Master of Public Health

Master international de Santé Publique

City level innovations to improve housing and health in France

The experience of the French Healthy Cities Network

<Andres GARCHITORENA GARCIA>

Class: MPH with concentration in Environmental Health (2010-2011)

Location of the practicum: Réseau Français des Villes-Santé (RFVS)

Professional advisor: Zoe Heritage, RFVS

Academic advisor: Jean-François Guégan, Institut de recherche pour le développement (IRD)

ACKNOWLEDGEMENTS

I would like to thank everybody who has played a role in this master, dissertation and internship.

Firstly, I would like to thank Zoë Heritage for giving me the chance of working in the French Healthy Cities Network. She has been a great “boss” and advisor, allowing me to properly combine the activities for the network with my own research. Her support and kindness during all these months have made this internship a very meaningful learning and working experience. I am also very thankful to Jean Francois Guégan, for his support as academic supervisor and for the discussions we had together.

I am grateful to the members of the RFVS because without their contribution I would have had nothing to research on. Also thanks to the members of the working group on housing and health, and specially the city of Nantes for offering the support I needed in order to be officially placed in the RFVS.

I am really thankful to the foundation “Obra Social La Caixa”. Their financial and administrative support during these two years has enabled me to complete my studies and finish this master’s degree. None of this would have been possible without them.

I would also like to thank all the staff of the two member institutions of my EUROPUBHEALTH track, EASP and EHESP. Professors, administrative staff and coordinators, all of them are great professionals and deserve our gratitude.

Finally I would like to thank my family and friends because the achievements in life are only worth if you have people to share them with. They make my life happier and more complete.

ABSTRACT (ENGLISH VERSION)

Introduction: Housing conditions and the quality of residential areas have an impact on physical and mental health and represent a source of health inequalities. Despite consensus having been achieved in urban health at the European and French levels, the responsibilities for housing fall on municipalities. Approaches that consider the global problem but act according to local circumstances are needed to support healthier housing policies. **Methodology**: A questionnaire sent to all the cities of the RFVS and case studies were used to describe the possibilities for innovation at the local level. In addition, a literature review was undertaken to explore the evidence on the impacts of housing conditions and housing improvements on health. **Results:** Most of the cities in the RFVS have the competences to act on housing environmental risks and the possibilities for innovation do not depend on the size of the city or its geographical location. A great variety of interventions are being carried out, often in cross-sectoral collaboration and supported by community consultation or participation. Some housing interventions in the literature have a clear impact on health improvement such as lead control, radon prevention and mitigation, improvements in energy efficiency and the installation of smoke alarms. **Conclusions:** This study raises awareness of the health consequences of poor housing conditions and joins the evidence found in the literature on housing improvement with local experiences in French cities.

ABSTRACT (VERSION FRANÇAISE)

Introduction: Les conditions de logement et la qualité des zones de résidence ont des impacts sur la santé physique et mentale et représentent une source d'inégalités de santé. En dépit des progrès en matière de santé environnementale en milieu urbain à l'échelle européenne et française, les competences en matière de logement appartiennent aux municipalités. Des approches qui considèrent la problèmatique globale, mais qui agissent en fonction du contexte locale, sont nécessaires pour soutenir des politiques de logement sain. **Méthodologie**: Un questionnaire envoyé à toutes les villes du RFVS et des études de cas ont été utilisés pour décrire les possibilités d'innovation au niveau local. En outre, une revue de littérature a été produite pour explorer les éléments de preuve sur les effets des conditions de logement et de l'amélioration du logement sur la santé. **Résultats**: La plupart des villes ont les compétences pour agir sur les risques environnementaux liés au logement, et les possibilités d'innovation ne dépendent pas de la taille de la ville ou de sa situation géographique. Une grande variété d'interventions sont menées, souvent en collaboration intersectorielle, et soutenues par consultation ou participation citoyenne. Dans la littérature, certaines interventions sur le logement ont montré un impact sur l'amélioration de la santé, tel que le contrôle du plomb, la prévention et l'atténuation du radon, l'amélioration de l'efficacité énergétique et l'installation de détecteurs de fumée. **Conclusions**: Cette étude vise à sensibiliser sur les conséquences sanitaires liés aux mauvaises conditions de logement, a travers d'une part les éléments de preuve trouvés dans la littérature sur l'amélioration du logement, et d'autre part les expériences locales dans les villes françaises.

TABLE OF CONTENTS

LIST OF ACRONYMS

CDC: Centres for Disease Control and Prevention

COPD: Chronic obstructive pulmonary disease

EC: European Commission

EEA: European Environmental Agency

EU: European Union
IPM: Integrated Pest Management
LARES: Large analysis and review of European housing and health status
LPEH: Local Plan of Environmental Health
PNSE: Plan National Santé Environnement (National Plan of Environmental Health)
RFVS: Réseau Français des Villes Santé (French Healthy Cities Network)
SCHS: Service Communal Hygiène et Santé (Community service of hygiene and health)
US: United States
UK: United Kingdom
WHO: World Health Organization
WHO-EHCN: World Health Organization European Healthy Cities Network
WHO-HEN: World Health Organization Health Evidence Network

LIST OF FIGURES AND TABLES

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

1.1 Methodological framework around the urban environment and health

More than half of the human population worldwide lives nowadays in towns and cities. This increase is especially dramatic in the context of developed countries. In Europe and the US, 75% and 80% of people respectively live in urban areas [1, 2]. It has been demonstrated that many links exist between people's health and the environment in which they live, considered as one of the key determinants of health [3]. The urban environment not only has direct physical impacts on health but also can have indirect impacts in the form of social and behavioural effects [4]. People's perceptions can intensify health risks or alternatively promote healthy behaviours through reinforcing feedback loops. As a result, many of today's most relevant health problems (asthma, diabetes, cancer, cardio-vascular disease, depression, etc) can be partly attributed to the urban environment [5].

A number of frameworks and research methodologies have been proposed by different authors and international organizations in an attempt to deal with the complex relationships of urban components and health [2,4,5,6,7,8]. While some authors suggest that the ecology of urban ecosystems should be integrated into the model of the determinants of health developed by Whitehead and Dahlgren [2,4,6], such as the "Settlement Health Map" (figure 1), others advocate a mix of research methods comprising not only ecological and multilevel analyses but also case studies and other socio-political methodology [7,8].

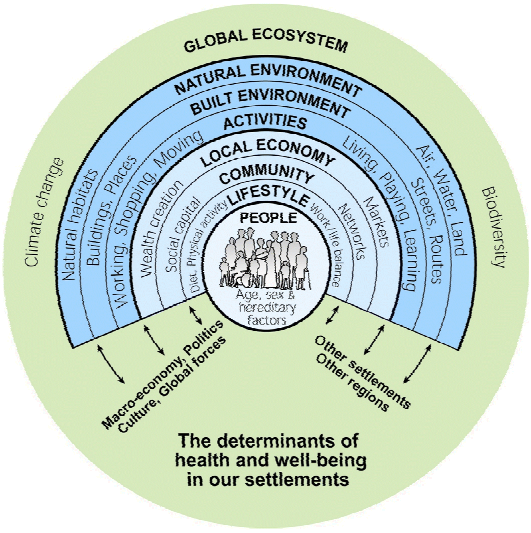


Figure 1. Socio-ecological framework: the settlement health map. Source: Barton and Grant [4]

The WHO Healthy Cities movement focuses on a socio-ecological approach to address urban health problems and has strongly relied on qualitative methods and the generation of case studies ever since its creation, emphasising the importance of unique experiences as part of the evidence base in urban health [9].

1.2 Housing: source of health inequalities

Housing has been defined as “the conjunction of dwelling, home, immediate environment and community.” [10]. Appropriate and affordable housing is a fundamental human right as well as one of the determinants of health. Yet homelessness has increased in many countries, including the richest, and these populations are the ones who suffer the highest rates of premature death [11]. The WHO “closing the gap in a generation” report warns that “One of the biggest challenges facing cities is access to adequate shelter for all. Not only is the provision of shelter essential but the quality of the shelter (…). This crisis (of housing) will worsen social inequities in general, and in health in particular.” [12].

Furthermore, housing conditions influence people’s health and represent a large source of inequalities. People spend a large part of their lifetime at home and therefore the exposure to housing-related factors represents a considerable threat. The most vulnerable populations such as the sick, the elderly, the children, the unemployed and the poor are also the ones who spend the largest proportion of time at home [10]. In addition, these populations often face the greatest risks related to housing and environmental conditions.

There is a social gradient for many housing-related risks, since neighbourhood and house quality vary greatly with the price. Lower household income is associated with inadequate housing which is linked to many risk factors such as mould growth, crowding, indoor pollution and noise [13]. Moreover, fuel poverty is disproportionately higher in low income groups, associated with excess winter and summer deaths due to thermal stress and also fewer resources for other basic needs such as food and medical or dental care, which results in lower general status and high malnutrition [14]. Neighbourhood characteristics such as exposure to traffic-related noise, proximity to industrial pollution sources, lack of green spaces and lack of perceived safety due to deprived neighbourhoods (litter, graffiti, etc) are also faced in a greater proportion by lower income groups [13].

A large study conducted in the European region by WHO (LARES) [15] found that not only the housing conditions might affect health but also that the exposure to such risk factors in Europe is still very high. In the European region, many of the inequities previously mentioned exist, both within and between countries. While it is true that the poorest populations in all countries usually face the worst housing-related conditions, in eastern European countries this situation is much more common than in western ones. Risk factors in the lowest income quartile of these countries like fuel poverty, indoor environmental exposures or lack of sanitary amenities are much higher when compared to the same group in the EU15 [13].

In the French context, a report [16] gathering official estimations from national institutes and other organizations reveal that the housing situation in France is far from being excellent. It is believed that more than half a million people are deprived of a personal home and among those, 133.000 are homeless. If we add to this figure the number of people living in a very difficult housing situation, the number rises to 3,6 million, more than 5% of the French population. The term difficult housing situation refers here to those living in accentuated overpopulation, lack of comfort (buildings in risk of falling down or with lack of basic amenities) or precarious occupation. Moreover, another 5 million people live in a very fragile housing situation at the short or medium term (lack of house maintenance, large unpaid rents, overpopulation, etc) and nearly 3,5 million face fuel poverty [16]. These estimates are likely to under-estimate the real problem given the present context of economic crisis.

To summarize, the extent of the housing problem in Europe and France is considerable, with a significant part of its population lacking of appropriate and affordable housing. This represents an important issue that requires great efforts from many public institutions and departments at the national and local levels. Given the great deal of evidence showing the links between housing, health and health equity, it constitutes a serious public health problem that needs the involvement of the public health departments in such efforts.

1.3 Action at the policy level on the field of the urban environment, housing and health

1.3.1 Europe

The EU regulatory context on **urban planning and environmental health** includes several charters, strategies, strategic papers and directives released recently [1]. In 2006, the EU adopted the Thematic Strategy on the Urban Environment in which it recognises the problems faced in urban areas and attempts to provide guidance for better implementation of existing policies and long-term action plans. A year later, the Green Paper and the Leipzig Charter favour an integrated sustainable urban development to overcome demographic, social and environmental problems in European cities. Besides, two EU Directives have been implemented to address the issues related to ambient air quality (2008/50/EC) and environmental noise (2002/49/EC). Finally, the Parma Declaration (5th Ministerial Conference on Environment and Health in 2010) describes the way forward in the work of environment and health in Europe. It sets out concrete targets to tackle the key environmental risk factors, paying special attention at children's health, inequalities and emerging environmental health challenges [17]. However, in the field of **housing and health** little has been advanced towards European standards. As it was pointed out by a WHO expert meeting, "the role of the EU in the framework of housing and health regulations is not very clear and uniform (…) current approaches to the regulations varies across Europe and insufficient emphasis is given to the protection and promotion of health and safety in housing standards" [18].

1.3.2 France

The field of environment and health has become one of the 5 key public health priorities of the French government, expressed in the public health law of 2004. As a result, a national action plan for environment and health (PNSE) is developed every 5 years along with regional plans. The PNSE2 (2009-2013) comprises, among others, specific strategies in the field of housing and health with the development of a network of advisors, actions against substandard housing conditions and greater control on construction materials and furniture [19]. It focuses on two major goals:

- To reduce those environmental exposures having a large impact on health.
- To reduce the inequalities linked to environmental risks.

Another recent keystone in this field of is the “Grenelle de l’Environnement”, a process initiated in 2007 to define the key points of government policy on ecological and sustainable development which resulted in 2 laws: Grenelle1 (2009) and Grenelle2 (2010). Even though it has an important focus on environmental health, its scope is much broader and includes regulations on urban planning, transport, housing and energy efficiency among others [20], including adaptation and mitigation strategies in a global context of climate change. [21]

Despite important regulations exist at the national level, a large part of the competences in urban planning and housing are decentralized [18] and therefore the municipalities play a major role. There is a need of structures working with the French municipalities while considering the national and international picture to “Think global, but act local”. A good example of such structures is the French Healthy Cities Network.

4. The role of the healthy cities networks in urban health and housing

The WHO European Healthy Cities Network (WHO-EHCN) was created in 1986 to implement at a local level the “Health for All” principles, based on the strategic framework provided by the Ottawa Charter for Health Promotion. Among the main action areas of the Ottawa Charter are: promoting healthy public policy, creating supportive environments and strengthening community participation. The Adelaide declaration in 1988 contributed to further develop the concept of healthy public policies, key in the Healthy cities movement [22]. In 1992, the Agenda 21 was presented in the UN Conference on Environment and Development held in Rio de Janeiro. This document provides a move towards sustainable development in urban policies, integrating health as the outcome of environmental, economic and social factors. It highlights the role of local governments as one of the main drivers of sustainable practices [23]. Both Agenda 21 and the health for all movement share common and complementary concerns, principles and processes (integrative approach, emphasis on intersectoral collaboration and community participation, etc) [22] and the Healthy Cities provide a great opportunity to merge these new paradigms and put them into practice.

