



Master of Public Health

Master international de Santé Publique

How to tackle environmental health inequalities?

Analysis of the French Environmental Health Plan (PNSE2-NEHAP2), Regional Health Plans (PRSE2) and the example of inadequate housing

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Abstract - English version

Background: In France, social and environmental health inequalities are currently on the increase. To tackle this issue, one of the main lines of action of the Second National Environmental Health Action Plan (NEHAP2) and of several subsequent PRSE2s consists in taking into account and dealing with environmental inequalities, namely in striving to limit environmental nuisances likely to cause or worsen health inequalities, exemplified by substandard housing which combines environmental exposure to social inequality. However, we still fail to have a clear understanding of this phenomenon as well as tools to address it. **Objectives** This article studies how environmental health inequalities and substandard housing are taken into account in the NEHAP2 and the various PRSE2s, so as to suggest working methods for the NEHAP2 follow-up with a more adequate implementation in the future. **Methods** As the concept and the issue of environmental health inequality is a complex one, several tools including quantitative and qualitative methods have been used and a tool has been set up to analyse to what extent environmental health inequalities are taken into account in a Public Health Programme. **Results and conclusion** The NEHAP2 and the PRSE2s represent an innovative and outstanding initiative of dealing with environmental health inequalities in a Public Health policy. However, more effort is needed to elaborate, carry out and assess a tangible program meant to fight against environmental health inequalities while considering all their characteristics (especially the link with social inequalities) and questioning the traditional operating methods of Public Health policies.

Abstract - Version française

Contexte La France est confrontée à des inégalités sociales et environnementales croissantes affectant la santé. Pour y faire face, l'un des principaux axes du Deuxième Plan National Santé Environnement (PNSE2) et de plusieurs Plans Régionaux (PRSE2) en découlant est la prise en compte et la gestion des inégalités environnementales, c'est-à-dire la limitation des nuisances environnementales susceptibles d'induire ou de renforcer les inégalités de santé (dont un exemple est l'habitat indigne qui lie les expositions environnementales aux inégalités sociales). Cependant, l'on manque toujours d'une compréhension claire de ce phénomène ainsi que d'outils pour y répondre. **Objectifs** Cet article étudie la manière dont les inégalités environnementales et l'exemple de l'habitat indigne sont pris en compte dans le PNSE2 et les PRSE2 afin de proposer des pistes d'action pour le suivi du PNSE2 et leur meilleure prise en compte à l'avenir. **Méthode** Le concept et problème des inégalités environnementales étant complexe, plusieurs instruments combinant les méthodes quantitative et qualitative ont été utilisés et un outil d'analyse de la prise en compte des inégalités environnementales dans un programme de santé publique a été élaboré. **Résultats et conclusions** Le PNSE2 et les PRSE2 représentent une initiative novatrice et exemplaire de prise en compte des inégalités environnementales dans une politique de santé publique. Cependant des efforts additionnels sont nécessaires pour élaborer, mettre en œuvre et évaluer un programme concret de lutte contre les inégalités environnementales affectant la santé qui en considère toutes les dimensions (notamment le lien avec les inégalités sociales) et réinterroge les modes d'action traditionnels de la santé publique.

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List of acronyms

ARS: Agence Régionale de Santé (Regional Health Agency)

ASV : Atelier Santé Ville

CLS : Contrat Local de Santé (Local Health Program)

CODERST : Conseil Départemental de l'Environnement et des Risques Sanitaires et Technologiques

CSDH: Commission on Social Determinants of Health

CUCS : Contrat Urbain de Cohésion Sociale

DALO : Droit Au Logement Opposable

DGS : Direction Générale de la Santé (General Directorate for Health)

DIRECCTE: Direction régionale des entreprises, de la concurrence, de la consommation, du travail et de l'emploi (Regional Directorate for business, competition, consumption, labour and employment)

DREAL: Direction Régionale de l'Environnement, de l'Aménagement et du Logement (Regional Directorate for Environment, Planning and Housing)

EIA : Environmental Impact Assessment

GRSE : Groupe Régional Santé Environnement

GSE: Groupe Santé Environnement (Environmental Health Steering Committee)

HCSP: Haut Conseil de la Santé Publique

HIA: Health Impact Assessment

IGAS: Inspection Générale des Affaires Sociales

INPES : Institut National de Prévention et d'Education pour la Santé

INSEE: Institut National de la Statistique et des Etudes Economiques

LARES: Large Analysis and Review of European housing and health Status

PDLHI : Pôle Départemental de Lutte contre l'Habitat Indigne

PNSE2 : Plan National Santé Environnement 2 (National Environmental Health Action Plan 2)

PNLHI : Pôle National de Lutte contre l'Habitat Indigne

PRAPS : Programme Régional pour l'Accès à la Prévention et aux Soins

PRS : Projet Régional de Santé

PRSE2 : Plan Régional Santé Environnement 2 (Regional Environmental Health Action Plan 2)

US EPA: United States Environmental Protection Agency

WHO: World Health Organization

ZUS: Zone Urbaine Sensible

I. Introduction

Environmental health inequalities' reduction has recently started being a concern in France. They now represent one of the main axes of the French Environmental Health Action Plan (2009-2013).

