Ann Ig 2017; 29: 453-463 doi:10.7416/ai.2017.2177

Public health and urban planning: a powerful alliance to be enhanced in Italy

D. D'Alessandro[1], L. Appolloni[1], L. Capasso[2]

Key words: Urban Planning, Building Hygiene, Urban Health
Parole chiave: Pianificazione urbana, igiene edilizia, igiene urbana

Abstract

Urban planning has played and still plays a key role in improving urban health and indoor health. The authors sketch out the historical evolution of the relationships between Public Health and urban planning, in particular to what happened in Italy during the past 150 years. The authors suggest some lines for further research, but also describe some interventions that could obtain practical results in terms of health gains for the population.

Introduction

The urban environment is a highly complex, interactive socio-physical system, with competing expectations and priorities (1). Several factors associated with the built environment are directly responsible for health impacts (2-5). They include air quality - both indoor and outdoor - climate, water quality and quantity, noise and traffic-related injuries (6-8). Much of the evidence concerning direct impacts is quantifiable and causal effects can be attributed (6). Other factors, included the ways in which built environment's features and their design (housing, neighbourhoods, social environments, connectivity, density, land use mix, accessibility, amenities and decision-making processes), have an indirect impact on health and wellbeing, because they are able to influence the feeling and behaviour of individuals and population (6). There is a considerable amount of literature focusing on the relative impact on health, wellbeing and social cohesion of neighbourhood characteristics, with a strong evidence associating larger concentration of disadvantage and neighbourhood problems with worse physical health and poorer mental wellbeing (9-12).

Unfortunately until now, considerations about health and wellbeing have had an insufficient influence on urban design and planning (13). As argued by the WHO (1), creating healthier cities should require new approaches to planning, giving greater prominence to health as well as recognition of a range of health-based objectives like:

[1]*Department of Civil Building Environmental Engineering, Sapienza University of Rome, Italy*
[2]*Department of Public Health, Experimental and Forensic Medicine, University of Pavia, Italy*

opportunities for healthy lifestyles; social cohesion and supportive social networks; access to employment opportunities, high-quality facilities, and open space; road safety, enhancement of personal security; attractive environments with acceptable noise levels and good air quality; good water quality and sanitation; reduction of emissions that threaten climate stability (1, 14-15).

The achievement of physical, mental, and social wellbeing ought to become the principal goal of plans governing land use, transport, open space, housing and economic development in cities (3, 7, 16). This implies a fundamental shift in the philosophical underpinnings of professionals involved in pursuing such a goal. Such a shift might be summarised in the recognition that healthy urban planning must be interdisciplinary, based on interagency and interdisciplinary collaboration, with shared approach to the problems and shared intention to address them (17, 18).

Health impact assessment (HIA) is one example of a precautionary practice that might link urban planning and Public Health (19, 20). The Gothenburg Consensus Paper of 1999 clarifies some of the main concepts and suggests a feasible approach to apply, carrying out HIA at all levels. In 2004 the Project Advisory Group produced the report *European Policy Health Impact Assessment* (EPHIA) for the European Union and its institutions, a guide that describes the EPHIA methodology's underpinning concepts and principles, and provides a step- by-step explanation of purpose, procedures, methods, skills and outputs (6, 20).

Now widely used for healthy urban planning in Europe, HIA is both an analytic tool and a political process that might bring together the built and social environmental factors that influence urban health (20). The challenge, both for city planning and Public Health, is to learn from each other and to combine best practices (6, 20).

Aims of this paper are: (a) to summarise the main evidences in terms of relationship between urban planning and Public Health in Italy in a historical perspective; (b) to describe the potential role of neighbourhoods regeneration on the reduction of health inequalities and the improvement in wellbeing.

Urban planning and Public Health: a longstanding alliance lost over time

Recognition that city design impacts Public Health was first established in the 19th century while attempting to control the outbreaks of communicable diseases (19). In particular, urban regeneration is an ancient concept, which made its first attempts - in terms of urban renovation - in France after the Revolution (21); this country issued a number of effective laws in order to act against urban decay, but these provisions were never fully implemented. England was the first country in which these principles went into practice at the beginning of the Victorian age. The intervention was elaborated as social reform, aimed at reacting to the extremely unhealthy life conditions in slums of the rapidly industrializing towns. The turning point of social distress was the cholera outbreak in 1831 and the other to follow (22).