The WHO-EHCN work on the urban environment and health has evolved over the last decades through five 5-year phases in which its principles, concepts and methods (city health profiles and plans, healthy urban planning, etc) have been developed in cities with very diverse political, economic and administrative contexts, offering evidence about their transferability and broad applicability [24,25,26]. It has largely contributed to widen the knowledge and evidence base on the subject; elaborated indicators and profiles; and developed useful tools to implement actions. Furthermore, the support of WHO provides member cities and municipalities increased political and scientific legitimacy to overcome the risks associated with such innovative policies and programmes [24].

As a result of the interest aroused after the creation of the Healthy Cities initiative and given the limited capacity of the WHO-EHCN, many national networks were formed. By 2009, 30 European national networks gave support to nearly 1300 cities and towns, contributing to extend the Healthy Cities principles far beyond the initial WHO-EHCN reach [27]. With many differences in terms of organization, relationship with national governments and participation criteria, they are defined generally as “organizational structures to inspire and motivate cities to join the healthy cities movement, to help them exchange information and experiences and to create more favourable conditions for the implementation of healthy cities strategies in their countries” [27].

One of such organizations is the French Healthy Cities Network (RFVS). Formally created in 1991, it involves today 74 cities and agglomerations from Metropolitan France and its overseas territories (see appendix 1). The field of environmental health, and specifically housing and health has been a priority for the RFVS for 2010 and 2011. As a result, a working group was created in April 2010 to increase awareness on housing hazards and the possible interventions at the local level. The members of the working group on “Housing and Health” were public health professionals and politicians from several cities of the network. Such an approach allowed combining scientific and technical expertise with a clear understanding of the political view. This was key if the outcomes of the group were to be included in the political agenda and integrated into the work of the municipal departments. The main outcomes expected from the group were the publication of a methodological guide for action on housing at the local level and the organization of a congress for all the cities of the network in October 2011 (see appendix 2). My MPH practicum took place in the context of this working group and the present dissertation is the result of the research done to support the group.

2. LITERATURE REVIEW: HEALTH IMPACT OF HOUSING HAZARDS AND INTERVENTIONS

“To improve the nation’s overall health, we must improve the health of the nation’s homes and ensure that safe, healthy, affordable, accessible and environmentally friendly homes are available to everyone” (US Surgeon General’s Call to Action, 2009) [28].

As a result of the increasing evidence that supports the link between housing and health, it might be reasonable to assume that interventions that are aimed at improving housing conditions will lead to significant improvements on people’s health. Despite this, there is still little evidence demonstrating effective interventions that protect health against specific hazards [29]. One of the reasons pointed out by Thomsom et al. is that “housing improvement addresses only one aspect of deprivation and it may not be realistic to expect to see health improvement in the relatively short time of most evaluations” [30]. For this reason, some systematic reviews assess an intervention as successful not only when it shows clinical evidence on health improvements but also when it reduces environmental exposures that have a clear dose-response relationship [31]. Although this section will just review such evidence, it is important to keep in mind that public health’s work is not limited to undertake tangible actions to improve the quality and safety of the home environment. Other actions might include: Establishment of guidelines, codes and enforcement; exposure assessments and consultation for individuals; community assessments; services for homeless people; cross-sectoral collaboration; advocacy; and public education and awareness [32].

The most significant housing hazards have been quantified (people affected, harm, strength of evidence) and ranked by the WHO Health Evidence Network (WHO-HEN) [33]. The ranking is the following: poor air quality; poor hygrothermal conditions; radon; slips, trips and falls; noise; house dust mites; tobacco smoke; and fires. Consequently, effective interventions against these hazards should be prioritized at the local level and this review provides evidence supporting those actions.

Given the socioeconomic gradient of poor housing conditions, public health actions related to housing have become an issue of social justice and health equity. In this sense, some of the research on housing interventions attempts to evaluate their impact on reducing health inequalities in developed countries [8,15,28,30,34]. There is also evidence suggesting that in developing countries, the provision of basic housing needs has shown to reduce illness among adults and children and improve socioeconomic opportunities. Some of such actions might benefit several generations [31].

2. 1 The neighbourhood as a driver of health

There is clear evidence suggesting that specific urban components at the neighbourhood and city level have an impact on several determinants of health (see fig.2), which in turn have a direct or indirect influence on the development of specific diseases or on general health and well-being [4,5,9].

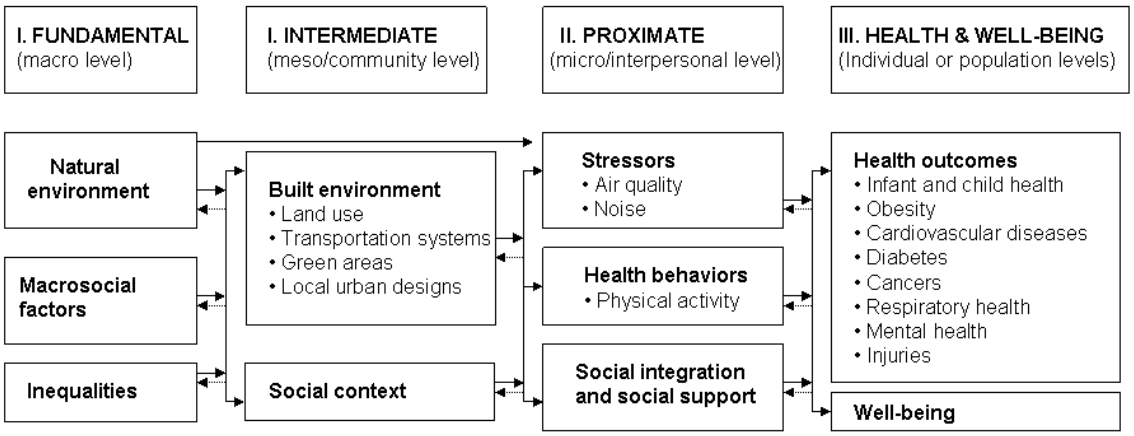


Figure 2. Links between the social determinants of health and the urban environment. Adapted from Schultz and Northridge [2].

The distance to daily destinations and therefore the levels of active travel and physical activity are partly determined by the choice in urban planning of either separated or integrated **land uses**, the city development density or the type of street network. Mixed land uses together with investments in good quality, accessible **public transport** and reductions in the capacity of motorised transport in residential areas, can reduce air pollution and traffic noise and might lead to increases in active travel and better mental health. In addition, lower speed limits in neighbourhoods (i.e. “zones 30”) are associated to decreases in noise, traffic related injuries and fatalities [5].

The **design of the neighbourhood** and the provision of **urban green spaces** have an impact on health risks, influencing aesthetic perceptions, physical constraints and determining the degree of social mixing. Poorly maintained and deteriorated urban environments lacking of green areas are associated with lower levels of physical activity and increased rates of overweight, partly explained through people’s perception as a reaction to the aesthetic impression, which also affects mental health and social isolation. The presence of accessible municipal services, public gathering places and green areas can counteract some of these effects. In addition, environments mimicking natural conditions (green corridors, parks, etc.) help reducing ambient air pollution, cool urban areas, provide a barrier against noise and may even have an influence on preventing the development of some forms of cancer [5].

Given that low income populations are disproportionately found in environments with worse urban features (less green spaces, poor urban design, etc), many **different approaches** have been developed in the last decades to address health inequalities by changing the neighbourhood

characteristics of low income people. For instance, many programmes have addressed area characteristics by moving people from high to low poverty neighbourhoods. The evidence shows that they can improve mental health, reduce obesity and impact positively on some wider determinants of health [8]. However, urban regeneration programs, aiming at the whole neighbourhood level are argued to be more cost-effective than the movement of individuals to better areas, since it benefits the community as a whole [34]. Yet the evidence supporting this idea is still weak: A systematic review in the UK [8] found small positive impacts on socioeconomic determinants of health but potential negative impacts might exist as well.

Mixed tenure has also been promoted in many European countries as a means to tackle social exclusion and create sustainable communities. Yet there is conflicting evidence on whether such intervention promotes social cohesion, residential sustainability or improves people's perceptions of the neighbourhood. Nor has it found to provide better job opportunities or changes in income mix [34]. Other interventions that have the potential to improve health and health inequalities are: demolition of distressed housing and relocation of residents; universal design standards to favour the elderly and people with disabilities; crime prevention through environmental design; smart growth and connectivity designs; zoning; and interventions concerning green space around housing [35].

2. 2 Air quality

Outdoor environmental air pollution causes premature deaths and it is associated, among others, to increased risk of coronary heart disease and many respiratory diseases such as asthma and COPD. Although poor populations are not always the more exposed to air pollution, they experience greater effects due to socioeconomic factors (higher susceptibility) [36]. Strategies to place residential settings away from highways [35] or urban planning policies looking for "spatial multipolarity and social diversity" [36] are some solutions suggested to improve outdoor air quality and reduce the socioeconomic inequities in such exposure. However, more research is needed in order to prove associations between the interventions and subsequent health outcomes.

Outdoor sources of pollutants are not the only contributors to poor indoor air quality. Many indoor sources contribute in a higher extent to damage air quality and therefore many interventions are proposed in the literature to reduce air pollutants inside the home, both of chemical and biological nature. In order to improve indoor air quality, simple and accessible methods can be suggested, like ensuring optimal levels of ventilation in the house or frequent vacuum cleaning. Appropriate air exchange rates help decreasing the levels of many pollutants indoors and reduce internal water vapour and the risk of dampness and mould. However, it is essential to minimize heat loss in order to avoid the negative impacts of cold home temperatures [33]. At the LARES survey, it was found that 40% of homes lack of an adequate ventilation system [15]. The evidence regarding specific indoor pollutants and possible interventions is summarised below.

2.2.1 Chemical agents

a. Lead

The wide use of lead in many products has represented a large source of outdoor and indoor exposure. Lead containing products such as paints and pipes have contributed for a long time (and they still do) to human exposure indoors. Its toxicity affects almost every system in the human body, being of particular concern its long-term effects on the brain and cognitive development of children [37]. In reducing the levels of lead, important legislations that banned its use in gasoline, paint, etc, represent a key progress. However, due to many reasons children are still exposed to hazardous levels of lead and public health interventions are necessary. Lead hazard control in the US has shown to be a very effective intervention, decreasing dust lead levels by 78% to 95% over a 3-year period. It includes "*a* combination of building component replacement, paint stabilization, enclosure, encapsulation, education and limited paint removal, followed by specialized cleaning and clearance testing" [38]. Measures to reduce lead exposure have great cost-benefit ratios and result in actual savings in medical care, education and productivity for those who are protected [33].

b. Radon

This radioactive gas is naturally deposited in soil and water and its concentrations vary geographically. It can enter the buildings through gaps and cracks in floors, walls and joints and concentrate indoors. When inhaled, it can deposit and irradiate the cells in the lower respiratory tract [39]. As a result, exposure to radon is the second leading cause of lung cancer overall after tobacco [38], causing up to 2900 deaths per year in France [40]. Radon mitigation to reduce house indoor levels is one of the interventions for which there is extensive literature supporting its effectiveness in reducing individual's risk of lung cancer and its cost-effectiveness compared to other healthcare and environmental interventions [38,39]. Different strategies can decrease radon levels under the recommended threshold in those geographical areas with dangerous levels: Sub-slab depressurization can achieve reductions in radon levels greater than 80% in already built homes while barrier membranes combined with block and beam construction in new homes result in a decrease by up to 75% [39].

c. Second-hand smoke (SHS)

The home is the most critical exposure setting to SHS for children [38]. Exposure to tobacco smoke increases in children the risk of pneumonia, bronchitis, bronchiolitis and exacerbates asthma symptoms in those already asthmatics. The main consequences in adults are increased mortality from lung cancer and cardiovascular disease [41]. There are studies suggesting the implementation of smoke-free home policies due to the expected reductions in acute coronary events and youth smoking [38]. However, they base on evidence coming from non-residential

smoke-free policies and they do not discuss the many problems that would arise from the implementation of such policy (ethical, regulatory, etc).

d. Other common sources of indoor chemical air pollutants

Among others, pesticides used in the house and volatile organic compounds released by many household items and products represent important sources of indoor air pollution. Long-term exposures to these chemicals may result in respiratory problems and development of cancers [38]. Integrated pest management (IPM) is proposed as an effective solution to reduce pesticide exposure, achieving significant decreases in indoor levels of pyrethroid insecticides [38]. Furthermore, it has been proved to effectively reduce levels of cockroach allergens and achieve modest benefits in clinical outcomes [42]. IPM includes a range of interventions to avoid pests proliferation combined with assessment, monitoring and education.

2.2.2 Biological agents

Housing conditions can influence the presence and levels of house dust mites, mould growth, cockroaches and other pests by creating a favourable environment. Overall, they represent the most common source of domestic allergens, and some of the fungal cell wall components can also irritate the respiratory tract through non allergic mechanisms. They are associated with asthma development and exacerbation and other respiratory problems. Leaks, plumbing problems or inadequate ventilation can lead to excess moisture which attracts pests and supports mould growth [42]. An effective intervention aimed at reducing the level of allergens and respiratory irritants is the combined elimination of moisture intrusion and leaks with removal of mouldy items. It has shown to decrease symptoms and medication use among asthmatic people and reduce other allergic and respiratory symptoms. In addition, multifaceted, in-home, tailored interventions to decrease exposure to asthma triggers have been found effective in decreasing asthma symptoms and short-term health-care use, and improving quality of life. These interventions include a range of actions such as environmental assessment, education, intensive cleaning, minor repairs and air filters [42].