1. Why are environmental health inequalities a public health concern?

Over the last decades, Europe has experienced a general improvement in life conditions and health status overall. However, important disparities in health between different population groups especially in France have started being a great concern for researchers and for all those who are committed with public health improvement.

The Commission on Social determinants of Health's report "Closing the gap in a generation" (CSDH, 2008) has shown that health inequalities are a major threat to populations' health status and jeopardize the ability to move forward towards a better and equitable health situation for all. Indeed, differences in health status are systematically distributed across identifiable social characteristics, like in France for example where manual workers' life expectancy in good health is 9 years shorter than that of white-collars, though both groups benefit from jobs, housing and social insertion. These differences are observed through several indicators both at individual level, such as socio economic status, income, education level, and at group level (neighborhood poverty level, etc.) The determinants of this gradient that have been highlighted since the 60s cannot be sought for only in extreme poverty (HCSP, 2009).

Social health inequalities, that is to say "measurable differences in health experience and health outcomes between different population groups according to socioeconomic status, geographical area, age, disability, gender or ethnic group" (Whitehead, 2007) have many different causes that are difficult to separate from one another (structural deeply rooted causes, intermediate and proximal causes). The World Health Organization's Commission on the Social Determinants of Health has defined health equity as "the absence of unfair and avoidable or remediable differences in health among social groups." These objective differences are not only due to biological or hereditary factors but mainly to social, political, economic and cultural factors (which are not innate) and "differences in opportunity for different population groups which result in, for example, unequal life chances, access to health services, nutritious food, adequate housing, etc" and then result in health outcome disparities. Inequalities in health are directly related to inequalities in society and "the conditions in which people are born, grow, live, work, and age" (CSDH, 2008). Social inequalities in mortality are more important in France than in other European countries and they have been rising over the last decades, especially among men (HCSP, 2009). Unsatisfactory life conditions are also a problem, which is the consequence of several incapacities. As a result, it is a twofold burden with consequences both on life expectancy and on life conditions.

In addition, environmental factors or determinants contribute also greatly to health inequalities and to the general burden of disease. Globally, an estimated 24% of the disease burden (healthy life years lost) and an estimated 23% of all deaths (premature mortality) was attributable to environmental factors in 2006.

Among children aged 0–14 years, the number of deaths due to environmental factors was as high as 36% (Prüss Ustün, 2006)¹.

Relationships between health and environment are not recent and have been described and analyzed by the hygienist current of thought among others which used it as a major sanitary intervention tool before the emergence of modern medicine (Roussel & Charles, 2011). The definition of environment is more opened or restricted according to institutions and people. For WHO, “environmental health addresses all the physical, chemical, and biological factors external to a person, and all the related factors impacting behaviours. It encompasses the assessment and control of those environmental factors that can potentially affect health. It is targeted towards preventing disease and creating health-supportive environments. This definition excludes behaviour not related to environment, as well as behaviour related to the social and cultural environment, and genetics” (WHO, 1990).

Because environmental determinants are definitely important factors that influence health (more than the health care system itself, indeed, according to some authors² [Dunn, 2000]), actions have to be carried out at this level. According to a WHO report (Prüss Ustün, 2006), “public and preventive health strategies that consider environmental health interventions can be very important. Such interventions are cost-effective and yield benefits that also contribute to the overall well-being of communities”.

To study more deeply health inequalities determinants, researchers and policy makers have recently started to investigate the potential contribution of the environment (especially environmental exposure) in health inequalities. Not only does the environment play a role in health outcomes but it also has consequences on health inequalities. Even if it is clear that the link between a health status and a determinant of health is not causal and is much more complex and that the attributable fraction of one determinant to one disease is not easy to define in these cases (IGAS, 2011), it is now demonstrated that environmental inequalities have detrimental consequences on health. That is the reason why researchers have also highlighted a possible link between environmental health inequalities and social inequalities which produce health inequalities.

Today, some parts of the French population who live near historical or current polluted sites, main road axes, airports, etc. are exposed to pollution levels that are much higher than the average population. These places are called “pollution or environmental black spots”. There is clear evidence of inequalities in the distribution of potential environmental risk such that “people in poor and deprived communities are more likely to be living near industrial pollution sites and within flood risk contours than those who are

¹ Of course, this “environmentally-mediated” disease burden is much higher in the developing world than in developed countries - although in the case of certain non-communicable diseases, such as cardiovascular diseases and cancers, the per capita disease burden is larger in developed countries.

² According to Dunn, the major determinants of health are not medical care inputs and utilization, but cultural, social and economic factors—both at the population and individual levels. (See population health perspective -Dunn & Hayes, 1999) Dunn J., Housing and Health Inequalities: Review and Prospects for Research, *Housing Studies*, 2000, 15:3, 341-366

better off” (WHO Europe, 2009 b). French overseas territories are, for example, more exposed to natural risks and to water and soil pollution. Other regions (e.g. Nord-Pas-de-Calais³ (Basset, 2008), Seine-Saint-Denis) are characterized by degraded environments due to their industrial past (CAS, 2009). It is the same in other countries: the siting of Integrated Pollution Control (IPC) sites has been examined for England⁴ (Walker et al., 2003; Walker et al., 2005) where the results indicate a strong inequality faced by the most deprived wards⁵.