Lord John Russell, Minister of the Interior, commissioned in 1838 a survey on the health status of the working population (23). The sad truth was revealed by the report of Dr. Edwin Chadwick and the parliamentary documents, published on the subject from 1840 to 1843, regarding the hygienic conditions of 50 English cities (23, 24). Among the terrifying data shown in these works there was the high mortality rate that overtook 23 deaths/1,000 inhabitants per year in 42 cities (20). These studies represented the basis for the rehabilitation law enacted in 1848, the first and famous *Public Health Act* (25, 26).

In 1875 a new Public Health Act was approved, one the most important nineteenth-century law in the health sector, which soon became a key example for other nations, inspiring a number of hygiene regulations across Europe (22, 23). In fact, in the second half of the century, other Governments, along with the municipalities, produced similar acts. In cities such as Paris, Berlin, Wien, Rome, Naples, which experienced severe urban decay, massive redevelopment interventions were realized (21, 22).

The emerging concept was that better living conditions would increase city residents' health from a physical and psychological point of view, but also boost the moral and economical state of the population (23, 27). Later (in 1889) Sir Ebenezer Howard – a British city planner – published the work "Tomorrow: *a peaceful path to real reform"*, a document in which he argued the opportunity to realize "garden *cities"* around London, cities that, with their "wards", anticipated, of about a quarter of century, the "neighbourhood *unit"* proposed by Clarence Perry for New York city in the 1920's (21).

In 1890 the *Housing Act,* a real pillar of the British legislation on public housing, demanded the health officers to draw up reports on neighbourhoods and on single unhealthy homes and gave them powers to clear or demolish them (22). At the same time in Germany Rudolf Virchow interpreted the role of Chadwick but, unlike him, believed that poverty and hunger lead to epidemics and that was necessary to remove them with political reforms (22), complying his vision "*Medicine is a social science, and politics is nothing else but medicine on a larger scale"* (28).

Not always the interventions were acted for hygienic and sanitary reasons, or, at least, not only for this (22). For example in France, from 1853, a renovation was implemented mainly for aesthetics and efficiency reasons, beginning with the recruitment of Baron Haussmann, one of the most famous and controversial urban planners in history, by Napoleon III for the redevelopment of Paris. Before the renovation, the French capital was overcrowded, dirty and regular outbreaks of cholera and typhoid had killed tens of thousands people. Therefore these interventions obtained extremely positive effects also in terms of health and economic development (21, 22).

Regarding Italy, after its national unification in 1861, the movement for the settlements reform was very active, and thanks to it some supporting laws were approved (29). Most of the towns performed consolidation efforts, with positive effects on mortality (21); in fact, the crude mortality rate between 1888 and 1897 decreased from 28-30 to 21 death/1,000 inhabitants/year (21). In addition, after 1890, a reversal in mortality rates was observed, resulting now lower in big cities than in small towns and rural areas (21).

The Country did not have a national housing policy until early 1900's. Policymakers addressed their attention to social housing policy with the so called *Luzzati Law* in 1903 and the consolidation bill on public housing, issued in 1908 (29-31). These regulations had to deal with the growing housing shortage, that affected poor people, and was mainly focused on providing financial aid and credits, encouraging both public and private entities, financed by banks, to take action (27).

The role of the State in the provision of social housing has been recognized for the first time during the so-called *Giolitti Age* (from 1901 to 1914). It was in this period that the Institute for Social Housing (Istituti Autonomi Case Popolari - IACP) was founded (31). During the following period, the *Fascist Age* (from 1922 to 1943), however, at least in larger towns, the emphasis shifted to civil servants' (mainly middle class) housing (32).

Before the Second World War, sanitary engineers built new urban infrastructure,

and renovated building regulations were enforced to improve the conditions of indoor environment - lighting and ventilation - and better hygienic standards were implemented. Hygienists addressed major health issues by employing emerging technologies to remove fluid wastes by piping them away from cities into rivers and seas, burning solid wastes and using the ashes for landfilling (19). These solutions for removing wastes had displacement effects that would continue to characterize Urban Planning and Public Health throughout the twentieth century, emphasizing waste removal instead of reduction in the consumption patterns that created waste (19). Hygienic theories helped to substantiate the idea that the solution against pollution was *dilution* and ecosystems became the sinks for urban pollution (19). The emphasis on engineered interventions imposed the idea that social, political, and economic problems could be best addressed through advances in science and technology (19).

In that period mortality from infections begun to decline, but it remained the dominant cause of death until the second quarter of the 20th century (33). Several factors changed mortality trends, in addition to social and engineered interventions, improvements in food supplies and nutrition, increasing literacy and vaccinations campaigns contributed to improve health and life expectancy (33-34).

