed in Excel format.

RESULTS OF THE COMPARISON

SOME DIFFERENCES BETWEEN THE TWO APPROACHES, DUE TO LOCAL REGULATORY SPECIFICITIES

Given the specificities of the regulatory process and of the planning procedures in Italy and France, the two tools bear some differences, for instance the type of plan/project the tool can be applied to and the scoring system.

The Italian tool can be applied to both city-scale and project-scale land-use plans. The French tool, however, is specific for the analysis of urban development projects. This is due to the specificities of urban planning procedures in each Country.

In Italy, the evaluation of urban development projects rests on the formalisation of a new land-use plan. Therefore, both in the case of city-scale and in the case of the project (neighbourhood scale), the type of file the LHA received and evaluated was the same. In France, however, the analysis of an urban development projects is not applied to the modification brought to the land-use plan: the analysis is carried on a report specifically written by the operator in charge of the project in the perspective of the EIA. Therefore, the RHA receives two very different files whether it has to analyse a city-scale land-use plan or a neighbourhood-scale development project. The adaptation of this tool so it can be applied to city-scale land-use plan is currently being elaborated.

The second important difference between the two tools is the scoring system. As previously stated, the Italian tool is structured around a scoring system applied to each criterion, which leads to a global score for the plan/project. This scoring system is necessary because the LHA's opinion can be «favourable» or «unfavourable» to the plan/project.

The French tool does not contain a similar scoring system, precisely because the RHA's notice cannot legally be «favourable» or «unfavourable» to the plan/project, but it can only contain comments and recommendations, which will be transmitted to the EA. The EA, then, writes its own notice which is «favourable» or «unfavourable» to the plan/project (figure 1).

Therefore, the Italian tool can be considered as a fully evaluative one, whereas the French tool is more an analysis method to express comments and recommendations.

TOWARDS A SHIFT IN PRACTICE: PROMOTING A SYSTEMIC APPROACH TO THE DETERMINANTS OF HEALTH

The divergence points are mainly due to the specificities of local urban planning and procedures. Despite this, some clear similarities appear when comparing the two approaches.

First of all, both tools are based on a systemic approach to determinants of health, which introduces a significant change for RHAs and LHAs, stepping away from an approach solely focused on the environmental determinants of health. These tools do not focus only on the reduction of risks and on prevention: they also give a large consideration to health promotion. Less familiar criteria for RHA and LHA agents, such as functional mix or urban design, are therefore included. Furthermore, they underline the need for an evaluation which integrates both quantitative and qualitative indicators (i.e., mixed-methods). In this perspective, it is also important to underline the positive aspects of the plan/project.

The incentive to make a shift in practice leads to the sec-

ond important convergence point: both tools do take part in a learning process of environmental health professionals to urban planning considerations. For instance, we noticed that agents do not fully understand the planning process and its stages. Therefore, they are not always able to place the moment of the EIA in the larger plan/project timing as well as understand the legal capacity of the said plan/project. This sometimes results in difficulties in making comments and recommendations that are relevant for the entity in charge of the plan/project. These tools are a step towards a better understanding of these public health professionals of urban planning stakes and procedures.

CONCLUSION

Environmental impact assessment, strategic environmental assessment procedures, and RHA/LHA evaluation are a relevant way to reduce the negative impacts of land-use plans and urban development projects on human health.

In addition to supporting the assessment task of health agency technicians, the two approaches can be considered as innovative answers to the instances emerged in the field of public health over the past two decades. These approaches allow:

- to define an overall picture of a city health and quality of life;
- to set local priorities and urban planning goals according to the WHO point of view;
- to monitor advancements by evaluating changes over time (only for the Italian tool);
- to increase public awareness about the link between quality of built environment and public health;
- to grow the opportunities for a more effective cross field of work and training among urban planners and public health professionals.

However, these evaluation procedures can take place when the plan/project is already at an advanced stage. In order to maximise the beneficial impacts on health and minimise the negative impacts, we also need to consider other levers such as the health impact assessment methodology defined by the Gothenburg consensus paper,³¹ earlier implication of public health professionals and building the grounds for a common culture among the fields of public health, of environment and of urban planning.

On a long-term perspective, it is expected that a wide use of such assessment tools will provide a better knowledge about the multidimensional nature of health, all its determinants and their combined effect over time, and that it will give a relevant contribution for better integrating the issue of health into urban planning policies.³²

Conflict of interest disclosure: the authors declare they have no conflict of interest.

REFERENCES

1. Capolongo S, Buffoli M, di Noia M, Gola M, Rostagno M. Current scenario analysis. In: Capolongo S, Bottero MC, Buffoli M, Lettieri M (eds). *Improving sustainability during hospital design and operation: a multidisciplinary evaluation tool*. Cham, Springer, 2015; pp. 11-22.
2. Lawrence R. Urban health: a new research agenda? *Rev Environ Health* 2000;15(1-2): 1-11.
3. Galea S, Vlahov D. Urban health: evidence, challenges, and directions. *Annu Rev Public Health* 2005;26:341-65.
4. Hancock T, Duhl L. *Healthy cities: Promoting health in the urban context*. Copenhagen, WHO Regional Office Europe, 1986.
5. Capolongo S, Buffoli M, Oppio A, Petronio M. Sustainability and hygiene of building: future perspectives. *Epidemiol Prev* 2014;38(6) Suppl 2:46-50.
6. Whitehead M, Dahlgren G. What can be done about inequalities in health? *Lancet* 1991;338(8774):1059-63.
7. Bottero MC, Buffoli M, Capolongo S et al. A multidisciplinary sustainability evaluation system for operative and in-design hospitals. Capolongo S, Bottero MC, Buffoli M, Lettieri M (eds). *Improving sustainability during hospital design and operation: a multidisciplinary evaluation tool*. Cham, Springer, 2015; pp. 31-114.
8. Duhl LJ, Sanchez AK. *Healthy cities and the city planning process*. Copenhagen, WHO Regional Office for Europe, 1999.
9. D'Alessandro D, Buffoli M, Capasso L et al. Green areas and public health: improving wellbeing and physical activity in the urban context. *Epidemiol Prev* 2015;39(4) Suppl 1:8-13.
10. Barton H, Tsourou C. *Healthy urban planning: a WHO guide to planning for people*. London, Spon press, 2000.
11. Barton H, Grant M, Guise R. *Shaping neighbourhoods: a guide for health, sustainability and vitality*. London, Spon press, 2003.
12. Frank LD, Engelke PO, Schmid TL. *Health and community design: the impact of the built environment on physical activity*. Washington, Island Press, 2003.
13. Edwards P, Tsouros A. *Promoting physical activity and active living in urban environments: the role of local governments*. Copenhagen, World Health Organization Europe, 2006.
14. Rao M, Prasad S, Adshad F, Tissera H. The built environment and health. *Lancet* 2007; 370(9593):1111-13.
15. Barton H. Land use planning and health and well-being. *Land use policy* 2009;26(S1): 115-23.
16. Vlahov D, Freudenberg N, Proietti F et al. Urban as a determinant of health. *J Urban Health* 2007;84(3) Suppl:16-26.
17. Roué-Le Gall A, Le Gall J, Potelon JL, Cuzin Y, EHESP/DGS (eds). *Agir pour un urbanisme favorable à la santé. Concepts & outils*. Paris, EHESP, 2014. Available from: <http://www.ehesp.fr/wp-content/uploads/2014/09/guide-agir-urbanisme-sante-2014-v2-opt.pdf>
18. Bhatia R, Wernham A. Integrating human health into environmental impact assessment: an unrealized opportunity for environmental health and justice. *Environ Health Perspect* 2008;116(8):991-1000.
19. Roué-Le Gall A, Legeas M. De nouvelles obligations réglementaires en France en matière d'évaluation environnementale: une opportunité à saisir pour promouvoir une approche systémique de la santé? *Vertigo: la revue électronique des sciences de l'environnement* 2014. Available from: <https://vertigo.revues.org/14960>
20. Directive 2011/92/EU; Directive 2001/42/EC
21. Capolongo S, Buffoli M, Oppio A, Nachiero D, Barletta MG. Healthy indoor environments: how to assess health performances of construction projects. *Environmental Engineering and Management Journal* 2013;12(S11):209-12.
22. Capolongo S, Buffoli M, Oppio A, Rizzitiello S. Measuring hygiene and health performance of buildings: a multidimensional approach. *Ann Ig* 2013;25(2):151-57.
23. French law No. 76-629 of 10.07.1976.
24. French law No. 96-1236 of 30.12.1996.
25. Capolongo S, Battistella A, Buffoli M, Oppio A. Healthy design for sustainable communities. *Ann Ig* 2011;23(1):43-53.
26. Buffoli M, Bellini E, Bellagarda A, di Noia M, Nickolova M, Capolongo S. Listening to people to cure people: The LpCp-tool, an instrument to evaluate hospital humanization. *Ann Ig* 2014;26(5):447-55.
27. Alfonsi E, Capolongo S, Buffoli M. Evidence based design and healthcare: an unconventional approach to hospital design. *Ann Ig* 2014;26(2):137-43.
28. Capolongo S, Buffoli M, Oppio A. How to assess the effects of urban plans on environment and health. *Territorio* 2015;(73):145-51.
29. Italian Decree No. 2011-210 of 24.02.2011.
30. Informative note No. DGS/EA1/2015/6 of 05.01.2015
31. World Health Organization. Health Impact Assessment: main concepts and suggested approach. Gothenburg consensus paper, December 1999. Brussels, European Centre for Health Policy, 1999.
32. Lawrence RJ, Fudge C. Healthy Cities in a global and regional context. *Health Promot Int* 2009;24 Suppl 1:i11-18.