In this context, a major health determinant in the environment is housing, especially inadequate or substandard housing⁶. It can be considered an intermediate or sometimes proximal factor of many health problems, such as asthma and several respiratory symptoms, injuries, tuberculosis, ischaemic heart disease, lung cancer, lead and carbon monoxide poisoning, mental health, among others. The burden of disease associated with inadequate housing is being characterized (Braubach, Jacobs & Ormandy, 2011) and there are some recent attempts to highlight the dimension of inequality regarding inadequate housing and initiatives to try to tackle it through public policies.

The LARES report shows that “less affluent residents and households are more exposed to and affected by inadequate housing conditions and associated risk factors. The results show that within the LARES data set inadequate housing conditions have a significant impact on health outcomes such as self-rated health, accidents (falls), respiratory diseases and also on safety perception, gastro-intestinal diseases, development of depression and the frequency of accidents” (WHO Europe, 2009 a).

Indeed, in France, an estimated 600 000 inadequate dwellings are occupied as main homes, both in urban and rural settings⁷. According to INSEE, at the beginning of 2000, 2,9 million people lived in dwellings lacking in comfort or overcrowded (127 000 people had both problems). In addition, 133 000 people were homeless and were using precarious temporary accommodation or living in the streets. The number of dangerous, unhealthy or substandard dwelling is low as compared with these figures but is also particularly

³ In an exploratory study in Nord Pas de Calais, there was a moderate but significant correlation between social inequalities (social défaveur index) and (1) presence of industrial sites polluting or presenting a risk (Seveso, SO₂, Nox, PM, VOC), at the town level ; NPC, (2) mean ambient NO₂ level (scale of 1 km²), in Lille Métropole, (3) data from the National Observatory on Sensitive Urban Zones (SUZ) (2003, 751 SUZ), (4) unemployment level multiplied by 2 and % of poor households multiplied by 3 (in comparison with the national median) (5) 45% classified as noise black spots (Basset, 2008).

⁴ “Use was made of Index of Multiple Deprivation 2000 which had been released at ward level (ca. 10,000 mean pop) to classify the population into 10 deciles. IPC sites in deprived areas on average produce greater numbers of emissions and present a greater potential pollution hazard, as indicated by the Agency in authorization scores. They also produce more “offensive” pollutants in deprived areas which are likely to have an impact on the day-to-day quality of life for people living nearby. Levels of PM₁₀ emissions to air from IPC sites were disproportionately high in more deprived wards and to a lesser extent also emissions of NO₂, the latter also being confirmed by Kruize et al. (2007) for the Netherlands when looking at poorer income groups (Fairburn, Braubach, 2009)

⁵ There are five times as many authorizations in the most deprived decile wards (decile 1) compared to the least deprived (decile 10). Regarding residential location, there are five times more people living within 500 m of a site in decile 1 compared to decile 10.

⁶ We will use both terminologies in this paper.

⁷ Pôle National de Lutte contre l’Habitat Indigne (PNLHI)

difficult to estimate. In brief, more than 100 000 deaths per year in Europe are attributable to inadequate housing conditions. A recent report of WHO Europe reckons that 128 430 deaths (39/100 000) and 2,2 million healthy life years lost may be due to this phenomenon. If we applied this rate to France, without considering national peculiarities, we would get up to 25 000 deaths and 588000 healthy life years lost (Belanger, 2012).

Housing conditions can therefore be regarded as one of the mechanisms through which social and environmental inequalities may translate into health inequalities. It is moreover the example that combines social inequalities (the burden is borne by lower socio economic status populations and inadequate housing is a “proxy” of socio economic characteristics) and environmental inequalities thus leading to and fueling health inequalities.

2. What we know about environmental health inequalities

Environmental health inequalities: a complex definition

The literature dealing with environmental inequalities and how they affect health is increasing and is related to many scientific domains (urbanism, epidemiology, sociology, geography, etc.), each of them proposing a particular definition. The concept of environmental health inequalities is complex and there is still little knowledge and little evidence on how to manage them in an effective and efficient manner, despite the fact that policy makers need a clear definition to be able to build policies.

However, this paper will prefer the definition which puts an emphasis on the understanding of inequalities as presented by M. Whitehead and the CSDH. They do not understand them only as the heterogeneity of environmental nuisances over the territory but as a dimension of avoidable inequality and justice.

The concept of environmental health inequalities (see appendix 1)

Environmental health inequalities can be considered in different manners, either just environmental differences or disparities or unfair and unacceptable differences which provoke inequalities.

Indeed, the different groups in a population are not equally exposed to environmental nuisances and hazards, according to the place they live and/or work, their life conditions, their behavior, their socio economic status and/or their personal characteristics (age, health status, sex, etc.). That is what is called the exposure differential.

In addition, people do not react in the same way to environmental conditions and may be more susceptible to environmental threats and/or not able to protect themselves from them. This represents the vulnerability differential.

The differential exposure of groups of people to health-relevant aspects of environment (with potential to create and sustain differences in health status) can often simply be disparities. “This might be the case where a group of people chooses to live in a polluted city centre for reasons of convenience or chooses

riverside homes – potentially more liable to flooding – for aesthetic reasons or social status” (WHO, 2012). The exposure differential in this case is related to personal “preferences”. However, “the potential for differences in health outcome linked to environment may have little or nothing to do with choice or biological variation and may have its origin in factors beyond the influence of those affected” (WHO, 2012). Often, environmental nuisances are not distributed evenly among territories and societies and may affect systematically some specific territorial areas or socially disadvantaged populations.