2. 3 Hygrothermal conditions

The materials used in walls and windows and the heating or air conditioning systems determine the household's ability to fight variations in temperature. Almost half of all households surveyed in the LARES survey [15], report thermal comfort problems. Homes in poorly isolated buildings and lacking of central heating were more likely to report perceived temperature problems, which is associated with respiratory problems (asthma, acute bronchitis, pneumonia allergies), specially among children and the elderly. For the latter, the reporting of arthritis was also significantly higher in cold homes.

It has been suggested that seasonal variations in deaths due to thermal extremes are not related to outdoor temperatures but rather indoor. The main contributors to such variations are respiratory,

cerebrovascular and heart diseases, being the elderly and the new born the most vulnerable populations [15]. In addition, damp conditions favour mould growth (present in nearly a quarter of the surveyed households in LARES) and attract pests, increasing the risk of respiratory problems [42]. Indirect impacts on health also occur, for example when people have to use a large proportion of their income for energy expenses (fuel poverty). This situation has been associated with lower general health status, malnutrition, iron deficiencies and lower use of medical and dental care [14].

There are strong associations of positive health impacts after improvements in warmth and energy efficiency [30]. Interventions such as insulation, installation of central heating or upgrade of heating systems might lead to better general health and physical functioning, improved respiratory health (mainly in asthma symptoms) and positive impacts on mental health. Qualitative research also suggests that better heating increases the use of the home, increases privacy and improves the relationship between household members. The greatest benefits appear to be achieved when targeting vulnerable individuals who have poor health and poor housing conditions [30].

2. 4 Unintentional injuries

A large proportion of fatal and non fatal injuries occur in the home. Poorly designed architectural features and overcrowding represent important hazards that might result in increased number of falls, scald burns and fire-related injuries and deaths [33]. Structural deficiencies such as slippery surfaces, poor lighting or inadequate stairs are responsible for many of the falls, while the lack of functional smoke alarms and the lack of adequate escape routes account for many of the fire-related deaths. Besides, little kitchen space correlates with greater number of falls, cuts and burns [15]. The lack of barriers or fences in residential swimming pools is suggested to account for half of the fatal drowning among children younger than 5 years in the US [43]. Building design also determines the accessibility to the dwelling for the elderly and those with functional constraints, with nearly a third reporting inability to make a normal use in the LARES survey [15].

Well designed architectural features, environmental modifications to the home and the buildings along with education, can reduce significantly the morbidity and mortality related to injuries, falls and fires. The clearest evidence has been found for programs that ensure the proper installation and maintenance of smoke alarms [33,43] (present in only 9% of European households surveyed by LARES) [15]. Homes with working smoke alarms show up to 50% decrease in fire related mortality when compared to those without such devices. Two methods seem effective in achieving increases in the prevalence of installed working smoke alarms and reduced incidence of fire-related injuries: The implementation of community-based installation of smoke alarms in high-risk homes, providing education simultaneously; and building codes or legislations requiring smoke alarms in homes and buildings [43].

The elderly, the disabled and children are especially vulnerable to falls and other home hazards. For the former, home modifications combined with education and training, have the potential to achieve significant reductions in home hazards and falls. Environmental modifications might include the installation of hand rails grab bars and nonslip mats, lighting improvement or the removal of clutter and electrical cords [33,43]. For children, the free distribution of safety devices and features is recommended in combination with educational outreach and home visits, notably to reduce intoxication with poisonous substances [33]. Regarding drowning of children in swimming pools, a review has found that four sided pool fencing is a highly effective method [43]. Such intervention might be implemented through legislation, building codes and home- or community-based education.

2. 5 The psychosocial influence of housing

Housing conditions can impact on health not only directly on physical health, but also through their influence on psychosocial factors and mental health. In addition they are not only associated to specific health outcomes but also to self-reported health status, well-being and quality of life.

House tenure provides psychological benefits and has been linked to improved health, greater feelings of security, stability and control [15,33]. However, the burden of debt involved in a mortgage may result in insecurity, anxiety and poorer mental health [13].

In addition, the home can be a source of exposure to many stressors. For instance, neighbourhood noise is the most frequent complaint lodged to the French municipal services [44]. Certain levels of neighbourhood noise due to proximity to outdoor sources of noise (traffic, night clubs, etc) and lack of sound proof isolation can induce stress, annoyance, sleep disturbances and changes in social behaviour, damaging general health and well-being [45]. Other sources of stress are exposure to dampness or lack of indoor daylight [15]. The WHO-HEN found that “improvements in mental health are reported consistently following housing improvements, and the degree of mental health improvement may be linked to the extent of housing improvement” [33].

Area and neighbourhood characteristics also impact on many aspects of mental health and well being through many pathways, being people’s perception (aesthetics, safety, etc) one of the main drivers. For instance, green areas, good quality services (i.e. public transport) and local facilities in the neighbourhood reduce stress and promote feelings of security, social interactions and cohesion, with positive effects on mental health, benefiting in particular the elderly and low income people [5].

3. METHODOLOGY

3.1 Objectives

The overall goal of my placement and therefore of this dissertation is to provide valuable information to stakeholders in French municipalities in order for them to improve local housing policies and interventions by integrating an environmental health approach.

The primary objectives of the study were:

- To explore the international published evidence regarding the impacts of housing hazards on health, and regarding the health improvements achieved after housing interventions targeting those hazards.
- To provide up to date information about the progress of the French healthy cities on environmental health (Agenda 21, Local Plans for Environmental Health, departments, obstacles, priorities, etc.)
- To disseminate innovative experiences and actions on housing and health at the local level through qualitative analyses and case studies.

3.2 Study design

The study integrated both quantitative and qualitative methods based on primary data collected in the form of questionnaires and case study research. The study unit is the town/city, represented by politicians and professionals of the different local departments (public health, hygiene, sustainable development, etc) who provided the information.

3.3 Study place, study population and sample

The study was conducted in France, including both metropolitan and overseas territories. The study population comprised the 74 cities and urban communities of the French Healthy Cities Network, which overall represent a population of 15 million inhabitants (nearly one quarter of the French population). The network gathers most big cities in France (more than 200.000 inhabitants), except Paris and Strasbourg, and includes many medium and small size cities. Given that the network as a whole was studied, no sampling was necessary for sending the questionnaire. However, for the case study research, a sample of nearly a quarter of the total local actions received was chosen, based on their relevance for the topic (see data collection).

3.4 Data collection

3.4.1 Literature review

A literature review of the scientific evidence was conducted regarding the links between housing hazards, housing interventions and health. Given the extensive amount of evidence in the field (e.g. more than 11000 articles in a PubMed search for housing and health), the literature review was limited to reviews, meta-studies and reviews of reviews where available. Searches using the

terms “housing” AND “health” and “housing interventions” AND “health” were made in scientific databases such as Tripdatabase, PubMed and Science Direct. In addition, manual searches were performed in a number of journals (*Journal of Urban Health, Health Promotion International*, etc.) and scientific reports from national and international organizations (WHO, EEA, CDC, Ministère de la Santé, etc.) to support the information provided in the dissertation. Overall, 26 studies and reports were identified, which are summarized in the section 2 “Literature review”.

3.4.2 Questionnaire

The questionnaire (see appendix 3) was conceived and agreed by all members of the group in November 2010. It was sent to the 74 cities of the network on December 10th. For each of the cities, it was sent at least to the two RFVS contact persons for the network (usually the politician in charge of health and the director of public health or similar). The contact persons were requested to complete the questionnaire in collaboration with other departments in the municipality.

The questionnaire consisted on a set of 27 open and closed questions. The first part of the questionnaire attempted to reveal specific aspects of the work of the public health departments relative to environmental health such as: the services with competences in this field; the existence of a Local Plan of Environmental Health and an Agenda 21; the main obstacles they face in order to implement actions and policies in environmental health; and the main topics they would like to exchange with other cities of the network. The second part specifically related to housing and health, and it was a set of 10 yes/no questions to identify the fields in which the cities had innovative actions. Each was followed by an open question asking for a short description of such actions along with the contact details. The aim of this part of the questionnaire was to identify the “state of the art” on the mentioned topics and provide examples and inspiration to the rest of the cities.

During the months of January and February, general and personal reminders were sent to the city technicians and politicians in order to improve the response rate. By 15th of April, 67.5% of the cities had replied either via an electronic or paper version.

3.4.3 Case study research

The identification of case studies was done in collaboration with the members of the working group, based on the information collected from the questionnaires. The selection criteria for the innovative actions to be included as a case study were the following:

- Original or outstanding actions of a particular city that were unique
- Actions that were undertaken in many cities but the approach chosen by a particular city made it innovative or exemplary.

- Actions that were developed in many cities but for some reasons they were especially relevant in one specific city (context, extent of the action, partnerships, etc).

In all, 52 case studies from 42 different cities (23% of the total number of actions originally identified through the questionnaire) were requested by email on March 4th. A text of 250 words maximum was requested for the action in question, which it was encouraged to include information about the context, the goals, the approach and the impacts of the action. In some cases, there was enough information available about specific actions (previous documents, questionnaires, internet, etc) that let us write a draft of the case study. In that case a confirmation of the suggested text was requested to the city, allowing any modifications that the responsible of the action considered necessary. During the following weeks, several personal reminders were sent to increase the response rate. By May 10th, 35 of the case studies requested (67.3%) were received

3.5 Data analysis

3.5.1 Qualitative analysis

A coding strategy was used to address the qualitative data obtained on housing and health in the questionnaire. All the actions of the cities were integrated into an excel ™ database and organized by topic. For each topic, codes were assigned to the different actions in order to further organize the data and allow comparisons between the codes (frequency, similarities and differences, links, etc).

3.5.2 Quantitative analysis

Statistical analyses of the questionnaire were performed using the software SPSS ™ 17.0. Initially, a descriptive analysis was undertaken for the closed questions and to explore the representativeness of the answers. Following this, hypothesis testing was used in order to evaluate the influence of three explanatory variables (size of the city's population, date of adhesion to the network and geographical location) on the number of fields on which the cities had innovative actions. The information about these 3 explanatory variables was obtained from internal documents of the RFVS (size and date of adhesion) and from maps (geographical location). In parallel, the entire set of actions on housing and health for each city was aggregated into a single quantitative response variable (ranging from 0 to 10) to allow the analysis.

Given the small sample size available for the test (50 cities), the three explanatory variables were turned into dichotomic qualitative variables (two comparison groups) with approximately even distribution of cities for each group. To decide the use of either parametric or non-parametric tests, the distribution of the variable "number of fields with innovative actions" was explored in each of the groups. The normality assumptions for the distributions were checked both graphically and by using the Shapiro-Wilk test.

Finally, the unpaired t-test was chosen for each of those three variables and the assumption of equality of variances was checked with the Levene's test.

To explore whether it was feasible for the test to give any significant results with such a small sample size, the Lehr's formula for calculating the sample size was used [46]. According to this formula, with a pre-established power of 80%, a significance level of 0.05, and assuming we wanted to detect a difference of at least two actions between the groups, a reasonable sample size was needed (16 for each group) if the standard deviation of the observations was of 2 actions.

The hypotheses to be tested for each pair of groups were:
Null hypothesis (H0): The mean number of fields with innovative actions is equal in the two groups of cities.
Alternative hypothesis (H1): The mean number of fields with innovative actions is not equal in the two groups of cities.

4. RESULTS AND DISCUSSION OF THE QUESTIONNAIRE

A total number of 50 cities out of 74 completed the questionnaire (67,5%). The representativeness of the responses was checked in terms of size of the cities, geographical location and date of adhesion to the network.

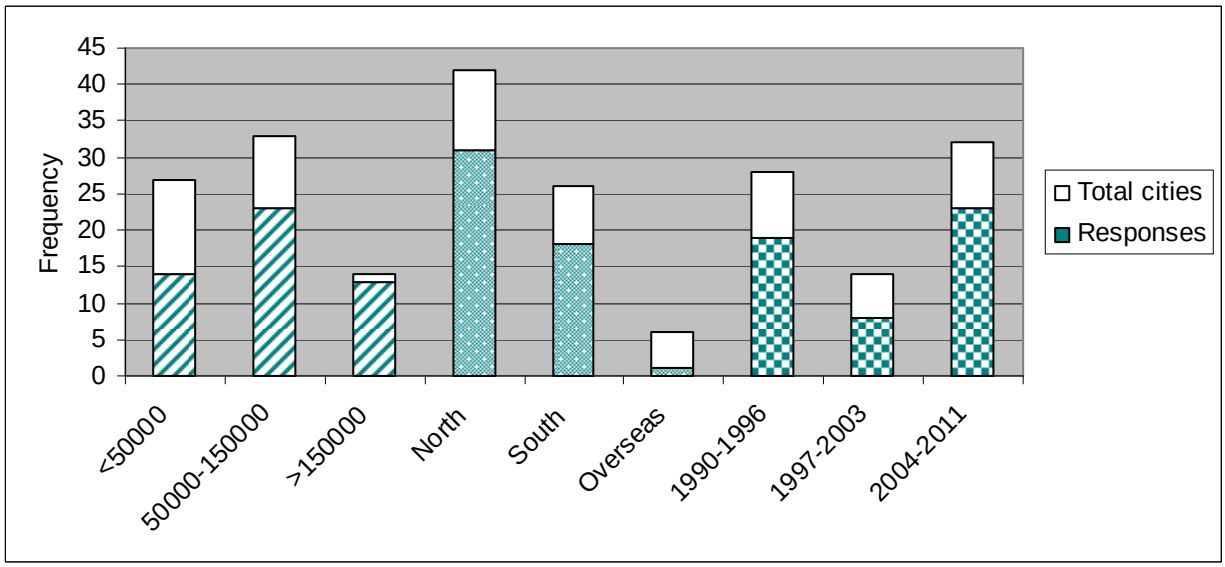


Figure 3. Representativeness of the responses: Size of the cities (left), geographical location (middle) and date of adhesion (right)

Regarding the size of the cities, the larger the size the higher was the response rate: Nearly all big cities (over 150000 inhabitants) answered, compared to 70% in medium size cities and around 50% in small cities (see fig.3). This could be due to the fact that smaller cities might have proportionally fewer human resources, consequently they did not have time to fill the questionnaire. It could also mean that they are less concerned for environment-health problems. In terms of date of adhesion and geographical location of the cities, all groups had similar response rates (between 60 and 70%) except for the overseas cities, amongst who the response rate was (only 1 answered). These results are consistent with previous questionnaires of the French network, in which overseas cities show very poor response rates. Overall, the response rate is satisfactory and slightly higher than in previous studies of the RFVS.

4.1. Environmental health

Regarding environmental health, the “communal services in hygiene and health” (SCHS) have important regulatory functions for municipalities. Among others, they have the responsibilities for health promotion and prevention of environmental risks (air and water quality, noise, food safety, housing, etc). In nearly half of the cities (46%) the service in charge of environmental health was in fact a SCHS. In many other cities (42%), however, other services had the functions of a SCHS such as “environmental health service”, “health promotion and education service”, “environmental hygiene and public health service”, etc. The remaining 12% did not answer this question. Due to the diversity of local structures, the competences of a SCHS might be integrated in a department,

even if it is not called that way. When asked where the competences of a SCHS were placed within the city, for the most part they were placed in public health departments (34%). In a quarter of cities they were placed in "technical" departments (25%) such as "Environment, health and sustainable development", "Environment and way of living", "Technical services and urban planning", etc. A significant proportion of cities had these competences at "solidarity" departments (11%). Other departments mentioned with the competences of a SCHS were "Urban ecology", "Sustainable development" and "Public space regulation and management". 15% of the cities did not have those competences at all. These results show that, regardless the department in charge, most of the cities (85%) have the competences to act on environmental health risks.

As mentioned before, WHO has encouraged the use of both Agenda 21 local and the implementation of city health plans as a means to tackle health risks arising from urban environments. In France, the Local Plans of Environmental Health (LPEH) are recently arising as optional approaches for the cities that can complement the PNSE at the local level. The results of this questionnaire show that, while an important proportion of the cities have already signed an Agenda 21, the implementation of LPEH is almost non-existent (see fig.4 and fig.5)

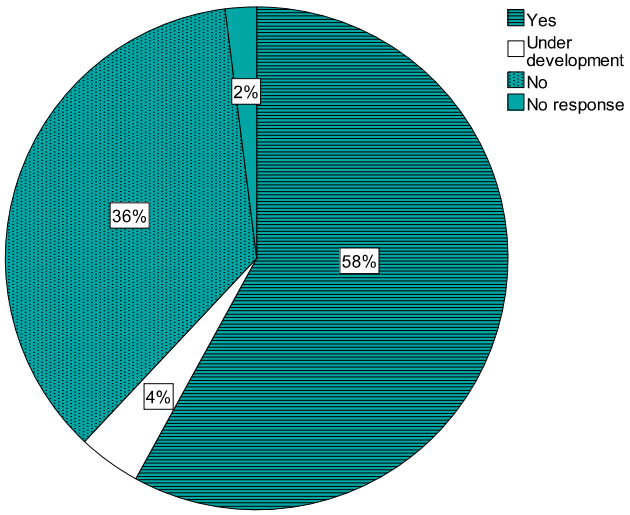


Figure 4. Existence of an Agenda 21

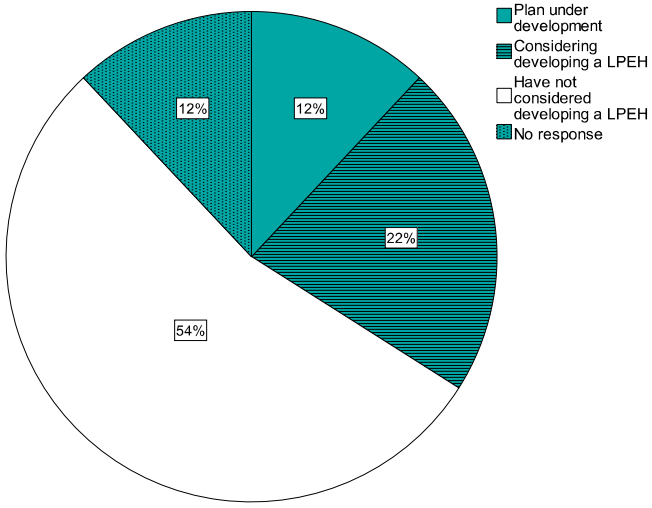


Figure 5. Existence of a Local Plan of Environmental Health

More than half of the cities have already signed a Local Agenda 21, and this rises to two thirds if the ones that are developing it are included. On the contrary, regarding the elaboration of a LPEH, no city has already developed and validated one. Furthermore, only six of the cities are in the process of developing one at this time and together with those who are considering developing a LPEH, the proportion rises to one third. Although the use of Local Agenda 21 is seen by WHO as a means to integrate health promotion into the sustainable development movement, the origin of such plans does not come specifically from the health promotion movement and does not necessarily have to include health in it. For this reason, we wanted to know to what extent health was present in the Local Agendas 21 of the French healthy cities (see fig.6). Among the cities that

have signed a Local Agenda 21, four cities have dedicated one section of the document specifically for health. In all, more than 70% of Agenda 21 included health.

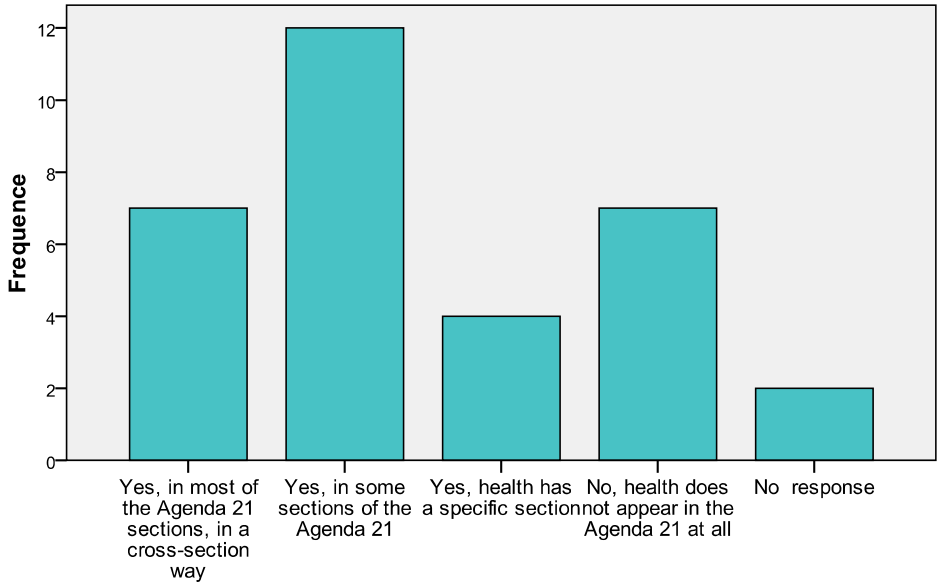


Figure 6. Presence of health in Local Agendas 21

The questionnaire also aimed at shedding light on the main obstacles found by the cities in order to implement actions or policies in environmental health. The question was open and several obstacles could be mentioned by one city. All responses were grouped in 8 categories: cross-sectoral collaboration; topic and field of action, material and financial resources; human resources; political interest; methodology and indicators available; and no problems (see table 1 below).

Table 1. Obstacles for local implementation of actions and policies in environmental health

Responses	Frequence	Percentage
Cross-sectoral collaboration	**11**	**24,5%**
Problems to work in cross-sectoral collaboration	4	
Multiplicity of actors and plans	2	
Local structures “too vertical”	1	
Lack of links between fields	1	
Articulation of competences, actions and policies	2	
Limited perception of health in services responsible for environment and urban planning	1	
Topic and field of action	**4**	**9%**
Field of action too large	2	
Field of action difficult to identify, involving different local policies	2	
Material and financial resources	**8**	**18%**
Lack of funding	6	
No resources allocated to this topic	1	
Capacity of real state developers to cope with environmental criteria	1	
Human resources	**6**	**13%**
Lack of human resources	5	
Workforce too small	1	
Political interest	**2**	**4,5%**
Lack of political interest	1	
Political project under development	1	
Methodology and indicators available	**2**	**4,5%**
Lack of methodology	1	
Lack of appropriate indicators	1	
No problems	**2**	**4,5%**
Others	**10**	**22%**

The main obstacle seems to be cross-sectoral collaboration, representing nearly a quarter of the responses. The field of environmental health, due to the broad range of topics concerning, involves many different professionals and departments within the local structures. This dispersion of competences along many specialized services is seen as a problem because there is no effective collaboration and coordination between them and each one remains on its field of expertise. It might also explain to some extent why it is seen as such a large topic and why roughly one third of the respondents consider that either financial or human resources are insufficient for the great deal of work that environmental health represents. When the competences and funding are not concentrated in one department, and are not well coordinated through effective collaboration between the departments involved, it results in action gaps, overlaps and inefficiencies. The lack of political interest, mentioned by two cities, might also influence the poor resource allocation on environmental health. Other obstacles were mentioned such as the lack of appropriate methodology and indicators, the lack of scientific knowledge in some topics, the lack of regulatory texts for action at the local scale, etc. Two cities did not find any problems at all.

Finally, RFVS seeks to facilitate the cities of the network to exchange information between them about topics of their interest. For this reason, we wanted to know what are the priority topics in environmental health to exchange with other cities. The 43 cities that answered this question gave a total of 94 responses. The answer was open and several topics could be suggested by each city. Unhealthy housing, noise and indoor air quality are seen to be the most important topics for the cities, accounting for nearly 60% of all responses (20% each). These results are consistent with those obtained in the second part of the questionnaire: these three topics are among the five fields (out of 10) in which the cities are developing more innovative actions. Some other relevant topics are outdoor air quality, urban planning and health, fuel poverty, water quality and electromagnetic waves, representing a fifth of the responses. Many others have been suggested (up to 20), such as health inequalities resulting from environmental risks, the implementation of a LPEH or the health risks linked to climate change.

4.2 Housing and health

Most of the 50 cities that answered the questionnaire (all but two) described at least one action they had developed and they considered as innovative in the field of housing and health. Some described actions in the ten fields. The main aim of identifying innovative actions was to disseminate good practices among cities and inspire the work of politicians and local departments. However, in parallel to this, statistical analyses were performed to check whether the mean number of fields with innovative actions in the cities could be influenced by their population size, geographical location or their date of adhesion to the network.

4.2.1 Hypothesis testing

All groups had very similar mean number of fields with innovative actions, ranging from 4 to 5 and the standard deviation of the distributions of the variable in all groups was almost equal (2.5-2.6). A summary of the statistics for each group is presented in appendix 4 (section a). The Shapiro-Wilk tests and the graphical representations of the dependent variable (number of fields with innovative actions) in the different groups suggested that the distributions could be assumed to be normal in all groups (see appendix 4, section b). Therefore, three t-tests were performed.

The results of the t-tests (see appendix 4, section c) show that for neither of the three comparison groups any statistically significant difference ($p<0.05$) was found between them (the results for "equal variances assumed" were used after checking the levene's test for equality of variances). The largest difference in mean values was found when comparing cities from the north and from the south, but there is no sufficient evidence to suggest that such difference is due to the geographical location. These results suggest that the number of fields with innovative actions in municipalities do not depend on their size, the geographical area where there are located or the number of years they have been engaged to the healthy cities values. Therefore, the possibilities for innovation are similar for all cities of the network regardless of these conditions.

4.2.2 Innovation at the local level

The qualitative results of this section are presented by topic. The descriptions of the most frequent and interesting innovative actions within the RFVS for each topic are complemented by a case study that illustrates the work of the cities. The total number of cities with actions for each topic is given in figure 8. Substandard housing is the topic for which the cities have described more innovative actions (29 responses) while improving water quality is the topic in which cities appear to have the fewest innovative activities (14 responses).

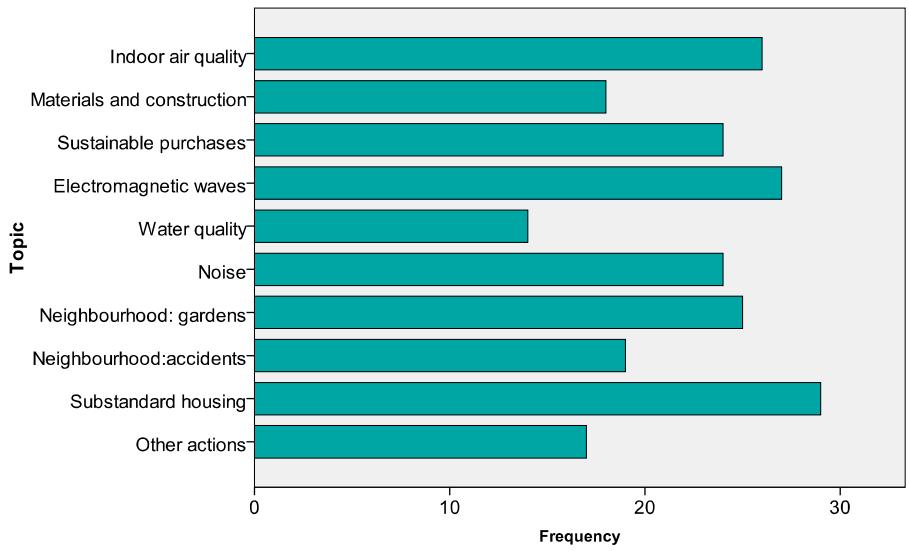


Figure 7. Number of French healthy cities with innovative actions for each topic

a. Indoor air quality

The most frequent innovative actions had to do with measures of the quality of air and with awareness campaigns (6 cities each). The measures were done in a range of buildings depending on the city: from unhealthy housing in Saint Denis to other public buildings such as community centres (Grand Synthe), schools or kindergartens (Bordeaux, Orleans, etc). The measures in public and private buildings had a focus on the prevention of risks associated to poor air quality, especially in children (see appendix 5, case study 1). In many cases collaboration with physicians allowed to make the links with the pathologies present in these populations. Such an approach can help improving the health status of people by just improving their indoor environment. The awareness campaigns differed too on their approaches and public. In Lomme or Salon de Provence, for example, the awareness was focused on the general public through conferences, pamphlets and advertisements. In Belfort and Nancy, however, the targets were health professionals and social workers, who can transmit in turn the message to the population. There were also some actions related to the prevention of radon. For example, in Nantes they measured the levels of this gas and when the results exceed recommended levels, they provided help to address the problem. Further actions involve the training of different professionals and the role of the new "advisors in indoor environment" within the cities.

b. Use of new materials or "healthy construction" techniques

The implementation of the criteria for "high environmental quality" in the new public buildings was the most common action, described by five cities. These criteria attempt to minimize the impact of the construction, maintenance and use of the building, on the environment, comfort and health. While the implementation in most cities is limited to schools and other public buildings, in others like Le Blanc Mesnil it comprises new subsidized housing as well. Other actions were related specifically to energy efficiency, with examples of a thermal study in La Roche Sur Yon and building isolation with ecologic materials in Nimes. 2 cities mentioned their local "eco-district" projects, which in the case of Lille it addresses both sustainable development and health promotion (see appendix 5, case study 2).

c. Sustainable purchases for housing and public buildings (furniture, etc)

In most of the cases the action in this field consists of encouraging the choice of environmentally friendly materials in public purchases, although the ways to do it and the type of materials stressed vary from one city to another. In Angers, for instance, it is done through a "charter of sustainable purchases", a public engagement signed by the city. Another solution is to integrate environmental criteria systematically in calls for tenders and public markets, which is done by Conflans Saint Honorine, Grand Synthe and Nice. In addition, Nantes has created a working group especially dedicated to improve best practices in all services through cross collaboration. The stress on the materials range from just ensuring purchases of paper and office materials with environmental

labels to taking into account the harmful indoor emissions coming from cleaning products, paints, furniture and carpeting, in cities like Amiens (see appendix 5, case study 3).

d. Electromagnetic waves

Two ways of addressing this problem appear to be more frequent among the cities of the network: charters of wireless telephony and measurements of exposure levels (12 replies each). The charters are agreements between the municipality and mobile network operators clarifying a set of rules and good practices regarding the installation of relay antennas (see appendix 5, case study 4). They include regular meetings in which they evaluate the operator's projects and the complaints of the population. In addition to these charters, cities like Bordeaux have bylaws that prohibit the installation of relay antennas close to schools. The measurements performed by the cities in order to survey the exposure levels target different populations: in Salon de Provence or Perpignan they perform them amongst the general population whereas in Metz they target "sensitive places" (hospitals and kindergartens) and in some other cities (Besançon, La Roche sur Yon, Valence, etc) the measurements are done in response to individual requests. In Lyon, they apply the principle ALARA (as low as reasonably achievable) and they modify the antennas when atypical results are obtained. Apart from information and awareness campaigns, other actions include the experimentation with lower emissions (0.6 volt) in La Rochelle and Saint Denis.

e. Housing water quality (e.g. drinking water, "grey" water)

When describing their innovative actions, 4 cities mentioned replacing lead pipes in the water distribution network. For instance, Bordeaux is promoting, with incentives to the owners, the replacement of lead pipes located between the main line of the street and individual meters. Other cities are replacing progressively the pipes in the network as a whole. Apart from ensuring water that is innocuous, complementary approaches are being developed: Aix les Bains and Nice have trained volunteers to warn of taste anomalies in tap water (see appendix 5, case study 5). In addition, three cities organised campaigns to inform about the quality of tap water and promote its use. A particular example is Dijon, where the city manufactured and distributed 30.000 attractive jars branded "la Dijonnaise" to promote tap water use in restaurants, bars, meetings, etc. Finally, the new systems of water recuperation (rain water, etc) have been taken into account. While Wasquehal is promoting the installation of recuperation systems (financial helps), Lyon is censing all households with such systems to survey in the future possible health problems associated to them, via Geographical Information Systems.

f. Noise inside the house and around the dwellings

The most frequent solution to the problem of neighbourhood noise was the "charter of noise" or "charter of night life", present in nine cities. Their main goal is to reach consensus between bars, night clubs, neighbours and municipality to ensure the respect of everyone. In addition, five cities

describe campaigns of noise level measurements with different purposes. In some cases, sonometric devices are installed along the city to survey the exposure levels of the population (due to transport, activities, etc.) and to develop noise cartographies. This might help acting against noise through urban planning, as it has been done in Rennes or Conflans Saint Honorine. In other cases, measurements are done by specialized services that go into place or by devices installed at hotspots (see appendix 5, case study 6), in order to check the noise levels when a complaint is issued. Some of the actions are focused on reduction of noise coming from transports, either through the coating materials used in the roads (Nice), panels close to railways (Aix les Bains) or better urban planning in new neighbourhoods (Chalon sur Saone). Finally, cities are using education campaigns as a means to raise awareness among young people and children about the health effects of noise, the need of respect of other's sleep, etc.

g. Environment surrounding the dwellings

Many of the actions were aimed at reducing accidents, which belonged to two main categories: walking buses and "zones 30". A walking bus, present in cities like Grande Synthe or Valence, is an initiative seeking to promote active travel at very early ages by accompanying children in their journey from home to school. The transformation of areas of the city into "zones 30" makes it compulsory for drivers to lower their speed under 30 km/h and pay special attention to pedestrians (particularly children), who have priority and the right to walk in the middle of the road. Even though traditionally, "zones 30" are present in areas with a great affluence of pedestrians and children, the trend in some cities is to extend these zones to new areas (the city centre or neighbourhoods as a whole). Some other actions are education campaigns (to both pedestrians and drivers), reductions in the length of some streets, improvements on the urban lay out in collaboration with the community or the development of cycling ways separated from road traffic.

Many cities also mentioned some sort of playground or shared garden surrounding the dwellings. Even though the fact of having a playground is not innovative in itself, Saint Quentin en Yvelines has installed one specially conceived for handicapped children. The movement of allotments and community gardens is not innovative either, both started many decades ago. Allotments encourage families to grow vegetables, by giving them a small piece of land outside the city centre at a low rent, whereas the latter proposes to do the same but in the neighbourhood, in a participative process with the local community. However, the extensive distribution in some cities and the activities promoted in parallel to their creation, make these actions particularly relevant. For instance, in Longwy they promote an ecological management of the gardens with no pesticides; in Metz they involve schools to promote gardening among children; and in Nantes it is used as a means to enhance social integration among the elderly and people with Alzheimer disease (see appendix 5, case study 7).

h. Actions of resorption of substandard housing

The efforts carried out by all municipalities on substandard housing pursue a common goal: the prevention and reduction of situations where families have to live in poor and hazardous housing conditions. However, their work takes many different names and organizational forms depending on the city: umbrella groups, departmental committees, units, local plans, charters, national programmes, etc. An interesting trait shared by most of such structures is their commitment to cross-sectoral work and partnerships as a means to tackle a problem that involves many different professionals: social workers, technical experts, health professionals, etc. Their actions might include some or all of the following: awareness, prevention, mediation, advocacy, disciplinary measures, rehabilitation, relocation, or social and medical follow up (see appendix 5, case study 8).

i. Other innovative actions

17 cities described innovative actions that did not belong to the previous fields. The most frequent action is focused on the management of housing-related complaints (substandard housing, noise, litter, maintenance, etc) for a more effective coordination and action. This is done through regular cross-sectoral meetings (La Roche sur Yon), use of specific software (Nantes) or cartography (Toulouse). Other interesting actions are: a observatory of smells in La Rochelle; an education campaign to reduce fuel poverty among poor households in Nancy; a local council on mental suffering that has a focus on housing-related problems in Reims (see appendix 5, case study 9); and health impact assessments carried out in Rennes.

5. OVERALL DISCUSSION

The aim of this dissertation is to provide information to French towns and cities about effective and ongoing housing interventions dealing with environmental risks in order to disseminate good practices and improve housing policies at the local level. For this purpose, a review of the existing evidence of the links between housing and health and of effective interventions can help raising public awareness. In addition, an exploration of the competences, obstacles and priorities on environmental health in the French context together with a description of local experiences should help policy-makers to identify challenges and potential solutions.

The findings in the literature review show that many links exist between housing conditions and both physical and mental health. The home represents an important source of exposure to many hazards (biological and chemical agents, noise, extreme temperatures, injuries, etc), given that people spend a large part of their life at home. In addition, the neighbourhood where the house is placed has an influence on proximal determinants of health such as the levels of physical activity and social interaction of the individuals. Both represent a source of inequities, since poor people are much more likely to live in worse dwellings and neighbourhoods, and their susceptibility to those hazards is greater. But revealing the links does not necessarily provide information about the effective methods to reduce such hazards. In this sense, few actions tackling housing hazards have sufficient evidence to prove an impact on health. This might be due to the fact that the relationships between housing and health are complex [31] and housing improvements have long term effects that aim at just one aspect of deprivation [30], making it very difficult to evaluate their actual impact. The actions with the greatest evidence supporting their effectiveness are: lead control [38], radon prevention and mitigation [39], the elimination of moisture and leaks [42], improvements in energy efficiency (insulation, central heating, etc) [30], and the installation and maintenance of smoke alarms [43].

The present study shows that, in general, the cities of the RFVS have the competences on environmental health distributed amongst many different departments and services. Yet, few cities (15%) lack of such competences. In addition, their commitment to sustainable development (and its link to health) is high, with a large proportion of cities having signed a Local Agenda 21 (58%) that includes, for the most part, references to health. These results contrast positively with those of an earlier study [47] in which half of the countries surveyed in the European region, including France, had a very low proportion of cities with Local Agenda 21 (<10%). However, substantial problems still exist: none of the cities have developed a Local Plan of Environmental Health yet and only a third are developing or thinking about developing one; cross-sectoral collaboration is perceived as the most important obstacle in the implementation of policies and actions on

environmental health; and few financial and human resources seem allocated for the work at the local level.

The priority environmental health topics for which the cities wish to exchange more information are substandard housing, noise and indoor air quality. In this sense, this dissertation provides evidence and local experiences about the three of them. In addition, the WHO Regional Office for Europe has published a manual for developing local housing and health action plans, together with recent guidelines for noise and indoor air quality [45,48,49] and the CDC Healthy Homes initiative [50] provides extensive documentation to public health and housing professionals on substandard housing and indoor air quality.

The last part of the dissertation shows that there are many possibilities for action at the local level on the different topics relating to housing and health. In addition, factors such as the size of the city, its geographical location or the time the city has been working with a "healthy cities commitment" do not seem to have an influence on the local possibilities for innovation. A great variety of interventions are being carried out, often in partnership with other local structures and supported by community consultation or participation. In many cases they include very specific actions to measure the levels of exposure to environmental risks and interventions to reduce them when they are hazardous. But the experiences described here reveal many other complementary approaches: general awareness and education campaigns; advocacy and mediation; local legislations; etc. Apart from the general analysis of all the actions carried out by the cities, the illustration with local experiences in the form of case studies allows the dissemination of innovative actions. This might serve as inspiration and model for other municipalities, encouraging good practices at the local level across France. Even though previous studies regarding housing and health have looked at individual (local) examples or at national policies, to our knowledge no study has approached the subject by looking at local examples across the national territory. Similar studies in different countries could help enlarging the evidence base on the subject and would allow dissemination of local experiences and comparisons at an international level.

5.1 Strengths and limitations

The evidence on urban environments, housing and health includes a variety of research methodologies. To inform policy-makers about the hazards and possible actions to take against them at the local level, it has been suggested that not only epidemiological evidence is needed, but also other socio-political studies with a mix of methodologies [5,7,8]. For instance, the 2008 WHO expert meeting on Policy advice on urban planning, environment and health [5] recommends the "identification of local challenges in urban planning in relation to environment and health (based on an evidence review, case studies and local authority representatives' experiences)". This

dissertation, despite the time constraints of a four month practicum that combines research and work for the RFVS, attempts to generate such a mix of evidence.

As the field of housing and health is large, the literature review prioritized systematic reviews and international reports to explore the evidence about the impacts of housing hazards and housing interventions on health and the socioeconomic determinants of health. By using reviews of complementary reviewed topics related to housing, it attempts to give a global perspective on the field. However, the approach has important limitations. To begin with, the use of reviews both appraised in systematic and non-systematic ways has the potential of missing important original studies and therefore drawing insufficiently documented conclusions. For instance, a systematic review of reviews on a housing and health-related topic found that most of the reviews drew on less than half the available primary studies [34]. In addition, the time constraints meant that the inclusion and description of the reviews were not appraised systematically, which may weaken the conclusions of this report.

Secondly, the questionnaire and the case studies show the progress of the members of the RFVS on environmental health and particularly on housing and health. By including actions carried out by cities of all sizes and geographical locations within France, the examples provided here might be generalized to a wide range of local contexts. The RFVS members comprise nearly one quarter of the French population and were well represented in the study. However, the network gathers most big cities in France but it might not be representative of the smaller cities and towns in France. Furthermore, the questionnaire was to be filled in collaboration with the different departments and professionals with competences in environmental health, thus showing the local reality of their work. An important limitation of the results is the extent to which the questionnaire was filled collaboratively, which might affect the validity of the results: many innovative actions and other data might not have been identified if the services concerned did not participate in the process of filling up the questionnaire, therefore missing very valuable information.

Another limitation of the questionnaire is the reliance on the subjective opinion of the respondents to consider an action as innovative or not. This point might have an important impact on the results of the statistical tests, diluting or increasing the effect of the variables. For instance, larger cities might include only the most innovative out of the many actions they develop, whereas smaller cities, with less personnel and resources might have a “lower threshold” for what they include as an innovative action. In addition, given that the study unit was the town or city, the resulting sample for the test was very small (less than 30 cities per group), which may have weakened the assumptions and results of the test.

5.2 Future directions for research

The present study describes the experiences and actions of the cities of the RFVS, helping identify the state of the art on housing and health at the present moment. However, it was not the aim of this dissertation to evaluate the effectiveness of those actions. Further research could take advantage of such a wide range of local contexts and actions in order to evaluate the health impact of different policies and interventions carried out.

In addition, the local plans of environmental health are a very recent idea in France and still under development in the cities of the network. They have the potential of becoming a very useful tool for the cities to address the environmental health problems adapted to their local circumstances. Further research is needed to follow up the evolution of these plans and their impact on local policies and actions on environmental health.

6. CONCLUSION

In order to improve health among the French population and reduce health inequalities, improving housing policies is important as it is acting on the risks associated to housing conditions. Given that a large part of the housing competences are decentralized, there is an urgent need for strategies that think globally but act according to local needs. The present study reveals that evidence exists regarding health improvements after housing interventions. Despite resource constraints and the difficulties inherent to cross-sectoral collaboration in the field, the possibilities for action at the local level are very large. The innovative actions presented here comprise, among others, interventions against environmental risks, awareness and education campaigns, advocacy and mediation. They can serve as inspiration for cities in France, encouraging good practices at the local level across France. Future research is needed to evaluate the impact of actions undertaken at the local level and of local plans of environmental health.

7. REFERENCES

[1] EEA (2011). "About the urban environment." Retrieved February 15 2011, from http://www.eea.europa.eu/themes/urban/about-the-urban-environment.

[2] Northridge, M., E. Sclar, et al. (2003). "Sorting out the connections between the built environment and health: A conceptual framework for navigating pathways and planning healthy cities." Journal of Urban Health **80**(4): 556-568.

[3] Whitehead, M. and G. Dahlgren (1991). "What can be done about inequalities in health?" The Lancet **338**(8774): 1059-1063.

[4] Barton, H. (2009). "Land use planning and health and well-being." Land Use Policy **26**(Supplement 1): S115-S123.

[5] Grant, M., M. Braubach, et al. (2010). "Urban planning, environment and health: From evidence to policy action", WHO Regional Office for Europe.

[6] Barton, H. and C. Tsourou, Eds. (2004). Urbanisme et santé: Un guide pour un urbanisme centré sur les habitants, S2D/Association internationale pour la promotion de la santé et du développement durable.

[7] De Leeuw, E. (2010). "Mixing Urban Health Research Methods for Best Fit." Journal of Urban Health **87**(1): 1-4.

[8] Gibson, M., M. Petticrew, et al. (2011). "Housing and health inequalities: A synthesis of systematic reviews of interventions aimed at different pathways linking housing and health." Health & Place **17**(1): 175-184.

[9] de Leeuw, E. (2009). "Evidence for Healthy Cities: reflections on practice, method and theory." Health Promotion International **24**(suppl 1): i19-i36.

[10] Thomson, H., R. Atkinson, et al. (2006). "Do urban regeneration programmes improve public health and reduce health inequalities? A synthesis of the evidence from UK policy and practice (1980–2004)." Journal of Epidemiology and Community Health **60**(2): 108-115.

[11] Wilkinson, R. and M. Marmot (2003). Social determinants of health: The solid facts. Copenhagen, WHO Regional office for Europe.

[12] WHO (2008). Closing the gap in a generation. Health equity through action on the social determinants of health. Copenhagen, WHO. Commission on Social Determinants of Health.

[13] Braubach, M. and J. Fairburn (2010). "Social inequities in environmental risks associated with housing and residential location—a review of evidence." The European Journal of Public Health **20**(1): 36-42.

[14] Kuholski, K., E. Tohn, et al. (2010). "Healthy Energy-Efficient Housing: Using a One-Touch Approach to Maximize Public Health, Energy, and Housing Programs and Policies." Journal of Public Health Management and Practice **16**(5): S68-S74 10.1097/PHH.1090b1013e3181ef1094aca.

[15] WHO (2007). Large analysis and review of European housing and health status (LARES), WHO Regional Office for Europe.

[16] Fondation Abbé Pierre (2011). Rapport 2011 sur l'état du mal-logement en France. Fondation Abbé Pierre.

[17] WHO (2010). Parma Declaration on Environment and Health. Parma, WHO Regional Office for Europe.

[18] WHO (2005). Housing and health regulation in Europe. Copenhagen, WHO Regional Office for Europe.

[19] Ministère de la santé et des sports (2009). "Santé Environnement - 2ème Plan national 2009 -2013 (PNSE2)". Ministère de l'écologie, de l'énergie, du developpement durable et de la mer, Ministère de la santé et des sports, Ministère de l'enseignement supérieur et de la recherche, Ministère du travail, des relations sociales, de la famille, de la solidarité et de la ville.

[20] (2010). "Le Grenelle de l'Environnement." Retrieved 10 March, 2011, from http://www.legrenelle-environnement.fr/.

[21] Havard, M., J. Jouzel, et al. (2010). Plan Adaptation Climat. Rapport des groupes de travail de la concertation nationale. Ministère de l'écologie, de l'énergie, du developpement durable et de la mer.

[22] WHO (1997). Twenty steps for developing a healthy cities project, 3rd edition. Copenhagen, WHO Regional Office for Europe.

[23] WHO, Ed. (1997). City planning for health and sustainable development. Copenhagen, WHO Regional Office for Europe.

[24] Tsouros, A. and G. Green (2009). "Health Promotion International: special supplement on European Healthy Cities." Health Promotion International **24**(suppl 1): i1-i3.

[25] Barton, H., M. Grant, et al. (2009). "Healthy urban planning in European cities." Health Promotion International **24**(suppl 1): i91-i99.

[26] WHO (2009). Zagreb declaration for healthy cities. Copenhagen, WHO Regional Office for Europe.

[27] Janss Lafond, L. and Z. Heritage (2009). "National networks of Healthy Cities in Europe." Health Promotion International **24**(suppl 1): i100-i107.

[28] Smith, K. D. (2010). "From Healthy Homes to Health Equity." Journal of Public Health Management and Practice **16**(5): S3-S4 10.1097/PHH.1090b1013e3181ee1090aaa.

[29] Meyer, P. A. (2010). "Healthier Homes for a Healthier Nation." Journal of Public Health Management and Practice **16**(5): S1-S2 10.1097/PHH.1090b1013e3181f5241a.

[30] Thomson, H., S. Thomas, et al. (2009). "The Health Impacts of Housing Improvement: A Systematic Review of Intervention Studies From 1887 to 2007." Am J Public Health **99**(S3): S681-692.

[31] Jacobs, D. E., M. J. Brown, et al. (2010). "A Systematic Review of Housing Interventions and Health: Introduction, Methods, and Summary Findings." Journal of Public Health Management and Practice **16**(5): S5-S10 10.1097/PHH.1090b1013e3181e1031d1009.

[32] Krieger, J. and D. L. Higgins (2002). "Housing and Health: Time Again for Public Health Action." Am J Public Health **92**(5): 758-768.

[33] Thomson, H. and M. Petticrew (2005). Is housing improvement a potential health improvement strategy? Copenhagen, WHO Regional Office for Europe (Health Evidence Network).

[34] Bond, L., E. Sautkina, et al. (2011). "Mixed Messages about Mixed Tenure: Do Reviews Tell the Real Story?" Housing Studies **26**(1): 69 - 94.

[35] Lindberg, R. A., E. D. Shenassa, et al. (2010). "Housing Interventions at the Neighborhood Level and Health: A Review of the Evidence." Journal of Public Health Management and Practice **16**(5): S44-S52 10.1097/PHH.1090b1013e3181dfbb1072.

[36] Deguen, S. and D. Zmirou-Navier (2010). "Social inequalities resulting from health risks related to ambient air quality—A European review." The European Journal of Public Health **20**(1): 27-35.

[37] US EPA (2004). Integrated risk information system: Lead and compounds. Retrieved 21 February 2011, from: http://www.epa.gov/iris/subst/0277.htm

[38] Sandel, M., A. Baeder, et al. (2010). "Housing Interventions and Control of Health-Related Chemical Agents: A Review of the Evidence." Journal of Public Health Management and Practice **16**(5): S24-S33 10.1097/PHH.1090b1013e3181e1093cc1092a.

[39] National Collaborating Centre for Environmental Health. (2008). Effective Interventions to Reduce Indoor Radon Levels. Vancouver, National Collaborating Centre for Environmental Health.

[40] Ministère du travail, de l'emploi et de la Santé (2008). "Les effects du radon sur la santé". Retrieved 5 May, 2011, from: http://www.sante.gouv.fr/les-effets-du-radon-sur-la-sante-humaine.html

[41] WHO (2000). Air quality guidelines for Europe. 2nd edition. Copenhagen, WHO Regional Publications, European Series, No. 91.

[42] Krieger, J., D. E. Jacobs, et al. (2010). "Housing Interventions and Control of Asthma-Related Indoor Biologic Agents: A Review of the Evidence." Journal of Public Health Management and Practice **16**(5): S11-S20 10.1097/PHH.1090b1013e3181ddcbd1099.

[43] DiGuiseppi, C., D. E. Jacobs, et al. (2010). "Housing Interventions and Control of Injury-Related Structural Deficiencies: A Review of the Evidence." Journal of Public Health Management and Practice **16**(5): S34-S43 10.1097/PHH.1090b1013e3181e1028b1010.

[44] Centre d'information et de documentation sur le bruit. (2009) Guide du maire: Bruits de voisinage. Paris, Centre d'information et de documentation sur le bruit

[45] WHO (2009). Night noise guidelines for Europe. Copenhagen, WHO Regional Office for Europe**:** 184.

[46] Petrie A. Sabin C. (2005) Medical Statistics at a Glance, Second Edition. Blackwell Publishing

[47] ARE (2005) National promotion of local agenda 21 in Europe. Federal Office for Spatial Development (ARE)

[48] WHO (2009). WHO guidelines for indoor air quality: Dampness and mould. Copenhagen, WHO Regional Office for Europe.

[49] WHO (2007). Local housing and health action plans: A project manual. Copenhagen, WHO Regional Office for Europe.

[50] CDC (2011). Healthy homes: public health and housing professionals. Retrieved 30 May 2011, from: http://www.cdc.gov/healthyhomes/ByAudience/Professionals.html

8. APPENDICES

Appendix 1 : Members of the WHO French Healthy Cities Network

Mai 2011

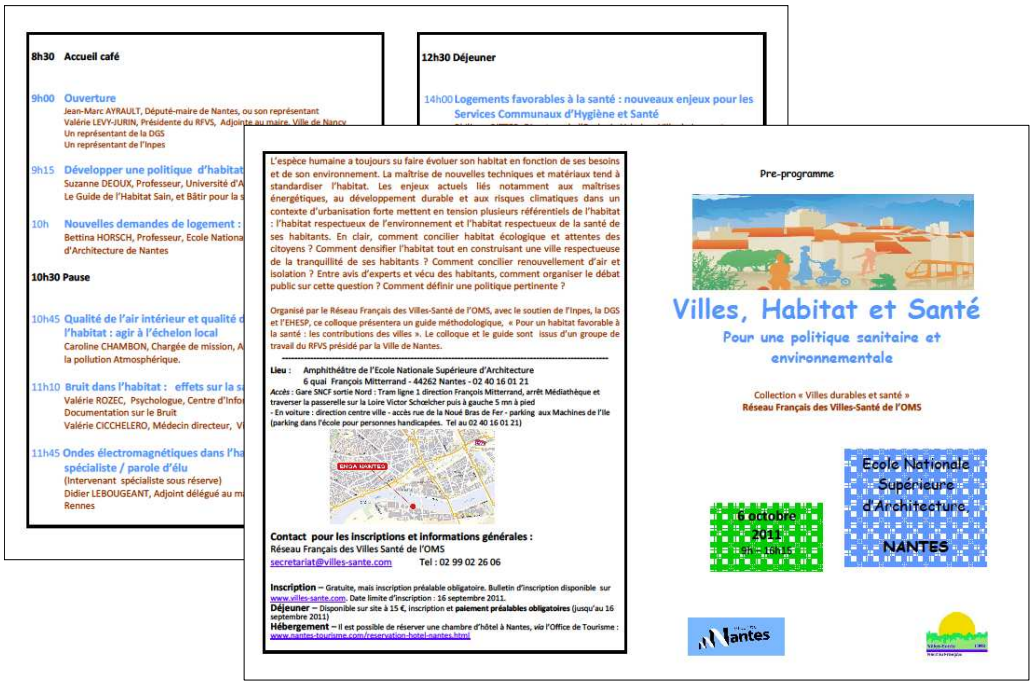
In bold : cities that answered the questionnaire

Aix les Bains
Ajaccio
Amiens
Angers
Aubagne
Aulnay-Sous-Bois
Beaumont
Belfort
Besançon
Blois
Bordeaux
Boulogne-Billancourt
Bourgoin-Jallieu
Brest
Briançon
Calais
Chalon Sur Saône
Châteauroux
Corbeil-Essonnes
Conflans Ste Honorine
Dijon
Dunkerque
Dunkerque (C.U)
Evry
Fort de France
Grande-Synthe
Grand-Nancy (CA)
Grasse
Grenoble
La Rochelle
La Roche sur Yon
Le Blanc Mesnil
Le Lamentin
Le Portel
Lille
Lomme
Longwy
Lorient
Lormont
Lyon
Marseille
Metz
Montpellier
Mulhouse
Nancy
Nantes
Nice
Nîmes
Orléans
Orly
Perpignan
Quimper
Reims
Rennes
Roman Sur Isère
Roubaix
Rouen
Saint-Brieuc
Saint-Dié-Des-Vosges
Saint-Denis
St Jean de la Ruelle
Saint-Joseph (Réunion)
Saint-Paul (Réunion)
Saint-Pierre (Réunion)
St Quentin en Yvelines (CA)
Salon-de-Provence
Toulouse
Valence
Vandoeuvre lès Nancy
Vaulx en Velin
Villeneuve d'Ascq
Villeurbanne
Wasquehal
Yzeure

Appendix 2: Outcomes of the RFVS working group on housing and health

1. Methodological guide on housing and health

2. Congress on housing and health



Appendix 3: Questionnaire Housing and health (French)

Ce questionnaire peut être rempli soit en version électronique, en remplissant les encadrés grisés ajustables au texte et en cliquant sur les cases à cocher (ensuite à retourner à zh@villes-sante.com), soit en format papier à l'adresse postale précisée à la fin du questionnaire. Il est en 2 parties. La première a 5 questions relatives à la santé environnementale dans votre ville, la deuxième étant plus spécifiquement sur habitat et santé.

VILLE : ……..... **NOM :** ……
Nombre d'habitants : …….. **Email :** ……..…

Santé Environnementale

1. a) Dans votre ville, où sont situées les compétences d'un 'Service Communal Hygiène et Santé, (SCHS) ?

☐ Pas de compétences SCHS à notre ville
☐ Dans une direction Solidarité
☐ Dans une direction Santé Publique
☐ Dans une direction technique, merci de préciser laquelle ……
Autre ……..

b) Comment s'appelle le service qui a la responsabilité de la santé environnementale ?

☐ SCHS
Autre ……..

2. Etes-vous en train d'élaborer un Plan Local Santé Environnementale (LPEH)?

☐ Plan validé et en place
☐ Plan en cours d'élaboration
☐ Début d'une réflexion sur un plan
☐ Pas de réflexion sur un LPEH actuellement

Si votre ville a déjà validé un Plan Local Santé Environnement, veuillez nous envoyer une copie.

3. a) Votre ville a-t-elle signée un Agenda 21 / Plan Climat ?

☐ Oui ☐ Non

b) Si oui, la santé est-elle présente ?

☐ Oui, dans les plupart des volets de l'Agenda 21 de façon transversale
☐ Oui, dans quelques volets de l'Agenda 21
☐ Oui, la santé a un volet spécifique
☐ Non, la santé ne figure pas dans l'Agenda 21 / Plan Climat

4. Quels sont pour vous les principaux obstacles à la mise en place des actions/politiques autour de la thématique Santé Environnementale ? ……..
……

5. Pour vous, quelles sont les thématiques 'Santé Environnementale' prioritaires sur lesquelles vous souhaitez échanger avec d'autres villes ? ……
……

Habitat et Santé : Recherche des études de cas et illustrations

En préparation d'un guide méthodologique du RFVS sur l'habitat et santé qui sera publié mi-2011, avez-vous des actions / projets / politiques sur les thématiques suivantes ? Si oui, veuillez indiquer le titre de votre action et aussi le nom de la personne à contacter pour plus d'information. Les actions sélectionnées pour le guide seront contactées en février.

1. Qualité de l'air intérieur
Avez-vous une action innovante dans ce champ ? Oui ☐ Non ☐

Si oui, son titre et une description courte
……
……
……
……
Personne à contacter pour plus d'information :
Nom …… Fonction ……
Email …… Téléphone ……

2. Utilisation de nouveaux matériaux ou techniques de « construction saine »
Avez-vous une action innovante dans ce champ ? Oui ☐ Non ☐

Si oui, son titre et une description courte
……
……
……
……
Personne à contacter pour plus d'information :
Nom …… Fonction ……
Email …… Téléphone ……

3. Achats durables dans l'habitat et dans les établissements recevant du public (ERP) (mobiliers…)?
Avez-vous une action innovante dans ce champ ? Oui ☐ Non ☐

Si oui, son titre et une description courte
……
……
……
……
Personne à contacter pour plus d'information :
Nom …… Fonction ……
Email …… Téléphone ……

4. Ondes électromagnétiques (rayonnements non ionisants….)
Avez-vous une action innovante dans ce champ ? Oui ☐ Non ☐

Si oui, son titre et une description courte
……
……
……
Personne à contacter pour plus d'information :
Nom …… Fonction ……
Email …… Téléphone ……

5. Qualité de l'eau dans un logement (ex : eau de boisson, eau grise)
Avez-vous une action innovante dans ce champ ? Oui ☐ Non ☐

Si oui, son titre et une description courte
……
……
……
Personne à contacter pour plus d'information :
Nom …… Fonction ……
Email …… Téléphone ……

6. Environnement sonore : bruit dans un logement et autour des habitations
Avez-vous une action innovante dans ce champ ? Oui ☐ Non ☐

Si oui, son titre et une description courte

……

……

……

……

Personne à contacter pour plus d'information :

Nom …… Fonction ……

Email …… Téléphone ……

7. Environnement autour des logements (1) : modifications en vue de réduire les accidents des enfants / zones sans circulations …

Avez-vous une action innovante dans ce champ ? Oui ☐ Non ☐

Si oui, son titre et une description courte

……

……

……

Personne à contacter pour plus d'information :

Nom …… Fonction ……

Email …… Téléphone ……

8. Environnement autour des logements (2) : mise en place aires de jeux / jardins partagées / jardins potagers …

Avez-vous une action innovante dans ce champ ? Oui ☐ Non ☐

Si oui, son titre et une description courte

……

……

……

Personne à contacter pour plus d'information :

Nom …… Fonction ……

Email …… Téléphone ……

9. Actions de résorption de l'habitat indigne

Avez-vous une action innovante dans ce champ ? Oui ☐ Non ☐

Si oui, son titre et une description courte

……

……

……

Personne à contacter pour plus d'information :

Nom …… Fonction ……

Email …… Téléphone ……

10. Autres actions innovantes

Avez-vous d'autre(s) action(s) innovante(s) dans le champ de la santé et de l'habitat ?

Oui ☐ Non ☐

Si oui, son titre et une description courte

……

……

……

Personne à contacter pour plus d'information :

Nom …… Fonction ……

Email …… Téléphone ……

Nous vous remercions vivement pour votre collaboration.

Questionnaire à retourner avant le **24 janvier 2011** svp:

zh@villes-sante.com

ou Zoë HERITAGE, RFVS, S/C SHSC, EHESP Av Léon Bernard, 35043 RENNES

Appendix 4. Hypothesis testing

a) Descriptive analysis

Table 2. Statistic summary for the number of fields with innovative actions in different groups

Group		N	Mean (std. deviation)	Percentile		
				25%	50 %	75%
Population size	<100 000 inhabitants	24	4,1 (2,5)	2	4,5	5,5
	> 100 000 inhabitants	26	4,5 (2,6)	2	5	7
Geographical location	North	31	4,0 (2,5)	2	4	5
	South	18	5,0 (2,6)	2	6	7
Date of adhesion	1990-2000	24	4,0 (2,6)	2	4	6,5
	2001-2011	26	4,6 (2,5)	2	5	6

b) Normality tests

Null hypothesis (H0): The normal distribution and the distribution compared are equal.

Alternative hypothesis (H1): The normal distribution and the distribution compared are not equal.

Table 3. Summary results from Shapiro-Wilk test for Population size groups

		Shapiro-Wilk		
		z	Degrees freedom	Prob>z
Population size	>100 000	0.955	24	0.341
	<100 000	0.948	26	0.208

Figure 8. Normal Q-Q plots of the distribution of innovative actions in the Population size groups

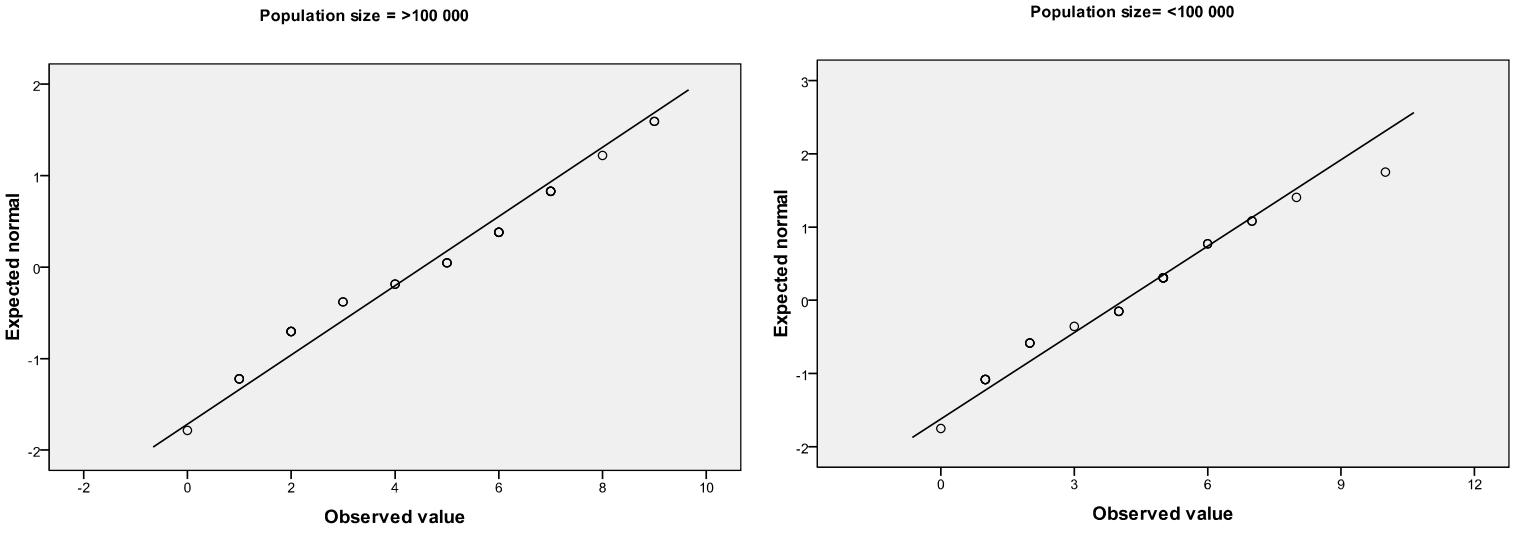


Table 4. Summary results from Shapiro-Wilk test for Date of adhesion groups

		Shapiro-Wilk		
		z	Degrees freedom	Prob>z
Date of adhesion	1990-2000	0.947	24	0.232
	2001-2011	0.947	26	0.202

Figure 9. Normal Q-Q plots of the distribution of innovative actions in Date of adhesion groups

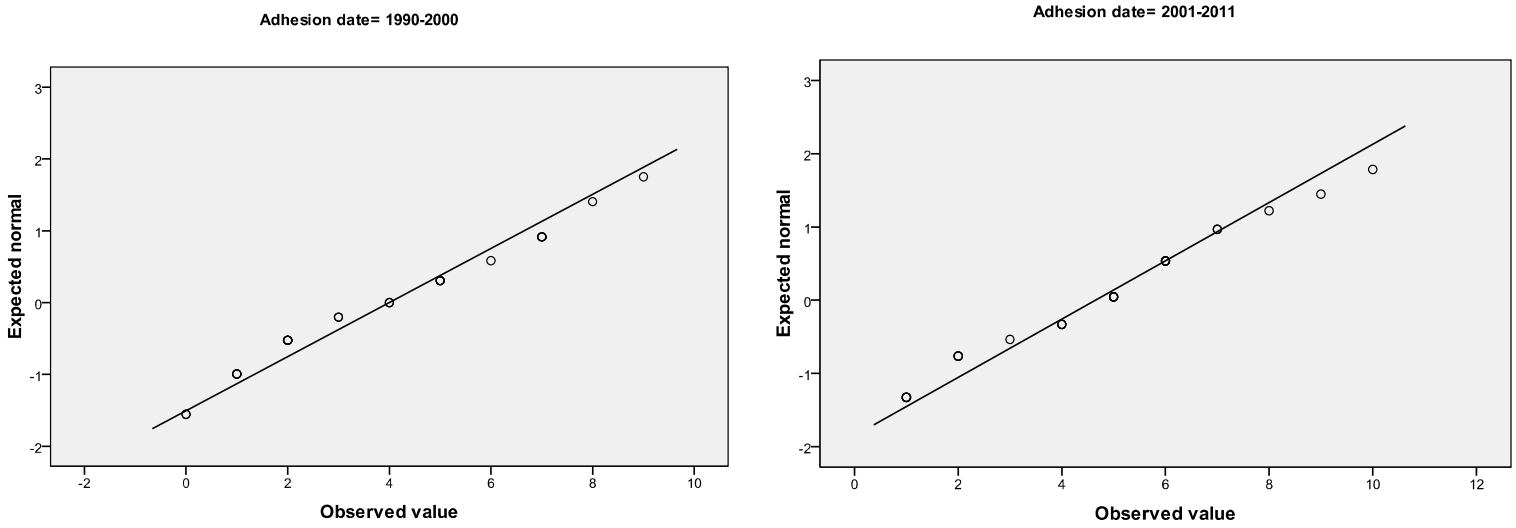
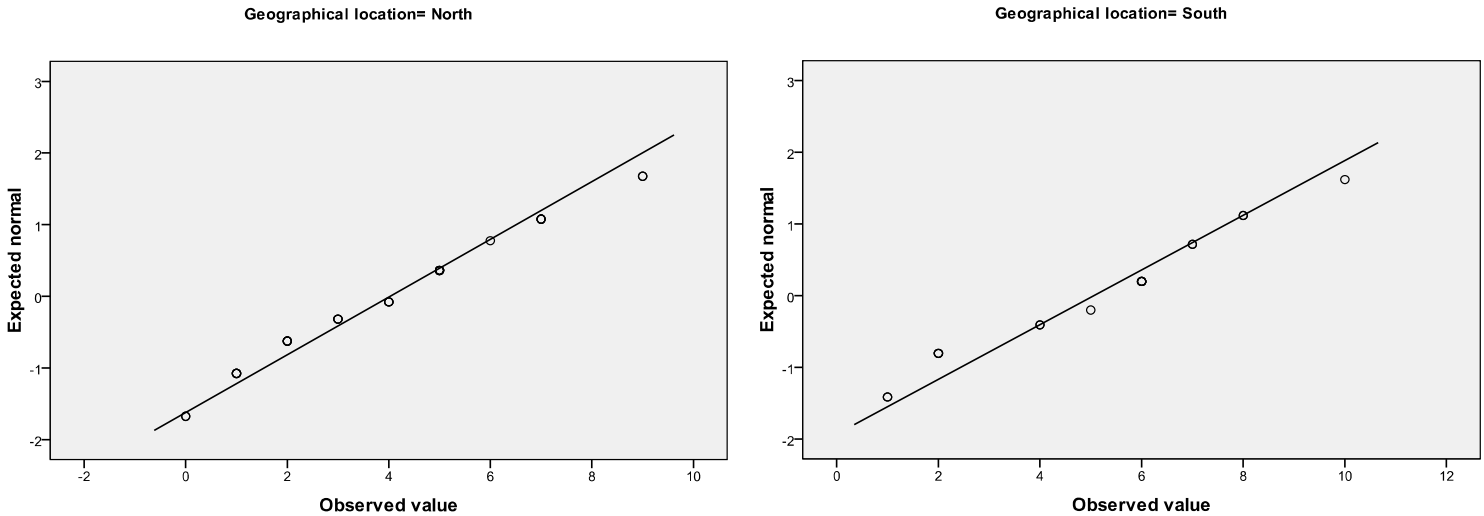


Table 5. Summary results from Shapiro-Wilk test for Geographical location groups

		Shapiro-Wilk		
		z	Degrees freedom	Prob>z
Geographical location	North	0.952	31	0.180
	South	0.937	18	0.259

Figure 10. Normal Q-Q plots of the distribution of innovative actions in the Geographical location groups



c) Unpaired t-test results

Table 6. Unpaired (two sample) t-test results for the number of innovative actions in different groups

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Population groups	Equal variances assumed	,338	,564	-,563	48	,576	-,413	,734
	Equal variances not assumed			-,564	47,910	,575	-,413	,733
Geography groups	Equal variances assumed	,097	,757	-1,362	47	,180	-1,023	,751
	Equal variances not assumed			-1,342	34,070	,188	-1,023	,762
Adhesion groups	Equal variances assumed	,338	,564	-,563	48	,576	-,413	,734
	Equal variances not assumed			-,564	47,910	,575	-,413	,733

Appendix 5: Case studies for each topic

Only a part of the total number of case studies collected (one per topic) is illustrated here. For further examples please refer to the book "*Pour un habitat favourable à la santé: les contributions des villes*", which will be published in September 2011 and available from www.villes-sante.com.

Case-study 1: Project "Live your house in good health"

Health promotion actions target two neighbourhoods with old buildings and economically poor households. It aims to reduce health inequalities by improving poor housing conditions, educating people to maintain a healthy indoor environment and avoid the risks. It is expected to reduce respiratory problems in children aged 0 to 6 years old.

The project develops three core actions:

- An interactive process of listening and advice with neighbours, due to the existence of a local social centre.
- Information sessions taking place in existing community workshops (schools, health insurances, etc), run by the service "Hygiene and health"
- Individual interventions in private houses, in collaboration with a local association, to help people improving the quality and comfort of their apartment. The works (reparations, etc) are done together with the tenant.

Evaluation (indicators): Estimation of the number of houses in this two neighbourhoods with housing problems; number of people informed collectively in the workshops; number of people backed by the association; number of medical visits (paediatricians and general practitioners) for children aged 0 to 6 in these neighbourhoods; number of medical visits resulting in antibiotic prescriptions.

Source : City of Nimes

Case study 2: A health section in the projects of « eco-districts »

The great challenges at the origin of the concept of « eco-districts » are environmental, sanitary, social and economic: they cross every profession involved in urban planning and construction.
Lille's project of eco-districts attempts to act at the local scale not only on the physical environment but also on the health problems related to that environment, both physical and psychological. It seems possible to promote a healthy way of living through the eco-districts. For this reason, Lille's project has an explicit section about the health of the citizens, with concrete goals:

- To preserve everyone's health by encouraging the adoption of healthier and safer lifestyles. The surveillance of health risks (pollution, noise, allergens…) is emphasized.
- To decrease pollution and nuisances through the organization of neighbourhoods, the improvement of environments and the use of healthy materials in the lay out and construction
- To conceive comfortable housing better adapted to everybody, with especial attention to outdoor spaces, the ventilation of places, visual quality and user-friendlyness.
- To create places that promote walking and relaxation, enhancing recreational activities and sports.
- To take into account the present and future needs linked to an aging population and to provide adapted and adaptable housing and public spaces to cope with these needs.

When taking into account the health dimension within the ecodistric projects, it is possible to complement environmental approaches and benefit our population and also future generations.

Source : City of Lille

Case study 3: Working group on the emissions coming from cleaning products

Indoor air quality represents a topic with great development in environmental health. The presence in indoor environments of many substances and the time spent in such environments (90% of the time) make it a legitimate environmental health worry. We can mention for example respiratory diseases and problems (such as asthma) that keep increasing in the region. Children are particularly vulnerable to these risks, due to their increased susceptibility to toxic products at specific periods of their development.

In the frame of the future call for tenders (public markets) for hygiene and maintenance products used in kindergarten, the municipal service « Hygiene and environmental health » has proposed a new step for the choice of such products. All products must respect the French reference values in indoor air quality (VGAI long-term).

After a collection of needs with the directors of the kindergartens, the conditions applicable to the products have been defined:
1) For the multi-use hygiene and cleaning products (apart from disinfectants). These products must respect the requirements of the European eco-label or similar. Criteria for dilution and others have then been included.
2) For disinfectants : a list of substances that products cannot contain has been defined. Another list will give the products with less toxic substances a better rank in the selection process. Criteria regarding the dilution and the system proposed for the dilution have been included.

Source : City of Amiens

Case study 4: An experience for reinforcing consultation to citizens.

In a few years, the use of radiofrequencies has developed in a considerable way in the region as a whole, particularly the mobile telephony. That is the case in La Rochelle, who has around forty relay antennas distributed in a homogeneus way along the city.
The Urban Community of La Rochelle signed in 2005 a charter with the cities that compose it and the three mobile operators. This charter provides detailed rules on information and consultation. An operator who wishes to install a relay antenna mobile in the territory of the commune, in private or public, must inform the residents, in connection with the Neighborhood Committee, upstream of the filing of prior notification or building permit.

The Urban Community and the City organize duty required for the operator in the area and notify by mail all residents living within 300 meters of the site approached. They may meet with a representative of the operator who can answer all questions (use the antenna relay, choice of location, operational modalities, integration with existing architecture ...).

The technical dossier presentation of this project is also available at the services of the Urban Community and the City. It is also available on the website of the City of La Rochelle, which has a dedicated space in the "Environment and public health." The website also provides links to reference sites (portal spectrum of environmental health).

In addition, the citizens can find the reports of measurements made on the territory of the community. A measurement campaign was conducted at the request of the City at the end of 2010 on new sensitive sites (nurseries, kindergartens and elementary and middle school).

Source : City of La Rochelle

Case study 5: sentinels of taste

Taking the example of the procedures used in the food industry, the city of Aix-les-Bains has put in place for 5 years, from 2006 to 2010, a consumer panel to survey the quality of the water distribution service.

After a day of training by engineers in water chemistry, to learn to recognize the different flavors of water and identify possible organoleptic anomalies (taste of dirt, chlorine, hydrocarbons, etc..) fifteen unpaid volunteers, spread over different sectors of water supply in the city, were the "Sentinels of taste" to alert the community of all changes of odor or taste in the drinking water system. Bottles of mineral water in glass have been distributed to these sentinels to be used as a reference, along with filling forms.

This experience has led the community to complete the processing system of one of its drinking water resources. Following this change and in the absence of two years of new alerts, this experiment ended.

Source : City of Aix les Bains

Case study 6: Acoustic terminals

Jules Ferry square, in Lorient's city centre is a place of entertainment throughout the year. The fairgrounds, the festival of music, concerts, Lorient Inter-Celtic Festival ...are held there each year. This square is surrounded by 15 schools, cafes, restaurants, hotels, nightclubs and shops and apartment buildings.

Recurring complaints of local residents led the community to install a network for noise control in 2006. This device, the system Oper@ 01 dB, includes 6 acoustic terminals located around the square. These terminals continuously record the sound level of the place and the data are transmitted daily by the Internet research firm, JLBi Councils, and the city of Lorient. This system allows controlling very rapidly the noise levels in the square, objectifying the complaints and responding promptly. For example, data from these terminals made it possible to limit the excesses of bars and to guide the choices of new sweepers of the cleaning company (schedules, etc).

This network, combined with various measures, has reduced the noise by 3 decibels during outdoor concerts.

Source : City of Lorient

Case study 7: Community gardens

The city of Nantes has developed an ambitious policy of community gardens, whose main characteristic is to provide gardens in the heart of neighborhoods across the city. Nantes now has 22 sites to nearly 1000 plots.

These gardens are designed and managed as real tools for enhancing social ties, open to their social environment. A charter of community gardens has been signed by the City and the 15 associations of gardeners in fall 2010, it contains two major directions: the creation of social ties, and awareness of environmental protection. For example, garden plots are now held by associations working on the breakdown of isolation towards a public in integration, but also towards the elderly with an approach to Alzheimer's disease. We also have plots aimed at people held in day psychiatrics.

Finally, an educational work is done with schools and recreation centers. The gardens are tools where we develop activities around the well-being and living together while cultivating to produce vegetables. In terms of habitat we establish community gardens on eco-district and on areas under construction by integrating them at the origin of the project.

Source : City of Nantes

Case study 8: Fight against substandard housing

To strengthen public action in its "coercive" dimension, due to indelicate landlords, an umbrella group for municipal fight against substandard housing was established in 2010.

The members of this group are: the Service Communal Hygiene and Health (insalubrity component), the Direction of Property Architecture (danger component), the Housing, Employment and Insertion Mission, the “Big Heart” Mission (Programmed Operations of Housing Improvements component), the Communal Centre for Social Action and the Departments of Finance and Legal Affairs of the City. After the record of an owner’s failure, this group is in charge of analyzing, proposing and implementing work procedures and measures for the required accommodation or relocation (including social support for the occupants).

The crossover of skills and combination of different dimensions (social, legal, technical, financial, etc.) enables the optimization and comprehensive treatment of the situations encountered.

Source : City of Montpellier

Case study 9: Local Council around Mental Suffering

The Municipality of Reims has launched the Local Council around Mental Suffering in June 2009, following diagnosis and city health workshops in order to meet a larger request of the inhabitants. Co-constructed with various partners in the medical, social, educational and legal fields, its objectives are to bring together professional and community groups around a common approach and to focus on networking across the city. It is led and coordinated by a health project manager within the Directorate for Solidarity and Public Health.

3 thematic groups meet regularly and develop courses of actions or projects:
Psychological suffering of the elderly: Special support for older people previously identified as frail, during and after relocation and rehabilitation operations during urban renewal (Funding from Urban Contracts of Social Cohesion). This project, led by an association, has been developed collegially with the partners in this group.
Mental health and housing: Registration of individuals with mental disability in departmental action plans for housing for disadvantaged people (Marne 2011-2013) and priority publics. In addition to this, a draft agreement has been reached between donors and the different sectors of psychiatry to facilitate access to housing for patients in the public park and the introduction of referents.
Psychological suffering of young people: The variety of groups allows a transversal and broader approach for mental suffering and brings together partners from various backgrounds to promote positive health.

A commission of complex situations tries to make partnership solutions to individual situations (combining issues of housing, social problems, psychological, medical ...).

Source : Ville de Reims