Urban renovation experienced also an intense phase of expansion in the late 1940s The reconstruction phase added new categories to the built environment through mass production, mass construction, re-construction, and the urgent need to create new and healthy urban settings for all, in the shortest possible time (35). New materials and new construction methods were applied; panel block housing estates arose everywhere (32). The process has had a big impact on many urban landscapes, and has played an important role in the history and demography of cities around the world. In the post-war economic *Recovery Age* (from 1943 to 1960) Italy had to deal with a huge low cost housing issue (32). Several factors contributed to this problem: the previous housing inadequacy worsened by the huge damages caused by intense bombing and the decreased construction activity due to economic policies that focused on the growth of other industrial sectors (32). In terms of social housing, after the World War II, a seven-year plan, called INA-Casa (Fanfani *Law,* 1949) was launched (31, 32). INA-Casa was the largest housing programme ever undertaken in the Country, and so remained (33). This system, which was initially planned to be implemented only for seven years, has then remained in force for several decades (35).

In the same period (1954), the Prime Minister Alcide De Gasperi obtained the approval of a special law for the restoration of Matera, a city in the Southern part of the country, where a significant portion of the population still lived in prehistoric cliff dwellings, called "I Sassi di Matera" (Matera *Stones),* dug into the calcareous rocks. Living conditions in the *Sassi* were very poor, as evidenced by the extremely high infant mortality rate (463/1000 live births) per year in 1949 in Matera, about four time higher than the already high Italian rate) (36). The law did not care much about the implementation aspects, but basically stated political principles: the direct intervention of the State in financing and building the houses, the local management, the participation of the inhabitants in the allocation process (36). The new housing system was intended by the State as a sign of redemption from the civil constriction in uninhabitable environments and of cancellation of a centuries-old history of subordination (36). The *Sassi* population did not accept willingly the imposition to move to the new houses (36); even though the conditions of the new settlements were much better, many older people were very

displeased to leave the Stones and their established habits, and resisted for a long time, probably because of scepticism and an unspecified distrust for the State, considered too far away from the practical needs of the population.

Similar dissatisfaction has been observed also in later years when residential upheaval due to urban renewal programs, or as consequence of natural disasters, have been related to both mental and physical health negative impacts (20, 37-38).

In terms of Public Health, during sixty years of rising economic prosperity and improvements in medical technology, a massive increase of consumptions and environmental pollution occurred, chronicle diseases shown a significant rise and inequalities in health persisted, particularly in the economically disadvantaged urban population (39, 40-44). However, after that period, Italy had to deal with a new debt crisis in early 1990's, with strong draconian measures under various Cabinets of experts (headed by Amato, Ciampi and Dini). Their Governments had to cut public spending and reduce inflation, thus public investments declined (34, 45). This situation persisted for several years and was worsened by international economic crisis that hit hard Italy (46).

Urban planning and Public Health: where are we now?

After the 1988 publication of the report *The Future of Public Health* by the US Institute of Medicine's, leaders in the field agreed that the nation's Public Health activities were in confusion and that the field needed to refocus its efforts to address growing inequalities in health across population groups (19). By the 1990s, Public Health researchers in the United Kingdom, Canada and the United States began to reconceptualise the reasons for the distribution of diseases across populations to explain health disparities, energizing the field of social epidemiology (47). This discipline, emphasizing distribution as distinct from causation, pushed Public Health to reconsider how poverty, economic inequality, stress, discrimination and social capital become "biologically *embodied"* and help explain persistent patterns of inequitable distributions of disease and well- being across different population groups and geographic areas (48). For over two decades the World Health Organisation's Healthy City Movement has promoted urban design features required to create health-enhancing cities (49). The Commission on Social Determinants of Health drew attention on how transport patterns, access to green spaces, pollution effects, housing quality, community participation and social isolation were all structured by social inequality (40, 49, 50). In their view healthy and sustainable communities create the conditions that optimize physical and mental health and wellbeing by impacting social determinants of health (41).

At the same time the attention to sustainable development increased and culminated in 1992 in the *United Nations Conference on Environment and Development* (UNCED), also known as the Rio de Janeiro Earth Summit (51). Several documents were delivered, including "Rio *Declaration on Environment and Development",* consisting of 27 principles intended to guide countries along future sustainable development, and *Agenda 21,* a voluntarily implemented action plan of the United Nations (UN) regarding sustainable development (52). Many of the agreements made in Rio have not been realized yet, such as those regarding such fundamental issues as fighting poverty and improving the environmental quality, and those will continue to be major priorities for mankind and were again proposed to the UN (53).

In line with the sustainability principles, a broader interpretation of urban renewal

has been developed. The urban regeneration approach, consisting in "an *integrated and intersectorial action policy promoted by a public entity, in partnership with private entities, aimed at the comprehensive, sustainable and holistic rehabilitation of a degraded urban area in its physical environmental, economic and social components"* (54), was seen as an answer for re-development issues. This approach has been taken up and confirmed by the informal ministerial meeting on urban development, held in Toledo city in 2010, during which the Toledo declaration was presented (55).

Until now, a national regulation on urban regeneration is not available; three regions (Apulia, Tuscany and Marche) issued specific regulations (56-58). So, in the last few years, urban regeneration projects started in many Italian cities, thanks to European and national investments, like the *European Regional Development Funds* (ERDF), *Urbact I* and *II, LIFE* programme, etc. Today urban regeneration is a key word for all projects regarding redevelopment of urban voids or degraded areas and it is an integral part of the programs (e.g. urban suburbs) of many local governments, often combined with small and big business incentives (53, 59, 60). The regeneration is also an approach to rethink the environment, by defining a new balance for cycles of water and energy resources, materials and biodiversity and for ensuring soil saving (58, 60-62). This time it will happen with an effort to create healthy and sustainable cities that facilitate healthy behaviours, reducing the risk of non-communicable diseases.

Many mistakes have been done regarding uncontrolled urban development, land misuse, building abuses and indemnities, unclear and often conflicting regulations (62, 63). These issues made several areas of Italian territory vulnerable as highlighted by floods and other natural disasters in recent years (64). These mistakes underline the compelling need to review in depth urban planning tools and to renew the approach to urban planning.

Conclusions

After the communicable disease control has been achieved, the links between urban planning and Public Health attenuated, and only recently there have been calls for the two disciplines to reconnect (19): this time in an effort to create healthy and sustainable cities that facilitate healthy behaviours and, consequently, the reduction of non-communicable diseases.

In the past, urban renewal has been responsible for the rehabilitation of communities, but in some cases the innovation did not provide an improvement in terms of health, wellbeing, social cohesion and environmental pollution (3, 65). Therefore, urban renovation continues its evolution, moving from successes and learning from failures, and testing and implementing new models of development (19, 66). Nowadays, data that support a healthy urban planning and design practice are available, but the body of evidence underpinning these principles is not completely conclusive (19, 67-71). The subjective nature of built environment raises issues on the appropriate design and planning of places in order to promote health and wellness (20, 71-73). Among the various characteristics of neighbourhoods that may impact on human health, one of the most important is *walkability* (70). More walkable urban neighbourhoods are associated with increased physical activity, lower overweight, higher social interactions, lower prevalence of depression and reduced alcohol and drugs abuse (70). It also contributes to reduce environmental pollution due to road traffic. The enhancement of green spaces can make the neighborhood more attractive and encourages walkability, reduces urban heat island and improves water drainage (50).

Furthermore, successful practices in one community setting may not always be transferrable to another, due to the different cultural backgrounds of the target populations (70, 74-78). However, the evidence is growing, and there are several ways through which policies and actions may result in environmental changes with positive impacts across the population (6, 67). In particular, one critical issue for Italy is to make the urban areas resilient to emergencies and disasters.

As previously mentioned, HIA is one example of precautionary practice that might link planning and Public Health (79-81). HIA may offer a process for bringing together different agencies and make them work synergistically, such as the ones involved in Public Health, urban and land planning, city administration, ecological protection. HIA may break down disciplinary boundaries and other institutional barriers to achieve interdisciplinary and transdisciplinary goals (19, 78, 82-85).

Planning and Public Health synergy should allow to find new ways to prevent adverse health impacts of housing policies (19, 84), also considering the rising inequalities in Italy (69, 77). Although nowadays 80% of the Italian families own the dwelling they live in, an ever-growing proportion of the population is beginning to face housing problems (64, 73, 83, 84). Economic, social, demographic changes and the housing market crises have worsened the situation (73, 77). The increasing demand from single people that need to live in single-person dwellings, also considering that Italy does not experience much co-housing (86), linked to the massive aging of the population (87), acting alongside a serious decrease in public investments (33, 73, 82, 88). A relevant issue is therefore to project urban spaces aimed to be inclusive, accessible and age-friendly.

As affordable housing decreases, low-income populations are not only forced to accept substandard and hazardous living conditions (77, 88-90), unfortunately also allowed by laws (62, 91-93), which can trigger asthma and increase indoor exposures, but they may also be forced to relocate to areas far away from social and family support networks or become even homeless (73, 78, 93-95). A preventative and precautionary alternative is ensuring that existing housing stays affordable and healthy (60, 62). Health protection, soil spare, energetic and economic sustainability are becoming part of the new research agenda (96-98) and should became a cultural endowment for Public Health operators, technical professionals, urban planners, but also policy makers. In this framework to ensure a participatory urban governance is fundamental, to pay attention to concerns and planning horizons that extend beyond current needs.

Riassunto

Sanità pubblica nella pianificazione urbana: un potente binomio da implementare in Italia

La pianificazione urbana ha svolto e svolge un ruolo fondamentale nel miglioramento e nella determinazione stessa dell'igiene edilizia ed urbana. Nel presente lavoro gli autori ripercorrono l'evoluzione storica del rapporto fra sanità pubblica e pianificazione urbana, con particolare riferimento a quanto accaduto in Italia negli ultimi 150 anni. Gli autori identificano alcune linee di indirizzo per la ricerca, ma anche applicative per ottenere i migliori risultati possibili in termini di guadagno di salute della popolazione.

References

1. International Society of City and Regional Planners (ISOCARP). Urban Planning and Human Health in the European City. Report to the World Health Organisation, 2009.
2. Rao M, Prasad, S, Adshead F, Tissera, H. The built environment and health. Lancet 2007; **370**(9593): 1111-13.
3. Evan GW. The Built Environment and Mental Health. J Urban Health 2003; **80**(4): 536-55.

4. Braubach M, Heroux ME, Korol N, Paunovic E, Zastenskaya IA. The value of housing conditions and urban environment for the health. Gig Sanit 2014; (1): 9-15.
5. Faggioli A, Capasso L. Inconsistencies between building regulations in force in Italy for indoor environment and wellness factors. Ann Ig 2015; **27**(1): 74-81.
6. Glasgow Centre for Population Health (GCPH). The built environment and health: an evidence review, 2013 Available at: http://www.gcph.co.uk/assets/0000/4174/BP_11_-_Built_environment_and_health_-_updated.pdf [Last accessed: 2017 February 21st].
7. Renalds A, Smith TH, Hale PJ. A systematic review of built environment and health. Fam Community Health 2010; **33**(1): 68-78.
8. Appleyard D, Lintell M Environmental Quality of City Streets: The Residents' Viewpoint. J Am Planning Assoc 1972; **38**(2): 84-101.
9. Ludwig J, Duncan GJ, Gennetian LA, et al. Effects on the long-term well-being of low-income adults. Science 2012; **337**(6101): 1505-10.
10. Diez Roux AV, Merkin SS, Arnett D, et al. Neighborhood of residence and incidence of coronary heart disease. N Engl J Med 2001; **345**(2): 99-106.
11. Galea S, Vlahov D. Urban health: Evidence, Challenges, and Directions. Annu Rev Public Health 2005; **26:** 341-65.
12. Diez Roux AV. Neighborhoods and health: What do we know? What should we do? Am J Public Health 2016; **106**(3): 430-1.
13. Corburn J. City planning as preventive medicine. Prev Med 2015; **77:** 48-51.
14. Capolongo S, Battistella A, Buffoli M, Oppio A. Healthy design for sustainable communities. Ann Ig 2011; **23**(1): 43-53.
15. Renalds A, Smith TH, Hale PJ. A systematic review of built environment and health. Fam Community Health 2010; **33**(1): 68-78.
16. Shapiro JM. Smart cities: Quality of life, productivity, and the growth effects of human capital. Rev Econ Stat 2006; **88**(2): 324-35.
17. Lawrence RJ. Housing and health: beyond disciplinary confinement. J Urban Health 2006; **83**(3): 540-9.
18. Lawrence RJ. Housing and health promotion: moving forward. Int J Public Health 2010; **55**: 145-6.
19. Corburn J. Reconnecting with Our Roots American Urban Planning and Public Health in the Twenty-first Century. Urban Affairs Review. 2007; **42**: 688-712.
20. Barnes R, Scott-Samuel A. Health impact assessment and inequalities. Pan Am J Public Health 2002; **11**(5-6): 449-53.
21. Pagliani L. Trattato di igiene e di sanità pubblica. Milano: Francesco Vallardi Ed, 1913.
22. Morbelli G. Città e piani d'Europa. La formazione dell'urbanistica contemporanea. Bari: Dedalo Ed, 1997.
23. Rosen G. A History of Public Health. The Johns Hopkins University Press, 1993.
24. Dye C. Health and urban living. Science. 2008; **319**(5864): 766-9.
255. Exner M. Edwin Chadwick and the public health act 1848: Principal architect of sanitary reform. In: Bartram J, ed. Routledge. Handbook of Water and Health. New York: Routledge, 2015: 699-706.
26. Stewart J. A Review of UK housing policy: ideology and public health. Public Health 2005; **119**(6): 525-34.
27. Hamlin C, Sheard S. Revolutions in public health: 1848, and 1998? BMJ 1998; **317**(7158): 587-91.
28. Wittern-Sterzel R. Politics is nothing else than large scale medicine Rudolf Virchow and his role in the development of social medicine. Verh Dtsch Ges Pathol 2003; **87**: 150-7.
29. Capasso L, Schioppa FS. 150 years of hygienic requirements of dwellings in Italy. Ann Ig 2012; **24**(3): 207-16.
30. Legge 31/05/1903, n. 251.
31. Legge 28/02/1949, n.43. Provvedimenti per incrementare l'occupazione operaia, agevolando la costruzione di case per lavoratori.
32. Novacco N. Fanfani e la sua iniziativa per le case ai lavoratori. In: Istituto Luigi Sturzo "Fanfani e la Casa". Soveria Mannelli (CZ): Rubbettino Editore, 2002: 283-92.
33. McMichael AJ. The urban Environment and Health in a World of Increasing globalization: issues for developing countries. Bull World Health Organ 2000; **78**(9): 1117-26.
34. McKeown T. The Modern Rise of Population. New York, NY: Academic Press, 1976.
35. Prosperi A, Mastrilli G, Gundes S. The Third Sector and Social Housing in Italy: case study of a profit and non-profit public private partnership. Democratization, Marketization, and the Third Sector. 10th International Conference of the International Society for Third Sector Research

(ISTR). Siena, Italy, July 10-13, 2012. Available at: http://www.istr.org/?WP_Siena [Last accessed: 2017 May 11th].
36. Morelli M. Storia di Matera. 2.ed. Matera: Edizioni F.lli Montemurro, 1971.
37. Fullilove MT. Root shock: How tearing up city neighborhoods hurts America and what we can do about it. New York: Ballantine, 2004.
38. Kassler RC, Ducan GJ, Gennetian LA, et al. Association of housing mobility interventions for children in high-poverty neighborhoods with subsequent mental disorder during adolescence. JAMA 2014; **311**(9): 937-48.
39. Sciandra M, Sanbonmatsu L, Ducan GJ, et al. Long-term effects of the moving opportunity residential-mobility experiment on crime and delinquency. J Exper Criminol 2013; **9**(4): 451-8.
40. Whitehead M, Dahlgren G. What can be done about inequalities in health? Lancet 1991; **338**: 1059-63.
41. Marmot M, Allen J, Bell R, Bloomer E, Goldblatt P. WHO European review of social determinants of health and the health divide. Lancet 2012; **380**(9846): 1011-29.
42. Braubach M, Fairburn J. Social inequities in environmental risks associated with housing and residential location a review of evidence. Eur J Public Health 2010; **20**(1): 36-42.
43. Marmot M, Bell R, Goldblatt P. Action on the social determinants of health. Rev Epidemiol Sante Publique 2013; **61**(Suppl 3): 127-32.
44. Adamkiewicz G, Zota AR, Fabian MP, et al. Moving environmental justice indoors: understanding structural influences on residential exposure patterns in low-income communities. Am J Public Health 2011; **101**(Suppl 1): 238- 45.
45. Priemus, H. Kleinman, M, Maclennan, D, Turner B. European monetary, economic and political Union: consequences for national housing policies. Delft University Press, 1993 (Housing and urban policy studies, No. 6).
46. Capasso L, Capolongo S, Flacco ME, Manzoli L, Buffoli M. Impatto sanitario del disagio abitativo: stato delle conoscenze, problematiche metodologiche e nuovi modelli valutativi. Ig Sanita Pubbl 2014; **70**(4): 411-22.
47. Berkman L, Kawachi I. Social epidemiology. New York: Oxford University Press, 2000.
48. Krieger N. Epidemiology and social sciences: Toward a critical reengagement in the 21st century. Epidemiol Rev 2000; **22**: 155-63.
49. Rydin Y, Bleahu A, Davis M, et al. Shaping cities for health: complexity and the planning of urban environments in the 21st century. Lancet 2012; **379**: 2079-108.
50. D'Alessandro D, Buffoli M, Capasso L, Fara GM, Rebecchi A, Capolongo S. Green areas and public health: improving wellbeing and physical activity in the urban context. Epidemiol Prev 2015; **39**(4 Suppl 1): 8-13.
51. United Nations Environment Programme (UNEP). Rio Declaration on Environment and Development, Available at: http://www.unep.org/documents.multilingual/default.asp?documentid=78&articleid=1163 [Last accessed: 2017 May 11th].
52. United Nations Conference on Environment & Development. Rio de Janerio, Brazil, 3 to 14 June 1992. Available at: https://sustainabledevelopment.un.org/content/documents/Agenda21.pdf [Last accessed 2017 May 11th].
53. Johannesburg Declaration on Sustainable Development. Available at: http://www.un-documents.net/jburgdec.htm [Last accessed: 2017 May 11st].
54. Musco F. Rigenerazione urbana e sostenibilità. Milano: Franco Angeli Ed., 2009.
55. Toledo Declaration. Toledo, 2010. Available at: http://ec.europa.eu/regional_policy/archive/newsroom/pdf/201006_toledo_declaration_en.pdf [Last accessed: 2017 May 11th].
56. Regione Puglia. Legge n. 21/2008. Norme regionali per la rigenerazione urbana.
57. Regione Toscana. Legge n. 40/2011. Modifiche della legge regionale 3 gennaio 2005, n.1 "Norme per il governo del territorio", alla legge regionale 9 settembre 1991, n. 47 "Norme sull'eliminazione delle barriere architettoniche", alla legge regionale 8 maggio 2009, n.24 "Misure urgenti e straordinarie volte al rilancio dell'economia e alla riqualificazione del patrimonio edilizio esistente" e alla legge regionale 8 febbraio 2010, n. 5 "Norme per il recupero abitativo dei sottotetti".
58. Regione Marche. Legge n. 22/2011. Norme in materia di riqualificazione urbana sostenibile e assetto idrogeologico.
59. Curti L. La rigenerazione urbana a Torino. Available at: http://www.comune.torino.it/rigenerazioneurbana/news/rigenerazione_urbana.htm [Last accessed: 2017 May 11th].
60. Kerr RA. Global warming is changing the world. Science 2007; **316**(5822): 188-90.

61. Robert P, Sykes H. Urban regeneration: a handbook. Sage Publication Ltd, 2000.
62. Capasso L, Varagnoli C, Basti A, et al. Exceptions to Hygienic Requirements of Dwellings in Building Restoration and Indemnity for Abuses in Italy. Ann Ig 2014; **26**(6): 553-8.
63. Capasso L, Gaeta M, Appolloni L, D'Alessandro D. Health inequalities and inadequate housing: the case of exceptions to hygienic requirements for dwellings in Italy. Ann Ig 2017; **29**(4): 323-31.
64. Capasso L, Capolongo S, Faggioli A, Petronio MG, D'Alessandro D. Living in a Semi- basement in the Era of Floods. Italian Laws Cause Inequalities in Health Protection. Ann Ig 2015; **27**(2): 502-4.
65. Lowry S. Housing and health: Getting things done. BMJ 1990; **300**(6721): 390-2.
66. Dannenberg AL, Jackson RJ, Frumkin H, et al. The impact of community design and land-use choices on public health: a scientific research agenda. Am J Public Health 2003; **93**: 1500-8.
67. Curtis S, Cave B, Coutts A. Is urban regeneration good for health? Perception and theories of the health of urban change. Environment and Planning C: Government and Policy 2002; **20**: 517-34.
68. Thomson H, Atkinson R, Petticrew M, Kearns A. Do urban regeneration programmes improve public health and reduce health inequalities? A synthesis of the evidence from UK policy and practice (1980-2004). J Epidemiol Community Health 2006; **60**(2): 108-15.
69. Dessì V. Environmental sustainability vs liveability of the compact city? TECHNE 2015(10): 77-84.
70. D'Alessandro D, Appolloni L, Capasso L. How walkable is the city? Application of the Walking Suitability Index of the Territory (T-WSI) to the city of Rieti (Lazio Region, Central Italy). Epidemiol Prev 2016; **40**(3-4): 237-42.
71. Egan M, Lawson L, Kearns A, Conway E, Neary J. Neighbourhood demolition, relocation and health. A qualitative longitudinal study of housing-led urban regeneration in Glasgow, UK. Health Place 2015; **33:** 101-8.
72. Capolongo S, Buffoli M, Oppi A. How to assess the effects of urban plans on environment and health. Territorio 2015; **73:** 145-51.
73. D'Alessandro D, Raffo M. Adeguare le risposte ai nuovi problemi dell'abitare in una società che cambia. Ann Ig 2011; **23:** 267-74.
74. Arpesella M, Campostrini S, Gerzeli S, Lottaroli S, Pane A, Traverso MA, Vandoni M, Coppola L. Obesity nutritional aspects and life style from a survey on a sample of primary school pupils in the Pavia province (Northern Italy). IJPH 2008; **5**(1): 12-17.
75. Macgregor C. Urban regeneration as public health intervention. Journal of Social Intervention: Theory and Practice 2010; **19:** 38-51.
76. Mehdipanah R, Manzano A, Borrel C, et al. Exploring complex casual pathways between urban renewal, health and health inequality using a theory-driven approach. Soc Sci Med 2015; **124:** 266-74.
77. Kearns A, Mason P. Regeneration, relocation and health behaviours in deprived communities. Health Place 2015; **32:** 43-58.
78. Capasso L, Capolongo S, A, Petronio MG, D'Alessandro D. Do Italian Housing regulations and policy protect poor people's health? Ann Ig 2015; **27**(4): 688-9.
79. Hutch DJ, Bouye KE, Skillen E, Lee C, Whitehead L, Rashid JR. Potential strategies to eliminate built environment disparities for disadvantaged and vulnerable communities. Am J Public Health 2011; **101:** 587-95.
80. Signorelli C, Riccò M, Odone A. The role of Health Impact Assessment (HIA) in the decision-making. Epidemiol Prev 2011; **35**(2):131-5.
81. Bianchi F, Lauriola P. HIA, health impact assessment: a multidisciplinary procedure to support decision making in public health. Epidemiol Prev 2011; **35**(2): 73-6.
82. Dannenberg AL, Bhatia R, Cole BL, et al. Growing the field of health impact assessment in the United States: an agenda for research and practice. Am J Public Health 2006; **96(2):** 262-70.
83. Egan M, Katikireddi SV, Kearns A, Tannahill C, Kalacs M, Bond L. Health effects of neighborhood demolition and housing implement: a prospective controlled study of 2 natural experiments in urban renewal. Am J Public Health 2013; **103:** e47-e53.
84. Lawrence RJ. Housing and health: from interdisciplinary principles to transdisciplinary research and practice. Futures 2004; **36**(4): 487-502.
85. Catalan R, Kessell E. Comment: Housing and health. J Soc Issues 2003; **59:** 637-49.
86. Bianchi F. Le co-housing en Italie entre rêve et réalité. Une recherche sur les aspirations à la co- résidence. Int Rev Sociol 2015; **25**(3): 481-501.

87. Jacobsen LA, Kent M, Lee M, Mather M. America's Aging Population. Population Bullettin Feb 2011; **66**(1).
88. Lowry S. Housing for people with special needs. BMJ 1990; **300**(6720): 321-3.
89. Capasso L, Savino A. Assessment of the hygienic and sanitary conditions of housing in a sample in Chieti (central Italy). Ann Ig 2012; **24**(1): 1-6.
90. Novoa AM, Ward J, Malmusi D, et al. How substandard dwellings and housing affordability problems are associated with poor health in a vulnerable population during the economic recession of the late 2000s. Int J Equity in Health 2015; **14:** 120.
91. Capasso L, Basti A, Savino A, Flacco ME, Manzoli L, D'Alessandro D. Semi- basements used as dwellings: hygienic considerations and analysis of the regulations. Ann Ig 2014; **26**(1): 3-9.
92. Capasso L, Flacco ME, Manzoli L, Basti A. Analysis of differences among hygienic requirements of habitable garrets in Italian regions. Ann Ig 2013; **25**(2): 159-65.
93. Sarti S, Zella S. Changes in the labour market and health inequalities during the years of the recent economic downturn in Italy. Soc Sci Res 2016; **57**:116-32.
94. Lowry F. Impact on health care adds to the social cost of homelessness, MDs say. CMAJ 1996; **155**(12): 1737-9.
95. Hood E. Dwelling disparities: how poor housing leads to poor health. Environ Health Perspect. 2005; **113**(5): A310-7.
96. Signorelli C, Capolongo S, Buffoli M, Capasso L, Faggioli A, Moscato U, Oberti I, Petronio MG, D' Alessandro D. Italian Society of Hygiene (SItI) recommendations for a healthy, safe and sustainable housing. Epidemiol Prev 2016; **40**(3-4): 265-70.
97. Fehr R, Capolongo S. Promozione della salute nei contesti urbani: l' approccio urban health. Epidemiol Prev 2016; **40**(3-4): 151.
98. Settimo G, D'Alessandro D. European community guidelines and standards in indoor air quality: what proposals for Italy. Epidemiol Prev 2014; **38**(6 Suppl 2): 36-41.

Corresponding Author: Prof. Daniela D'Alessandro, Department of Civil Building Environmental Engineering, Sapienza, University of Rome, Via Eudossiana 18, 00184 Rome, Italy.
e-mail: daniela.dalessandro@uniroma1.it