Basically, three different dimensions of environmental health inequalities exist:

- The unequal distribution of environmental quality between different social groups. It can be a negative definition (the exposure to environmental nuisances and hazards, the unequal distribution between territories –either because of natural hazards or of the territory occupation by humans) or a positive one (the access to environmental amenities such as landscapes, green spaces, access to water, etc.). It also deals with the different social groups’ vulnerability to environmental nuisances, with the risk of a multiple and cumulative impact on them, the environmental inequalities not being independent from one another nor from social inequalities (income, social status, etc.). It has to do with a lack of distributive justice⁸;
- The unequal environmental impact of different social groups⁹;
- The unequal impact of environmental policies on different social groups (distributive and procedural justice) and the unequal power or different capacities to influence environmental health decisions by some social groups. This refers more to a lack of procedural justice¹⁰.

Environmental inequalities are often linked with social inequalities. This paper will consider the unequal distribution of natural risks and nuisances (and the fact of living in a place where environmental hazards are present due to individual preferences) and the susceptibility differential (as understood as the differing way of being affected by environmental hazards or reacting to them due to age, pregnancy or health condition¹¹) as environmental disparities. Of course, it does not mean that no measures against them

⁸ “It means that environmental risks are not evenly distributed within societies and populations. It concerns the nature of a socially just allocation of goods in a society. A society in which incidental inequalities in outcome do not arise would be considered a society guided by the principles of distributive justice. The concept includes the available quantities of goods, the process by which goods are to be distributed, and the resulting allocation of the goods to the members of the society” (see Wikipedia)

⁹ Which will not be addressed in this paper.

¹⁰ “Different population groups may have different opportunities to influence decisions affecting their close environment. It refers to the idea of fairness in the processes that resolves disputes and allocates resources” (see Wikipedia)

¹¹ For example people who have had cancer or people with allergies. It is also related to the impact of some toxicants (for example endocrine disruptors’ substances) on children (*in utero* exposure being a major challenge) or pregnant women, among several other examples.

should be implemented but here “the environmental health challenge is about addressing health inequities that are unfair and avoidable” (WHO, 2012) and are linked with social inequalities.

According to WHO Europe, socio demographic variables may influence: the nature and distribution of environmental conditions, the exposure to these conditions for the individuals and for groups in the society, the exposure-response relationship which leads to different health outcomes in individuals with comparable exposures, access to and quality of health related services (See appendix 2).

One of the great challenges, additionally, is the fact that some populations or geographical areas may face cumulative exposures and be exposed to what is called “environmental black spots”.

3. What we know about inadequate/substandard housing

In this context, one of the examples of environmental health inequity that is cross-cut with social inequity is the issue of inadequate housing. The idea that housing and health are linked is not a new one. F. Nightingale said: “The connection between health and the dwelling of the population is one of the most important that exists”. As a result, substandard housing has clear adverse health outcomes¹² (Bonnefoy, 2007), as aforementioned.

In France, the definition of substandard housing is the following (art.84 Law of the 25th march 2009): “Are considered substandard housing dwellings and installations used to live in and unfitted to this use as well as dwellings whose condition or that of the dwelling in which they are situated expose occupants to clear risks which may threaten their physical integrity or health”.

To date, relatively little research has systematically investigated pathways between housing, socio-economic status, and health status (Dunn, 1998; Hwang et al., 1999). But, “there is a growing awareness that one of the most important research needs in health inequalities scholarship is to elucidate better those pathways by which differences in socio-economic status manifest in everyday life, and produce, at the aggregate level, the systematic social gradient in health observed in all industrialized countries of the world” (Lynch & Kaplan, 1997; Macintyre, 1997). The population health approach has focused on the following areas which correlate inadequate housing, health and inequality: income inequality and health (the housing market being the engine of differential wealth distribution), social support and health (“people of lower incomes are more heavily constrained in their residential choice, and coupled with the tendency for cities to act as socio-spatial sorting mechanisms, producing clusters of people of similar socio-economic circumstances; this increases the likelihood that less affluent people may be ‘prisoners of space’, lacking connections to opportunities outside their immediate neighborhood environment”) and “life course”

¹² Because of physical conditions (heat, cold, energy efficiency, radon exposure, noise, inadequate light, ventilation, and fine particulates in the home), chemical conditions (carbon monoxide, volatile organic chemicals, lead), biological conditions (rodents, house dust mites), building and equipment conditions (accidents and unintentional injuries, access to sewer services), social conditions (architectural features related to mental health) (Bonnefoy, 2007).

epidemiology (“social influences during “sensitive” periods of human development can also have lifelong influences” (Dunn, 2000), hence the adverse potential of living in substandard housing during childhood).

Braubach and Fairburn’s review indicates that social status and especially low income are strongly associated with increased exposure to environmental risks in the private home or related to residential location. “Housing conditions and environmental quality of residential areas are differentially distributed in the population. Less affluent population groups are more often affected by inadequate housing conditions and higher environmental burden in their residential neighbourhoods”. Moreover, it affects socially vulnerable populations and the effects of this exposure are combined with other determinants of inequalities (poverty, migration status, etc.).

Several studies show that housing improvements have positive consequences on health (housing interventions targeting fuel poverty and energy efficiency interventions (Gibson et al., 2011); Howden Chapman, 2011), multifactorial tailored home-based asthma interventions, lead poisoning interventions (Jacobs, 2011) etc.). At the area level, in spite of the lack of more evidence, some studies have highlighted some promising results (evidence linking improved mental health outcomes to housing mobility interventions and reduced housing segregation (Jacobs, 2010) or interventions aimed at improving area characteristics (Gibson et al., 2011). However, there is a lack of studies and data “broken down by social categories is rare, especially on household or person level. Almost no information is available on the parallel exposure to multiple risks”. According to Braubach and Fairburn (2010), “public health work needs to further address the dimension of health and environmental inequity as a major policy focus”.

4. Context - Which policies have been implemented so far to tackle environmental health inequalities?

The issue of social health inequalities has been tackled for the last two decades by international organizations¹³ and by spearhead countries¹⁴. They all analyze this issue in terms of social justice and show the importance of including all health determinants (not only the healthcare system) for an adequate understanding of health mechanisms and inequalities production. They reckon that only actions at the level of social, behavioral and environmental health determinants will be effective along with healthcare strengthening (see appendix 3).

These issues have also been on the research agenda in France since the 80s and policies to fight precariousness and social vulnerability have predominated and have focused so far on healthcare system and on vulnerable and excluded populations, not on the gradient of inequalities. However, awareness on these issues has only been increasing recently. Research results have been presented, seminars have

¹³ See the WHO Commission on Social Health Determinants’ report in 2008 “Closing the gap in a generation: Health equity through action on the social determinants of health”; the EU agenda on social health determinants, etc.

¹⁴ Such as Great Britain, Norway, Holland, Québec in Canada, the states of Victoria etc. in Australia, New Zealand...

taken place, some practical tools have been proposed¹⁵ and some reports on the situation have been elaborated¹⁶. Above all, the future public health law is supposed to be built around this concern and perspective¹⁷. Moreover, one of the PRS¹⁸ priorities is to address social health inequalities. The report on social health inequalities issued by the French High Council on Public Health (HCSP, 2009) has developed an analysis about social health inequalities in France that is similar to the one made by the Commission on Social determinants of Health. In this report, the HCSP acknowledges the need to design and implement interventions and policies to tackle and address social health inequalities (see recommendation 13 in the research item: “to develop methods for assessing interventions related to social health inequalities”) and also highlights the lack of data and information on health inequalities in France.

However, there is still no explicit policy and strategy on social health inequalities and the issue has not been put on the French political agenda yet except by a small circle of experts. Yet, social health inequalities are the priority of several Regional Health Projects and we may think that it will only be a matter of time and political will until France works out a health framework to tackle social health inequalities.

As regards environmental health inequality - which is a specific issue and not a sub part of social health inequalities though interacting closely with them - at the international level, especially in WHO Europe, this issue is clearly on the agenda. In the Health 2020 strategy proposal¹⁹, one of the policy priorities consists in creating healthy and supportive environments while tackling the determinants of health and health inequalities. That is the reason why they are on the research agenda and have been studied recently (Braubach, Jacobs & Ormandy, 2011; WHO, 2012).

Environmental health inequalities have been tackled by some countries through targeted policies, an example of which being the US EPA work on environmental justice. By decreasing environmental burdens, increasing environmental benefits, and working alongside the population to build healthy, sustainable, and green communities, the Environmental Justice Strategy²⁰ tries to incorporate environmental justice into all its processes: into rulemaking, permitting, through compliance and enforcement, by supporting community-based action programs and fostering administration-wide action on environmental justice. Plan EJ 2014 identifies cross-agency focus areas, tools development, and program initiatives as three essential

¹⁵ By the INPES for example.

¹⁶ See HCSP (2009) and IGAS (2011) reports.

¹⁷ The current Public Health Law only mentions social health inequalities in two of its articles.

¹⁸ PRS (Regional Health Project) consist in the main strategic tool that ARS have to implement the regional health policy in a coherent and coordinated manner. They must be elaborated every 5 years.

¹⁹ This strategy is to be presented on September 2012 to the Regional Committee at its sixty-second session in Malta.

²⁰ It was first published in 1994. The latest strategy is called Plan EJ (Environmental justice) 2014.

elements that will advance environmental justice across the EPA and the federal government and defines the notion of environmental justice as “the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws regulations, and policies”. Scotland and UK (UK Department of Health, 2003) also have environmental justice programs but they are more focused on social inequalities rather than on ethnic discrimination.

As said before, addressing environmental inequalities is quite a recent phenomenon in France. France has developed and has been implementing the National Environmental Health Action Plan (NEHAP) since 2004. The PNSE/NEHAP is part of the French Sustainable Development Strategy that was adopted in 2003 in response to the commitments taken in 1992 at the Earth Summit in Rio and restated in 2002 in Johannesburg and which constitutes one of the five plans of the French Public Health Law²¹.

The first NEHAP dealt with the links between environment and health. The NEHAP2 (PNSE2) (National Environmental Health Action Plan 2, 2009-2013) was elaborated in a different context: following the NEHAP1 but also the Environment Charta (2005) (with its article 1 stating that “everyone has the right to live in a balanced environment that respects health”) and the “*Grenelle de l’Environnement*”, an Environment Round Table which defined the key points of government policy on ecological and sustainable development issues, in 2007.

NEHAP2’s aim is to strengthen the coherence of environmental health actions. It is one of the only plans which are built around a central and transversal axis: the reduction of environmental inequalities, that is to say the “reduction of environmental nuisances that may induce or reinforce health inequalities”. Indeed, fighting health inequalities has been set as a priority on the public health political agenda and “reducing environmental health inequalities will contribute to the reduction of health inequalities”.

The NEHAP2 approach recognizes the following types of environmental inequalities: inequalities related to the sensitivity to pathogens according to age and health status (children, pregnant women, people with allergies, occupational exposure etc.), inequalities related to environmental nuisances’ exposure (air pollution, indoor air quality, water contamination, pollution black spots, noise impact, radon, naturally produced asbestos) and inequalities related to the socio economic context (inadequate housing policy). It deliberately does not include risks arising essentially from individual behaviour because these areas are all covered by specific public health plans. This plan is monitored by a steering committee divided into three working groups in charge of the Plan monitoring; one of which being the workgroup on environmental inequalities²².

²¹ Law n° 2004-806 (9th August 2004) on the Public Health Policy

²² The two other groups are: the working group on high health impact exposures and the one on emerging risks.

At the regional level, since 2009, the regional task forces set up as part of the consultation process have been asked to develop new regional environment and health plans (PRSE 2). They represent the regional and local adaptation of the NEHAP2. Each PRSE2 has to be developed jointly by representatives of the five committees involved in the *Grenelle* round table. Regional and national cohesion is ensured by a group of regional PRSE correspondents, who meet regularly on a national level. To date, 18 PRSE2 are adopted and currently implemented; for 4 regions they are about to adopt it and 4 are working on it.

The problem of inadequate housing has been set on the political agenda in the UK for example (UK Department of Health, 2003) and is one of the priority measures of the NEHAP2. It is becoming an important public health research issue in Europe (WHO Europe, 2009; WHO, 2011). However, we still have little data on the extent of the problem of inadequate housing in France, as well as little knowledge about how much the policies that have been and are being implemented tackle the issue of environmental health inequalities²³.

Generally speaking, even if there are still gaps in the understanding of the specific mechanisms and causality pathways of environmental health inequalities, there is strong evidence on their detrimental effects. The definition of environmental health inequality is complex because many factors are interconnected²⁴, hence the difficulty of elaborating adequate policies to tackle them. The aim to reduce environmental health inequality and inadequate housing specifically is often stated but the means to achieve it remains somewhat unclear so far. Environmental justice brings a particular set of concerns to the policy process by asking not only what the environmental impacts of a new policy, program or regulation might be, but also how these impacts are likely to be distributed across different social groups (Walker, 2007). It reminds us of the need for evidence to help monitoring the public health policy related to environmental health inequalities.

²³ Findings of the individual semi directed interviews.

²⁴ There are several connections and relationships with other determinants – individual ones, behaviors, health system, etc.

II. Objectives of the analysis

The main interrogation, when addressing environmental health inequalities through public policies, is whether interventions and policies are really able to reduce health disparities. But, to know that, there is a previous step which consists in understanding how environmental health inequalities in public policies are tackled. This is the main objective of this paper that will focus on France, with the analysis of the policies that are currently undertaken.

What are the common elements used to tackle environmental health inequalities in French public health policies? And specifically, how is the issue of substandard housing addressed to tackle environmental health inequalities?

This is a major issue when dealing with environmental inequalities. To date, as explained before, the scientific community has highlighted several problems related to health inequalities - especially those suspected to be due to environmental exposure and nuisances - and is still actually investigating many aspects of the links between environmental exposure, health conditions and social inequalities, for a better understanding of their mechanisms.

However, what remains to be investigated is how concretely programs and policies can tackle these environmental health inequalities and to what extent it is possible to progress in addressing the issue of environmental health inequalities related to inadequate housing, such as the example of what can be done in France in the framework of the NEHAP2 and the PRSE2s. Indeed, in the policy making process, we need to implement evidence-based interventions. We also need information to be able to prioritize actions in the territory. This is what is lacking when addressing environmental health inequalities in France.

As a consequence, this study consists in analyzing and evaluating the NEHAP2 and the PRSE2s with the focused example of the specific actions of the NEHAP2 on inadequate housing so as to provide insights that would help guide the action to tackle environmental health inequalities. This can be a tool for evidence-based policies/programs²⁵ and for the NEHAP2 and PRSE2 monitoring. This paper analyzes what has been implemented so far in France and then proposes some pathways of action to reduce environmental health inequalities, especially as regards substandard housing.

III. Material and methods

1. Study design

Since environmental health inequalities are a complex issue and given the broad range of questions about how the NEHAP2 and PRSE2s address environmental health inequalities, several methods including

²⁵ Several documents on environmental health inequalities and some operational tools to assess and address them have been elaborated in the context of the practicum at the General Directorate for Health.

qualitative and quantitative approaches have been used. Indeed, this study consists in a policy analysis, based on several sources of information.

2. Data collection

First, a literature review on the concept of environmental health inequalities and injustice was carried out so as to summarize the different documents and get an understanding of the concept, its mechanisms, causes and effects. This was done by hand search in books and peer-reviewed literature papers and by searching Medline, Pubmed, Science Direct, Google Scholar, etc. with the following key words: environment, health, inequalities, justice, environmental health, equity, policies.

Then a specific literature review on the links between housing and health as well as the links between inadequate housing, social inequalities and health was also performed. This was done by hand search in books and peer-reviewed literature papers and by searching Medline, Pubmed, Science Direct, Google Scholar, etc. with the following key words: housing, inadequate/substandard housing, health, social inequalities. Additionally, several documents from the Ministry of Health, the Ministry of Ecology and Sustainable Development and the *Ministère de la Ville* webpage were used to get information on the French housing legislation and policies.

Second, the main documents used for the analysis were collected, that is to say: the NEHAP2, all PRSE2 (the 22 that were available out of 26), NEHAP2 monitoring tables, the "*Livre des Plans*".

A questionnaire for the ARS was elaborated, tested and submitted to all 22 ARS having an ongoing PRSE2 (either approved or being at a consultation stage)²⁶. As the study population was quite small and because all regions were necessary to get a representative picture of the situation, with all the qualitative information needed to highlight the possible differences and specific cases, all the 22 regions having a PRSE2 were included, without any sampling method. The idea was to perform descriptive statistics analysis in order to get a summary of the situation. Out of the 22 regions, 21 answered, which represents a level of response reaching 95,45%.

15 semi directed individual interviews to get qualitative information were done with key actors of the field such as civil servants and representatives from the Ministries of Health, Ecology and Sustainable Development and Housing, the French Surveillance Institute, the Public Health High Council, the French Health Education and Prevention Institute, the ARS in Ile de France and the association "*France Nature Environnement*".

²⁶ 22 ARS have (or will have one soon) a PRSE2: Alsace, Aquitaine, Auvergne, Basse Normandie, Bourgogne, Bretagne, Centre, Champagne Ardennes, Franche Comté, Guyane, Haute Normandie, Ile de France, Languedoc Roussillon, La Réunion, Lorraine, Midi Pyrénées, Nord Pas De Calais, Pays de Loire, Picardie, Poitou Charente, Provence Alpes Côte d'Azur, Rhône Alpes and 4 do not : Corse, Guadeloupe, Limousin, Martinique.

The participation and involvement in the NEHAP2 steering committee workgroup on environmental inequalities was also a very relevant means to get first hand information.

3. Data analysis through an “equity” lens

The analysis was carried out in three steps. A first pre-tool meant for assessing whether environmental health inequalities are addressed and for including this perspective into a program or an intervention was elaborated for the practicum’s purposes. The main questions of this tool corresponding to several criteria were selected to form a matrix so as to analyze in the same way the NEHAP2 and the 22 PRSE2. The objective of this assessment tool is to describe the policy, project or intervention regarding its environmental health inequalities perspective. The intervention has a positive, neutral or negative perspective regarding inequality. It is the fruit of a personal reflection and was elaborated thanks to some pre existing tools selected from the available literature that were then adapted and intertwined (see appendix 5).

The analysis is based on a logical framework approach in order to make it useful to policy makers and to be reproduced when necessary. It is carried out according to the different stages of the project elaboration, from the Plan’s conception to its implementation. Briefly speaking, it is a classical logical framework around which we add the dimension of inequalities that is to say in which we insert questions we have to ask ourselves when elaborating and implementing it. All too often, associations of dubious relevance are found, and intermediate or surrogate outcomes are reported with unclear relationships to the critical equity health and wellbeing endpoints. While elaborating a project/program, we have to draw a logical framework²⁷ of it and ask the right questions in order to make sure that throughout the project/program, the necessary elements essential to take inequalities into account are indeed considered.

The tool is divided into two main parts and presents the essential elements and the questions that have to be asked so as to achieve our goal. The different areas are the following: the diagnosis and the planning and monitoring parts. It is presented below.

²⁷ It is a table that shows the hypothesized relation between interventions and their intended outcomes (Harris et al., 2001). Logic models should address societal and contextual factors that may influence the successful implementation of an intervention (Baxter et al., 2010).

Logical framework elements	Questions to be asked or elements to be taken into account
Diagnosis: understanding the problem	
Determinants and problems	<ul style="list-style-type: none"> - Are environmental health inequalities described? (Example of questions: What inequalities exist in relation to the health issue/environmental exposure under consideration? Who is most advantaged and how? How did the inequalities occur? What are the mechanisms by which the inequalities were created, maintained or increased?) - Does the description refer to epidemiological data (frequency, distribution, prevalence, incidence of the problem)? - Is the description of environmental and social health inequalities based on theoretical and scientific data from the specialised literature (studies, evaluation reports, needs assessment, epidemiological studies theoretical models of SHI)? - Have different determinants been identified for the different target sub groups (age, sex, SES, residence location, health status ...) who are concerned? Are the types of inequalities (=exposure differential, vulnerability differential, socio economic, geographic inequalities and those relative to the effective involvement in environment decisions) defined?
Needs assessment	<ul style="list-style-type: none"> - Was the situation analysis carried out at a low-scale territorial level? - Was the population sub groups' opinion considered when describing the problem of environmental health inequalities?
To prepare the response	<ul style="list-style-type: none"> - As from the diagnosis step, was the largest representation ensured in order to encourage collective and intersectoral project elaboration? - Were questions about the impact of policies asked? (Examples: Who will benefit most? How could this intervention affect health inequalities? What might unexpected consequences be?)
Planning and monitoring	
Main goals	<ul style="list-style-type: none"> - Is the intervention explicitly aimed at reducing environmental health inequalities? It its purpose to tackle social health determinants? To tackle environmental health determinants?
Specific objectives	<ul style="list-style-type: none"> - Are the objectives coherent with the problem analysis? - Does the intervention target: 1. the reduction of the gap between more/less vulnerable, more/less exposed, richer/poorer populations; 2. the gradient of inequalities; 3. the exposure differential; 4. the vulnerability differential; 5. The promotion of a healthier environment; 6. knowledge strengthening on environmental health inequalities; 7. target populations' empowerment strengthening?
Expected results	<ul style="list-style-type: none"> - Is the strategy's choice based on rigorously established and potentially effective information to reach the goals? - Is the reduction of environmental inequalities specifically expected?
Activities	<ul style="list-style-type: none"> - Which types of actions have been chosen? (Communication, information, awareness raising/Education/Training, Professional training/Health promotion/ Monitoring tools (information and observation systems, indicators, etc.)/Studies, evaluation/Rules and regulations/Police/control action/Research/Incentives/Coordination, organization of actors/Capacity building/ Needs assessment/Health impact assessment/Program of action/Services provision/Action on social &/or environmental health determinants/ Actions to

	<p>make the living environment better)</p> <ul style="list-style-type: none"> - Was the interventions' soundness supported by quantitative &/or qualitative data? - Are the operational activities coherent with the analysis of the problem of environmental health inequalities?
Indicators (How shall we measure whether these outcomes have been achieved)	<ul style="list-style-type: none"> - Are the selected indicators able to show differences between two or more categories and/or between <i>ex ante</i> and <i>ex post</i> situation regarding inequalities? - Are they disaggregated by sex, age, place of residence, exposure type, low-scale geographic level, etc.? - Do the indicators take into account effects on sub groups of population?
Keys actors	<ul style="list-style-type: none"> - Does the intervention favour target population's involvement and empowerment? Which type of involvement is it? - Were the main partners (e.g. associations, institutions, organizations, donors) concerned by the intervention involved when planning it? - Were partners having a specific experience in environmental health inequalities associated to the planning process?
Target Population	<ul style="list-style-type: none"> - Are the sub groups &/or zones concerned by the environmental health inequalities problem well identified and defined? - Is the intervention aimed at the most disadvantaged (defined by the indicator « PROGRESS »²⁸ or existing disadvantage indexes) &/or at areas that are the most affected by environmental (and social) nuisances? - Soundness of the target group or zone: Was/were the target group(s) or zone(s) identified based on the analysis of environmental health inequalities? - Does the intervention target the whole population taking into account the social and health gradient?
Implementation methods	<ul style="list-style-type: none"> - How is the intervention carried out? Do we make sure environmental health inequalities are actually considered? - Are incentives used to make sure target populations participate? - Are methods to take into account target populations inputs and contributions used? - Is leadership shared among the different actors and stakeholders? Does the intervention tend to support target populations and actors' empowerment? - Are the communication tools adapted to the different target sub groups?
Resources (human, fin.)	<ul style="list-style-type: none"> - How are the resources managed? - Are the economic constraints for the target groups to participate considered?

²⁸ PROGRESS is an acronym for Place of Residence, Race/Ethnicity, Occupation, Gender, Religion, Education, Socioeconomic Status, and Social Capital.

Elements for monitoring	<ul style="list-style-type: none"> - Are all actors' roles, duties and responsibilities clearly defined? - In the monitoring process, is there a reflection about the intervention's potential negative consequences or side effects on environmental health inequalities (possible increase of inequalities)?
Elements for evaluation	<ul style="list-style-type: none"> - Is there a possibility to know if inequalities have been reduced? (evaluation preparation) - Does the evaluation process consider the disadvantaged? - Is the evaluation based on results? (Sentinel indicators, groups to be compared, long term follow up, evolution of the social gradient, etc.) - Are the project/program resources inter disciplinary and inter professional to guarantee viewpoints' diversity and complementarity? - Did the different actors and target groups participate to the elaboration of the evaluation plan?

A specific analysis was carried out for the inadequate housing issue. The elements were analyzed as follows:

Inadequate housing	<ul style="list-style-type: none"> - Does the Plan tackle inadequate housing? On which level of relevance? - What are the main interventions to address inadequate housing? - Was the issue of inadequate housing tackled when elaborating the Plan? If not, why not? - Was there a policy to fight against inadequate housing before the Plan? Was it evaluated? - Are the objectives of addressing environmental inequalities &/or health determinants well defined? - Are the interventions aimed at addressing and reducing environmental health inequalities in housing? What type of interventions is planned? - