

Evaluation of Urban Processes on Health in Historic Urban Landscape Approach: Experimentation in the Metropolitan Area of Naples (Italy)

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Paola Carone, Pasquale De Toro, Alfredo Franciosa

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ABSTRACT

Purpose: Experimentally apply the Health Impact Assessment (HIA) to the Historic Urban Landscape (HUL) approach according to the socio-ecological model of the World Health Organisation (WHO), where health is defined as “a state of complete physical, mental and social wellbeing and not simply the absence of disease and illness” (1986).

Methodology/Approach: The methodology considers the application of HIA, a multi-criteria evaluation approach capable of organising knowledge concerning the effects that projects, plans and programmes impose upon the wellbeing/health of an urban community. The case study is the metropolitan area of Naples and it considers a system of evaluation to support the drafting of the new instrument for the territorial governance: the Territorial Metropolitan Plan.

Findings: The research has developed through the identification of the “social determinants of health” and in the construction of a set of indicators implemented in a Geographic Information System (GIS), able to identify and to cartographically represent homogeneous landscape units of health.

Research Limitation/implication: The virtuous connection between health and conservation, proposed in the method applied to the case study, is completely experimental because there are no other similar experiences in literature.

Originality/Value of paper: The paper opens a prospect of research for the better understanding of spatial phenomena, creating new tools based on new technologies.

Category: Research paper

Keywords: Health Impact Assessment; Historic Urban Landscape; regeneration; wellbeing; metropolitan planning

1 INTRODUCTION

The issues that affect individual and collective wellbeing/health, adopting a landscape approach to the historical context of the urban landscape (UNESCO, 2011, p.9), are transversal. Therefore, they invite the investigation of the impact on a multidimensional level. A state of complete physical, mental and social wellbeing means the combination of social, environmental and economic factors, affecting the subjective and objective perception of a “safe” life. In this way, it is able to produce conditions (Hancock, Labonte and Edwards, 2000) of liveability in the built and natural landscape; social conviviality (contentment with oneself and others); economic prosperity; sustainability of material resources; habitability of places and vitality of socio-economic relations and equality of rights.

These factors are identified in the literature as “social determinants” of health and they include “experiences of the first years of life, education, economic status, employment and decent work, housing and environment and effective systems for the prevention and treatment of diseases” (WHO, 2011, p.6). The typological interpretation of determinants is extensive and extremely complex, due to the nature of health, according to the subjective perception and objective experience of a population that lives and interacts in a historical urban area of “cultural and natural values and traits” (UNESCO, 2011, p.8).

Following this logic, the UNESCO approach regarding Historic Urban Landscape (HUL) represents an effective strategy to activate a process of urban regeneration, based on participatory governance of cultural heritage and able to convey the impact of urban multidimensional processes on human development (D’Auria, 2009).

“The Historic Urban Landscape approach aims at preserving the quality of the human environment and enhancing the productivity of urban spaces. It integrates the goals of urban heritage conservation with the goals of social and economic development. It is rooted in a balanced and sustainable relationship between the built and natural environment” (UNESCO, 2011, p.3, art.12).

Considering HUL from the perspective of the promotion of wellbeing/health means recognising not only use values but, as stated by Sen (1999), “that the income level is not an adequate indicator of important issues, such as the freedom to live a long time, the ability to escape from preventable diseases, the possibility of finding a decent job or to live in a peaceful community, free from crime”. Therefore it must also consider a number of intrinsic values that contribute to the quality of life and motivate people’s actions, opening the field of assessing the needs of social groups below the minimum income threshold, the needs of future generations, the natural environment and animal species, in line

with the conceptualisation of the Complex Social Value (Fusco Girard and Nijkamp, 1997).

The strategies to maintain or improve wellbeing/health represent an exceptional trigger point of regenerative community-based urban processes on which the HUL approach should rely, even before the targeted strategies for income, as the economic performance and the attraction of a landscape are closely linked and dependent on the quality of life and relations perceived therein (D’Auria and Monti, 2013).

2 THEORETICAL OVERVIEW

2.1 The multidimensional approach to wellbeing in the historical landscape: the “social determinants”

It is important, considering that the HUL approach impacts on wellbeing, to focus on all the factors (social, economic, cultural, physical, etc.) that can generate an outcome on (Hancock, Labonte and Edwards, 2000):

- satisfying basic needs for all,
- achieving adequate levels of economic and social development,
- the ability to weave social relations based on mutual respect and support,
- the liveability and sustainability of the landscape of life (built and natural).

These factors are identified in the literature as “social determinants” of wellbeing/health and they include “experiences of the first years of life, education, economic status, employment and decent work, housing and environment and effective systems for the prevention and treatment of diseases (WHO, 2011, p.6). Barton and Grant (2006) systematise the general categories of social determinants at the neighbourhood level, the urban landscape and ecosystem level, highlighting the complexity of the factors that can materialise synergistically. At the centre of the discussion is the human being, with biological characteristics.

The model reveals a hierarchy of values between the different determinants in which more external factors, those representing the context of life, affect health. Therefore, the conditions of the natural and built landscape, impacting on business and social processes, have a strong influence on the local economy, the lifestyle of a community, quality of life and ultimately, on the wellbeing of people.

Scott-Samuel’s, Birley’s and Arden’s (1998) studies on the categories of determinants on an urban scale are an example of possible indicators. They can also be a starting point to adapt the approach to the HUL (Tab. 1).

The typological interpretation of these determinants is extensive and extremely complex due to the values of wellbeing, according to the subjective perception and objective experience of the population living and interacting in an historical urban area of “cultural and natural values and traits” (UNESCO, 2011, p.8).

Table 1 – Categories of determinants and indicators (Source: Scott-Samuel, Birley and Arden (1998))

Determinants on health	Examples of indicators
Biological factors	Age, sex and nutritional factors
Family and personal background / lifestyle	Family structure and its operation, primary, secondary and adult education, employment, unemployment, risk behaviours, diet, smoking, alcohol, abuse of substance, physical activity, recreation and transportation
Social environment	Culture, conflicts between different interests, discrimination, social support (neighbourliness, social networks, isolation) the sense of community, participation in cultural and spiritual life
Physical environment	Air, water, conditions of housing and the workplace, noise, odours, visual environment, public safety, design of urban space, shops (location, range and quality), transport (road and rail), land use, waste disposal, energy and characteristics of the local environment
Public services	The access to and quality of primary, secondary and community healthcare, childcare, social services, housing, leisure, social services and employment, public transportation, security services, other public health agencies relevant to the third sector and legal services
Public policy	Trends of economic, social and environmental health, priorities of policies, programmes and projects at the local and national level

Therefore, one of the aims of the “tools of civic engagement”, promoted by UNESCO Recommendations (UNESCO, 2011, p.24a), is to stimulate stakeholders to identify not only the complex values of the urban area but also to decipher all those multidimensional factors that, individually or synergistically, may affect the conditions of the community’s wellbeing.

2.2 Operational tools to implement HUL approach

In UNESCO Recommendations on HUL, there is an explicit reference to “the need to provide for the monitoring and management of change to improve the quality of life” (UNESCO, 2011, p.24b). However, the question is still open and it considers some specific evaluation tools that should, undoubtedly, be multi-criteria, based on meta-economic (quantitative and qualitative) indicators, chosen on the basis of the recognition of complex values and “social determinants” of health in the urban landscape. In a more analytical way, this evaluation tool should be able to:

- *address* integrated and multidimensional issues at different scales in HUL;

- *define* the meaning and values of urban processes, according to the practical experience of a community in a specific area and related to “social determinants” that can affect people;
- *identify* the indicators and their interpretation from the perspective of promoting human health;
- *evaluate* in a multi-criteria way to study the intensity of urban processes on health determinants;
- *monitor* the impacts of the alternative “action” to take on the “determinants of health”, with some medium to long-term effect, and define a list of priorities or rework new “actions” to maximise the benefits for all social groups.

To assess the possible impacts of a regenerative process of HUL on health, it is important to develop an appropriate matrix of indicators able to monitor those multidimensional factors involved in the “social, cultural and economic aspects of conservation of urban values” (UNESCO, 2011, p.4a). It must, firstly, recognise the key factors (tangible and intangible, economic, social, physical, cultural, etc.), or the “social determinants”, through which to trace the complex values of the wellbeing of a population, characterised by a community-based approach to the investigation. From a collection of academic research and applications of case studies, a number of these typological “social determinants” could be defined in the following list and considered the basis of different evaluation experiences for urban transformation:

1. safety;
2. education;
3. social services and health;
4. power and local products;
5. social cohesion and local democracy;
6. social peace;
7. employment and income;
8. transportation;
9. quality housing;
10. public spaces;
11. culture and leisure;
12. quality of the built and natural landscape.

While the list of psychophysical determinants and their approach to wellbeing is based on value judgments inevitably linked to personal lifestyle, there is a consensus in affirming that the “holistic” quality of the welfare of the community

in a landscape mainly depends on its perceived safety. This concerns the offer of services in support of basic needs for the performance of daily activities (social services, health, nutrition proximity); the formation of human capital; the cohesion of the share capital in the participation of decision-making in order to reduce conflict and give everyone an equal opportunity to a safe and healthy life; the right to work; to decent housing and living standard materials of households (income, consumption); accessibility to public spaces and cultural heritage/landscape; the vitality of culture and leisure and the quality of the built and natural landscape in which they develop social relationships around these issues. The analysis of the “status quo” of each determinant and reporting of related changes, due to a transformative process, requires the use of appropriate quantitative and qualitative indicators suitable for the scale of the HUL, to detect objective data from surveys and subjective data interpretation of the stakeholders’ perceptions through appropriate methodologies.

3 METHODOLOGY

3.1 Health Impact Assessment, experimental approach to integrate heritage conservation with human wellbeing

The Health Impact Assessment (HIA) is a multi-criteria evaluation approach capable of organising knowledge regarding the effects that projects, plans and programmes can have on the wellbeing/health of an urban community. Its mission, in fact, is supporting policy makers in the analysis of potential impacts of the physical transformations on “social determinants” and to identify the most effective solutions for an equitable distribution of benefits to all social groups. As such, the potential of HIA is to facilitate the activation of integrated planning strategies, bringing together all urban sectors, to pursue local objectives of sustainable development, broad and inclusive (as supported by the United Nations summit in Rio de Janeiro, 1992) placing human beings at the centre (Breeze and Lock, 2001). The main reference for the definition of HIA is the document drawn up in 1999, in Gothenburg, by the European Centre for Health Policy. It reads: “The Health Impact Assessment is a combination of procedures, methods and tools with which one can estimate the potential effects on the wellbeing/health of a population caused by policy, plan or project and the distribution of those effects within the population” (WHO, 1999). The development of this tool originated at the end of the 1980s. The Ottawa Charter, in 1986, recalled the urgent need for “a systematic assessment of the health effects of a rapidly changing environment of life - particularly in the areas of technology, work, energy production and urbanisation”. The HIA focuses on urban factors that can undergo a series of changes (social, economic, environmental, cultural) upon which the community’s state of wellbeing/health is highly dependent.

In urban areas, recognising the wellbeing/health of the community as a complexity of values, it is necessary to adopt the holistic conceptual model of “Merseyside” (Scott-Samuel, Birley and Arden, 1998; Quigley and Taylor, 2003), which monitors the impacts of physical and spatial transformations of the landscape, analysing the social determinants of wellbeing/health. There are three operational models to the evaluation, distinguished by methods, phases and characteristics:

- *Model 1.* Proposed by Scott-Samuel, Birley and Arden (1998) and accepted in foreign countries, the “Merseyside model” is based on the health of a socio-economic development, focusing on the analysis of the determinants of health that influence the welfare of the community. The HIA, developed through “bottom-up” processes, includes the participation of all possible stakeholders to promote a democratic process (Cole and Fielding, 2007) in the definition of the categories of determinants and the set of indicators around the project to be undertaken. This ensures greater consensus in the decision-making phase of the project.
- *Model 2.* The evaluation methodology developed in Germany, recognised as the “Bielefeld model”, is closely associated with biomedical health, using the collection of scientific evidence of a quantitative nature. In this approach, the evaluation follows a similar process and Environmental Impact Assessment techniques are used for risk assessment with extensive use of mathematical models. Monitoring is, in this case, an integral part of the assessment of the project in order to compare the risk estimates with the results of the actions taken.
- *Model 3.* The methodology came out of an investigation into health inequalities, disclosed as the “Acheson model” and is widespread in the United Kingdom for the evaluation of policies (Acheson, 1998). It is directed especially at the health sector, with particular emphasis on equity and distributive effects of health services. As for the Anglo-Saxon model, this approach is based on bottom-up participation, recognising the community decision-making ability and leadership throughout the course of the evaluation.

Beyond these models, commonly used and promoted in the literature of case studies, central passages of the evaluation are often incomplete (Wright, Parry and Mathers, 2005; Mohan, et al., 2006). There are reasonable grounds for believing that the best approach is to be developed ad hoc, based on the conditions and needs of the case and the local community. In fact, applying HIA is uniquely determined by local factors, such as:

- a) the state and the complexity of the policy, programme or project;
- b) whether HIA is to be taken before, during or after adopting decisions on policy, the programme or project;
- c) the likelihood of impacts on health;

- d) the establishment of values that define the “category” health for the local community;
- e) the definition of the determinants that affect the local community’s wellbeing;
- f) the construction of meta-economic indicators that investigate the determinants of health;
- g) the extent and severity of the impacts;
- h) the human resources available to conduct the evaluation process;
- i) the quality of basic data and data availability;
- j) priorities and health targets that local politics will pursue.

Whatever the approach, it should definitely be rigorous, systematic, participatory and transparent. The procedure commonly adopted is based on a methodological process marked by five stages, where the action is preceded by evaluation consultative activities/knowledge, followed by communication of the activities results and finally, the monitoring of the impacts of the alternative action choice by appropriate decision makers. The five stages are, in particular:

1. *Screening*: represents the first phase of problem finding, based on mostly dialogic activities. It determines the programme, plan or project under consideration and may have an impact on welfare/health and define whether it is appropriate to initiate an evaluation procedure.
2. *Scoping*: constitutes the steering group (composed of representatives of the public sector, by stakeholders, the third sector and the private sector) through which complex values of wellbeing/health on the urban landscape identify its categories of “social determinants”. Also, some operating procedures must be adopted to assess the impacts through a multi-criteria approach, taking into account participatory activities to the community perception of the quality of the transformations, and quantitative measuring methods, objectively communicating the impacts.
3. *Assessment*: is the central and operating body of HIA, making use of the integration of qualitative and quantitative assessments based on the indicators defined in the meta-economic phase scoping. The following procedures are discussed to:
 - a. identify the profile of the community;
 - b. apply the most suitable methodology for participatory learning from perceptions, knowledge, opinions of the community involved, the possible qualitative impacts (through focus groups, workshops, interviews, surveys);
 - c. support the previous assessment to quantitatively estimate and communicate the relationship between the variation of the physical-

spatial conformation of the urban landscape and the increase/decrease of welfare (socio-economic surveys of the change in the local real estate market, the profit of the small-medium enterprises, income, etc.);

- d. determine a preference for alternative actions, useful to support policy-makers through a final report, or develop a new proposal which can better integrate the issues raised and the equitable distribution of the benefits.
4. *Declaration of influence*: filed in a statement to demonstrate how the HIA has influenced the process decision-making based on empirical evidence (ensuring its validity and reliability). This document will demonstrate the effectiveness or otherwise of the evaluation process performed in the following monitoring phase, checking the consistency of the impact produced by the project.
 5. *Monitoring and evaluation*: ongoing, the goals and expectations set by previous impact multi-criteria evaluation are achieved in the medium to long-term, or if the expected positive effects, wellbeing/health and fair distribution of the benefits have been strengthened and negative effects were minimised.

The potentiality detected in HIA methodology is to start multi-criteria evaluations to compare the social determinants of health related to the landscape heritage (natural and built), urban activities, the local economy, the community and its lifestyle. In a hierarchical process, codes of relatedness between landscape, society and people are affected. The operational activities have allowed the development of new information and evaluation system to support the Metropolitan City of Naples' sustainable planning.

3.2 An operational experiment applied to the metropolitan area of Naples

HIA is tested through the case study of the Metropolitan Area of Naples (Italy). The objective is to support political decisions in drafting the new Metropolitan Territorial Plan Law (as considered by the Italian Law No. 56/2014), interpreting the environment through UNESCO approach from the perspective of health promotion, highlighting landscape units and homogeneous areas in need of the special intervention of sustainable scenarios (D'Auria and Pugliese, 2013).

The HIA methodological process starts with the phases of "screening" and "scoping"; considering the territorial characteristics to recognise the HUL according to the attributes defined by UNESCO (2011, art.10): "the wider context includes the site's topography, geomorphology and natural features; its built environment, both historic and contemporary; its infrastructures above and below ground; its open spaces and gardens; its land use patterns and spatial organization; its visual relationships; and all other elements of the urban

structure. It also includes social and cultural practices and values, economic processes, and the intangible dimensions of heritage as related to diversity and identity”. This interpretation considers the urban context as the result of a historical layering of cultural and natural values resulting from the complex social, economic, environmental processes and expressed by the tangible and intangible heritage according to two criteria:

- *diversity*: the unique and irreproducible characters;
- *identity*: the people, the municipal and the metropolitan community recognise themselves; they build their lifestyle by adapting to daily challenges to lead a healthy and productive life.

The conservation of the heritage might suggest the development of regenerative strategies, able to convey the principal objective of the Statute of the Metropolitan City of Naples (art. 1(2)): “making cities and settlements inclusive, human, safe, durable and sustainable”, in line with the eleventh Goal of the 2030 Agenda for Sustainable Development. The first step of the experimental method proposed in this paper then, is to understand the different features of the physical-spatial and intangible attributes (topography, geomorphology, hydrology, natural features, the built environment historical and contemporary, infrastructure above and below ground, the open spaces and gardens, the land use and spatial organisation, perceptions and visual relationships, practices and social and cultural values, economic processes, the intangible dimensions) which allow to recognise, according to UNESCO approach, the Historic Urban Landscape of the Metropolitan Area of Naples.

The land area occupies 1,171 km²: 8 % of the Campania region. It has all 53.4 % of the population of the Region and is the most densely populated province of Italy (3,118,149 inhabitants surveyed by the Italian Institute of Statistic in 2014). It is bordered in the north by the provinces of Caserta and Benevento, in the east by the province of Avellino and the south-east by Salerno. It overlooks the Tyrrhenian Sea to the west and south and is also characterised by the presence of three anthropised islands: Ischia, Capri and Procida. The territory is administratively divided into 92 municipalities, with variable geographical areas:

- 60 % of the municipalities are small (inferior or equal to 10 km²);
- 36 % are medium-sized (> 10 km² and ≤ 25 km²);
- the remaining 11 % are over 25 km² and, of this, only Acerra and Giugliano are between 50 and 100 km² while Naples exceeds 100 km².

The components of cultural interest, landscape and economics, as well as its strategic location in the Mediterranean, make the area very attractive for tourism and entrepreneurship, but at the same time it is characterised by a strong propensity to hydrogeology and a high volcanic risk in the most densely populated areas. In addition, the management policy of urban areas has caused a

number of negative impacts at the expense of the physical-spatial quality and the health of the inhabitants.

All the research carried out was by the judgement of experts concerning the characteristics and quantitative parameters of the landscape (Daniel and Vining, 1983; Dakin, 2003) and of particular interest were the reports and dossiers that have tried to bring out a wealth of knowledge on the perception and the needs of people (Censis, 2014). After the operating framework of the HUL in the metropolitan area, all the influential factors on the “state of complete physical, mental and social wellbeing” (WHO, 1986) of the population, e.g., the “social determinants of health”, were identified. It was decided to take 11 of the 12 social determinants of health found in the literature and presented in paragraph 2.2, to integrate the crucial issues unearthed by expert analysis in the analysed reports. The determinant “built and natural landscape” has been treated according to two spatial depth levels:

1. built and natural landscape at the municipal level, referring to the physical and spatial attributes of the urban environment within the administrative borders;
2. built and natural landscape at the metropolitan level, covering the structural attributes of the Historic Urban Landscape which, with their characteristics, directly and/or indirectly affect human activities and the socio-economic characteristics of the whole area.

The social determinants of health were then grouped and classified hierarchically by territorial aspects, also called “themes”, and the collective and individual health is the result of complex interactions of special physical-spatial qualities and of activities and socio-economic processes. Therefore, as pointed out by the WHO (2012), it may be investigated not only for its clinical aspects but it requires a multidimensional approach to the social aspects of proposed determinants of health. To do this it was necessary to prepare, for each social determinant of health, a matrix of indicators comparing three levels of investigation of HUL (Tab. 2):

- Provincial level, analysing the physical-spatial structural characteristics, the equipment and importance of provincial infrastructure;
- Municipal level, focusing on each of the 92 municipalities;
- Census areas, detailing the scale information of the neighbourhood or neighbourhood’s aggregates.

Based on the statistical and administrative sources, two databases were processed; the quantitative information of each indicator has been tabulated in them. The first database covers municipal indicators; the second details the indicators of the scale of Census Areas.

To facilitate the management and subsequent analysis of heterogeneous data (around 6,500), a Geographic Information System (GIS) has been employed

(Burrough, 1986; Murgante, 2008). The map projection is UTM (Universal Transverse of Mercator) and datum is WGS (World Geodetic System) 1984, 33North. A rasterisation process was proposed by which the data is mapped, with respect to the administrative borders, and classified into a range of five quantitative measurements at regular intervals (equal interval) and ascending, on the basis of the significance of emerging phenomena. Each pixel cell expresses information relating to spatial surfaces, with dimensions of 100 meters by 100 meters. This process - synthesized in Fig. 1 - was used to generate 77 thematic maps through which the actual values reported by each indicator of the determinants of health can be seen and to start a first comparative reading of the information in the large metropolitan area (Fig. 2).

Table 2 – Themes, determinants, indicators and spatial scales

Urban Sector	Social determinant of health	Number of indicators	Spatial reference scales
Built and natural landscape	Built and natural landscape at metropolitan level	7	Provincial
	Built and natural landscape at municipal level	13	Municipal, Census Area
Activities	Culture and leisure	5	Municipal
	Food and local products	4	Municipal
	Transport	6	Municipal, Census Area
Local economy	Employment and incomes	6	Municipal, Census Area
Local community	Social cohesion and local democracy	4	Municipal, Census Area
	Social services and health	3	Municipal
Lifestyle	Safety	11	Municipal
	Public spaces	4	Municipal, Census Area
	Housing quality	9	Municipal, Census Area
	Instruction	5	Municipal, Census Area
Total	12	77	

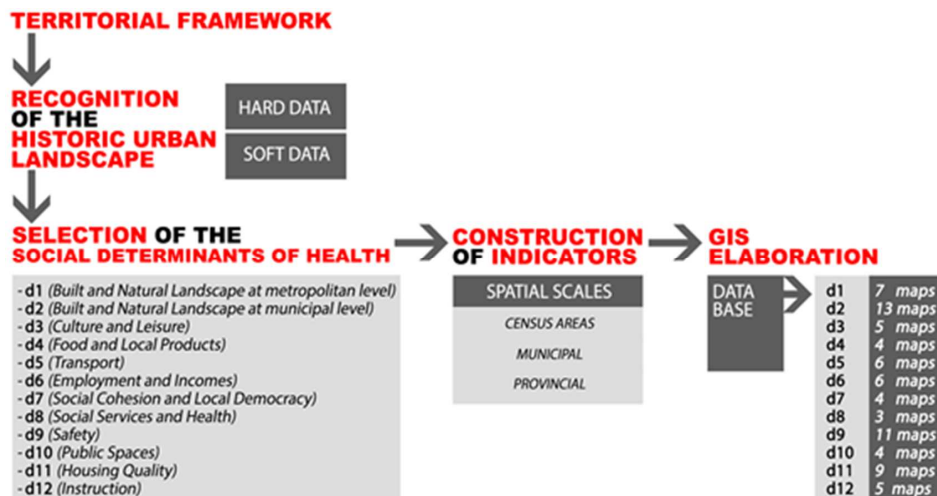


Figure 1 – Methodological framework

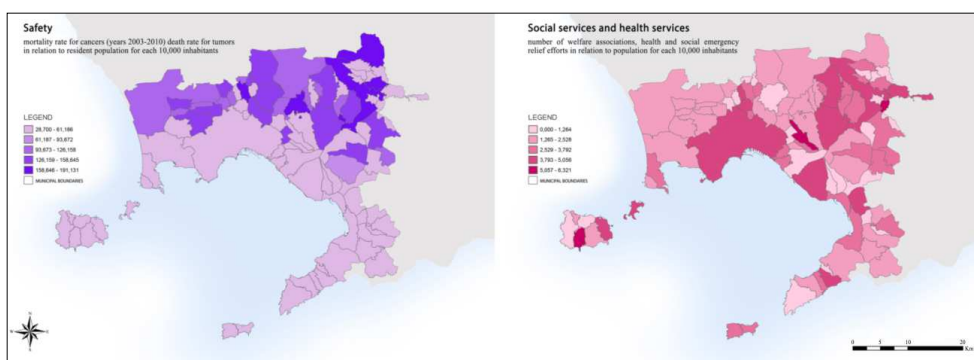


Figure 2 – Maps of Safety and Social Services for health

3.3 The interpretation of the Historic Urban Landscape in the perspective of health promotion

Thematic maps have disclosed complex information in databases in synthetic and readable cartographic representations. It was necessary, however, to codify this information in order to make them comparable with each other through a normalisation process, transforming the measures of the indicators along a common ordinal scale with 0-1 range, on the basis of the particular key of reading of the promotion of human health.

This activity has produced two more geo-referenced databases of normalised values scale and municipal scale of census areas. Multivariate analysis for major components has allowed the analysis of the correlation matrix, the eigenvalues and the matrix of the eigenvectors of each set of indicators relating to the social determinants of health (Lillesand, Kiefer and Chipman, 2015). The main

components have been selected with a cumulative percentage of variance that stood between 75 % and 85 % and were subsequently semantically interpreted, investigating the “weight” of the numeric variables.

Employing this statistical method, it was possible to reduce the set of 77 initial indicators in a selection of 34 major components of the 12 determinants of health. The main components are the new “synthetic indicators” that reduce the initial complexity and enable the comparison of these determinants in the Historic Urban Landscape, without resorting to possible problems of data redundancy that would compromise the final results of the evaluation process (Tab. 3). The support of their respective GIS maps has favoured a clear and controlled understanding of their physical-spatial distribution.

The identification of 34 major components has allowed recognition of those phenomena, in the HUL of the metropolitan area of Naples, which have particular significance to people with respect to each social determinant of health. However, it is important to recognise the degree of impact on people. The Barton and Grant scheme (2006), reworked specifically for this study, orders the pertinent urban factors into a hierarchical procedural structure that suggests at least three “degrees” of influences on health:

- urban themes, in an important scale from the outer circle to the inner;
- determinants groups that characterise every urban theme;
- the main components of the social determinants of health.

This complexity needs Multi-Criteria Decision Aid (MCDA) (Keene and Raiffa, 1976; Munda, 1993; Fusco Girard, Cerreta and De Toro, 2014; Figueira, Greco and Ehr Gott, 2005) to face multi-dimensional and integrated assessments.

Table 3– Interpretation of the main significant components

Social determinants of health	Main components	Interpretation of main components	% variance explained
Built and natural landscape at metropolitan level	1	Rural landscape	52.5
	2	Incidence of urban functions on the rural landscape	26.2
Built and natural landscape at municipal level	1	Settlement efficiency	27.4
	2	Anthropic concentration in vulnerable areas	17.5
	3	Urban area to consolidate and regenerate	14.0
	4	Historic/natural fabric	9.0
	5	Buildings with thermo-hygrometric under requirements	8.3
Culture and Leisure	1	Associations for the exploitation of local resources	60.7
	2	Surface of historical, cultural and landscape interest	13.3
	3	Attractiveness of minor heritage	12.5
Food and local products	1	Solidarity groups of purchase	56.7
	2	Cultural and food awareness	27.5
Transport	1	Availability of private and public transport	63.9
	2	Commuter out of municipality of residence	11.4
	3	Extra-communal travel by private vehicles	10.5
Employment and incomes	1	Economic sustainability of families	38.4
	2	Occupation	24.0

Social determinants of health	Main components	Interpretation of main components	% variance explained
	3	Development of human resources	15.4
Social cohesion and local democracy	1 2	Social vivacity Social inclusion	49.6 38.5
Social services and health	1 2	Differentiated collection of urban waste Associations for social welfare	51.3 38.4
Safety	1 2 3	Environmental health Security to the anthropic risks Survival from environmental / social / accidental causes	50.8 19.9 11.6
Public spaces	1 2 3	Municipal area to urban uses Functional mixité Public permeable surfaces on the impermeable	37.1 28.4 19.3
Housing quality	1 2 3	The long term affordability Sanitary conditions of leaseholders' families The short-term affordability	38.8 24.9 20.0
Instruction	1 2 3	People with skills and competences to work Cultural disparities Low level of education	54.7 20.6 9.8
Social cohesion and local democracy	1 2	Social vivacity Social inclusion	49.6 38.5

The result of the valuation model of Analytical Hierarchy Process (AHP), formulated by Thomas Lorie Saaty (1980), is particularly interesting as it combines multi-dimensional scales measuring, revealing a single hierarchical scale of priorities (Fusco Girard and De Toro, 2007; Cerreta and De Toro, 2012), giving weights between quantitative and qualitative elements that are not directly comparable. Through the Expert Choice software (Forman, et al., 1983), it structured the hierarchical tree AHP and dealt with value judgements on greater importance. The hierarchical tree consists of four hierarchical levels, considering:

1. overall objective: the promotion of human health in the Historic Urban Landscape;
2. under objectives (in the Expert Choice are called the “goals” to be reached): urban themes;
3. criteria: the social determinants of health themes;
4. sub-criteria: the main components of any social determinant of health.

The comparison of activity took place from the micro to the macro level, defining the relative importance between pairs criteria on the basis of Saaty 1-9 scale. It was decided to give equal importance to all the sub-criteria, as they express different but closely interdependent aspects of the same phenomenon. The relative importance of the criteria under each objective has been decided on the basis of issues raised in dossiers and reports studied in Screening HIA phase. In this way, it was possible to perform an overlay geographic features of the variables, giving everyone the specific weight emerging from AHP.

The elaboration of maps of the five urban themes returned a sector inquiry of HUL, highlighting areas that express different intensities of health phenomena, based on the social determinants group considered. Finally, the overlay of five thematic maps, each associated with AHP weight, reported the synthesis of intensity mapping of current urban processes that significantly affect the health of the metropolitan population (Fig. 3).

The most intense phenomena in humans are observed in the hinterland metropolitan area, which is undergoing a strong vocational change from agricultural to urban/productive. There are areas to be monitored as incubators of new economic, social and environmental change, and from which the Metropolitan Territorial Plan will be drawn up through sustainable development strategies coordinated among municipalities around the capital specificity. The less intense phenomena, however, are observed in the historic urban settlements located along the coast and in areas with a strong naturalistic prevalence, mostly governed by the physical heritage protection plans. None of these cartographic products express qualitative information about the state of health, other than the investigated phenomena. The store of knowledge comes from the study of 77 indicators and 34 previously analysed main components. However, these maps identify spatially urban areas, currently connoted by a greater or lesser intensity of multidimensional processes that particularly affect the population.

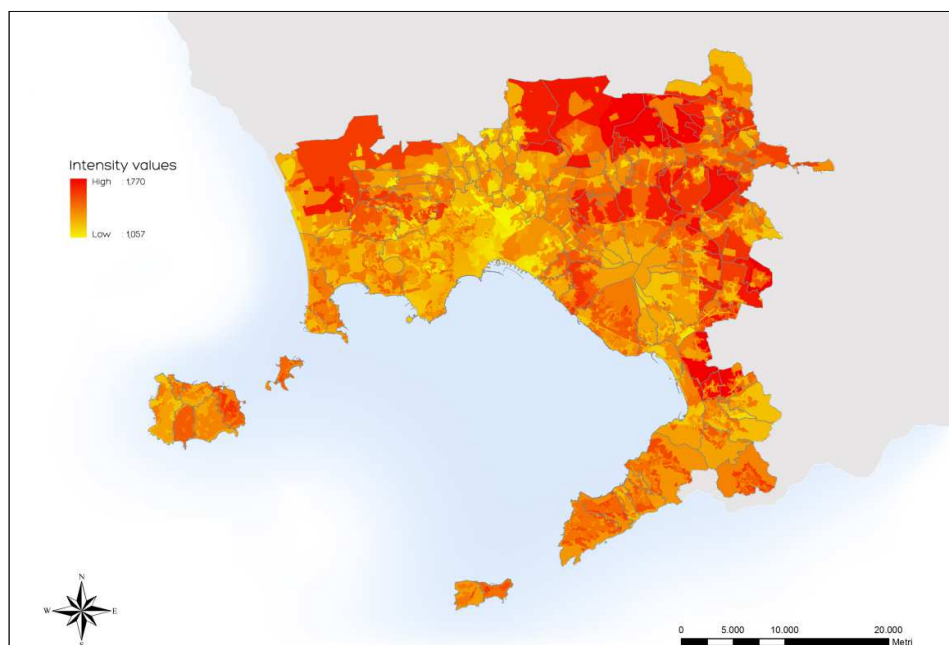


Figure 3 – Intensity of urban processes on human health in the Historic Urban Landscape of the metropolitan area of Naples

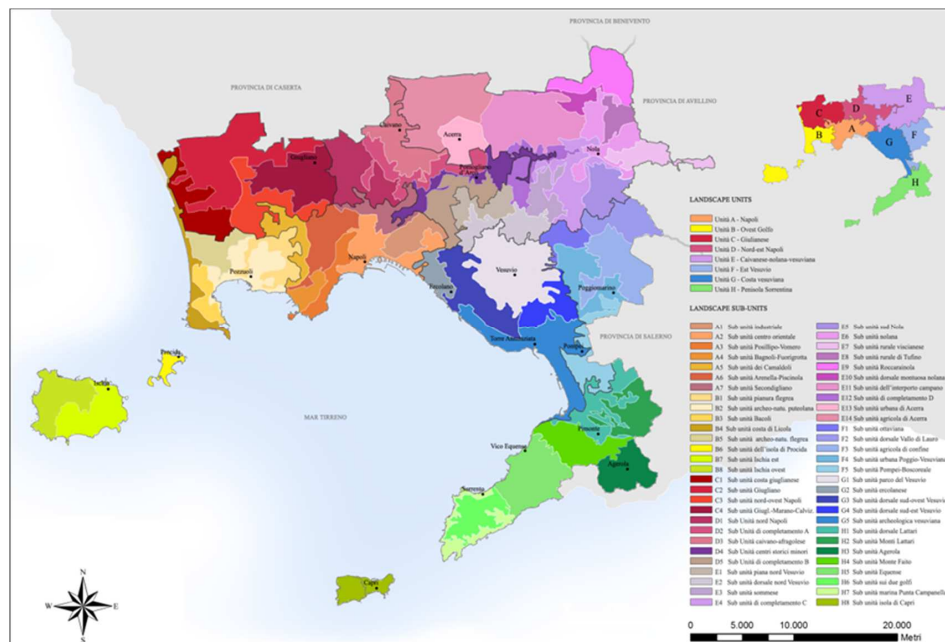


Figure 4 – Proposal for dynamic landscape units

Starting from the mapping of processes in the Historic Urban Metropolitan landscape, some units of homogeneous intensity levels are geographically analysed. This activity has redrawn the map, identifying the health landscape units. The definition of territorial perimeter portions has brought about a considerable variance of processes involving the determinants of health. We have traced eight units with the respective 56 sub-units or aggregations of heterogeneous municipal portions in which it is possible to observe the processes on the promotion of health of homogenous intensity. They may vary over time because the spatial boundaries are closely related to changed determinants of health (Fig. 4).

4 CONCLUSION

The Historic Urban Landscape (HUL) in the UNESCO approach addresses territory in a multidimensional context and it expresses the interdependence between heterogeneous attributes that produce new values under pressure from socio-economic and environmental changes, with outcome effects on people. The adoption of the socio-ecological model of health, attentive to the relationship between man and the urban context, creates a benchmark of the analysed category to measure the sustainability of HUL and to observe the urban processes' view of the fundamental right to life. Even though there are no case studies in the literature concerning the virtuous connection between health and conservation, we think that urban strategies, focused on the promotion of wellbeing and human development, could promote economic productivity. This

could determine the attractiveness and the competitive character of the landscape and, therefore, move towards actions that can also enhance the urban space, with the creation of a positive outlook (win-win) which can fuel a virtuous and sustainable process.

The significance in the methodology at Health Impact Assessment (HIA) is the potential to start integrated assessments to systematically compare all the factors, or the social determinants, of health that affect relationships between landscape and people, in a hierarchical process. It is an interesting perspective in support of the effective sustainability policies of the landscape regeneration strategies. Therefore, it is considered that this evaluation experiment deserves special consideration and implementation by UNESCO (2011), as it offers a solution to point 24b of the Recommendations to the HUL, concerning the need for monitoring urban processes to allow the preservation of assets and the quality of people's lives.

The decision to conduct the entire process via an “expert” approach has proved necessary for the size of the territory analysed. Replicability and scalability of the methodology to smaller, more manageable geographical areas, such as landscape units or homogeneous territorial areas, can give way to a “bottom-up” approach and even the use of perceptive indicators. It could also support the municipal policy-makers to:

- “provide for the monitoring and management of change to improve the quality of life and of urban space” (UNESCO, 2011, art. 24/b);
- develop alternative scenarios of sustainable urban regeneration;
- assess the impacts, focusing on the effects on the holistic health of residents;
- make operational development strategies, involving local actors.

The identification and the division of the territory into smaller areas could support the MTP (Metropolitan Territorial Plan) in territorial government, systematically regulating programmes and strategies for macro areas, in which municipalities are aggregated to similar phenomena prevailing on human health. Instead, the recognition of units and sub-landscape dynamics of health units, which provide insight into phenomena beyond the administrative borders to encourage micro-scale participatory governance of local communities, make the concept of self-sustainability operational through alternative forms of organisation, management and financing of the urban regeneration process.

REFERENCES

Acheson, D., 1998. *Independent Inquiry into Inequalities in health: Report*. London: The Stationery Office.

Barton, H. and Grant, M., 2006. A health map for the local human habitat.

Journal of the Royal Society for the Promotion of Health, 126(6), pp.252-253.

Breeze, C. and Lock, K., 2001. *Health impact assessment as part of Strategic Environmental Assessment*. Copenhagen: WHO, Regional Office for Europe.

Burrough, P.A., 1986. *Principles of geographical information system for land resources assessment*. Oxford: Oxford University Press.

Censis, 2014. *48° rapporto sulla situazione sociale del paese*. Roma: Censis.

Cerreta, M. and De Toro, P., 2012. Urbanization suitability maps: a dynamic spatial decision support system for sustainable land use. *Earth System Dynamics*, 3(2), pp.157-171.

Cole, B.L. and Fielding, J.E., 2007. Health Impact Assessment: a tool to help policy makers understand health beyond health care. *Annual Review Public Health*, 28, pp.393-412.

Daniel, T.C. and Vining, J., 1983. Methodological issues in the assessment of landscape quality. In: I. Altman, and J.F. Wohlwill, eds. 1983. *Behavior and the Natural Environment, Human behavior and environment*. New York: Plenum Press. pp.39-84.

Dakin, S.L., 2003. There's more to landscape than meets the eye: towards inclusive landscape assessment in resource and environmental management. *The Canadian Geographer*, 47(2), pp.185-200.

D'Auria, A., 2009. Urban cultural tourism: creative approaches for heritage-based sustainable development. *International Journal of Sustainable Development*, 12(2-4), pp.275-289.

D'Auria A. and Monti, B., 2013. The guardianship of the landscapes between identification and assessment: Ischia and its lost identity. In: Rezekne Higher Education Institution, *Society, integration, education: utopias and dystopias in landscape and cultural mosaic: visions values vulnerability*, Vol. IV. *Proceedings of the International Scientific Conference on Society, Integration, and Education Location*. Udine, Italy, 27-28 June 2013. Rezekne, Latvia: PSRI of Rezekne Higher Education Institution. pp.165-176.

D'Auria, A. and Pugliese, S., 2013. The governance of UNESCO cultural landscapes between universal values and local identity: the case of Campania. In: Rezekne Higher Education Institution, *Society, integration, education: utopias and dystopias in landscape and cultural mosaic: visions values vulnerability*, Vol. V. *Proceedings of the International Scientific Conference on Society, Integration, and Education Location*. Udine, Italy, 27-28 June 2013, Rezekne, Latvia: PSRI of Rezekne Higher Education Institution. pp.189-200.

Figueira, J., Greco, S. and Ehr Gott, M. eds., 2005. *Multiple criteria decision analysis: state of the art surveys*. Boston: Springer.

Forman, E.H., Saaty T.L., Selley M.A. and Waldron, R., 1983. *Expert Choice*. McLean: Decision Support Software.

- Fusco Girard, L. and Nijkamp, P., 1997. *Le valutazioni per lo sviluppo sostenibile della città e del territorio*. Milano: Franco Angeli.
- Fusco Girard, L. and De Toro P., 2007. Integrated spatial assessment: a multicriteria approach to sustainable development of cultural and environmental heritage in San Marco dei Cavoti, Italy. *Central European Journal of Operations Research*, 15(3), pp.281-299.
- Fusco Girard, L., Cerreta, M., and De Toro, P., 2014. Integrated assessment for sustainable choices. *Scienze Regionali*, (13)1, pp.111-142.
- Hancock, T., Labonte, R. and Edwards, R., 2000. Indicators that count! Measuring population health at the community level. *Canadian Journal of Public Health*, (90)1, pp.22-26.
- Keene, R.L. and Raiffa, H., 1976. *Decisions with multiple objectives*. New York: John Wiley and Sons.
- Lillesand, T.M., Kiefer, R.W. and Chipman, J., 2015. *Remote sensing and image processing*. New York: John Wiley and Sons.
- Mohan, R., Spiby, J., Leonardi, G.S., Robini, A. and Jefferis, S., 2006. Sustainable waste management in the UK: the public health role. *Public Health*, 120, pp.908-914.
- Munda, G., 1993. Multiple-criteria decision aid: some epistemological considerations. *Journal of Multi-Criteria Decision Analysis*, 2(1), pp.41-55.
- Murgante, B., 2008. *L'informazione geografica a supporto della pianificazione territoriale*. Milano: Franco Angeli.
- Quigley, R. and Taylor, L., 2003. Evaluation as key part of health impact assessment: the English experience. *Bull WHO*, 81(6), pp.415-419.
- Saaty, T.L., 1980. *The Analytic Hierarchy Process*. New York: McGraw Hill.
- Scott-Samuel, A., Birley, M. and Arden, K., 1998. *The Merseyside guidelines for health impact*. Liverpool: University of Liverpool.
- Sen, A., 1999. *Development and freedom*. Oxford: Oxford University Press.
- United Nations, 1992. *The Rio Declaration on environment and development*. [online] Nairobi: United Nations Environment Programme. Available at: <www.unep.org> [Accessed 01 August 2016].
- UNESCO (United Nations Educational, Scientific and Cultural Organization), 2011. *Recommendation on the Historic Urban Landscape*. [pdf] Paris: UNESCO. Available at: <http://portal.unesco.org/en/ev.php-URL_ID=48857&URL_DO=DO_TOPIC&URL_SECTION=201.html> [Accessed 01 August 2016].
- WHO (World Health Organization), 1986. *Ottawa Charter for health promotion: an International Conference on Health Promotion, the move towards a new*

public health. Ottawa, 17-21 November 1986. Ottawa, Canada: WHO.

WHO (World Health Organization), 1999. *Health Impact Assessment: main concepts and suggested approach (Gothenburg consensus paper)*. Brussels: WHO Regional Office for Europe.

WHO (World Health Organization), 2011. *Rio Political Declaration on social determinants of health*. Rio de Janeiro: WHO.

WHO (World Health Organization), 2012. *Health indicators of sustainable cities*. Rio de Janeiro: WHO.

Wright J., Parry J. and Mathers J., 2005. Participation in health impact assessment: objectives, methods and core values. *Bull World Health Organ*, 83(1), pp.58-63.

ABOUT AUTHORS

Paola Carone, PhD. in Evaluation Methods for Integrated Conservation of Urban and Environmental Heritage, University of Naples “Federico II”, paola.carone83@gmail.com, via Toledo 402, 80134 Naples, Italy.

Pasquale De Toro, Associate professor, University of Naples “Federico II”, detoro@unina.it, via Toledo 402, 80134 Naples, Italy.

Alfredo Franciosa, PhD. in Evaluation Methods for Integrated Conservation of Urban and Environmental Heritage, University of Naples “Federico II”, alfredofranciosa@hotmail.com, via Toledo 402, 80134 Naples, Italy.



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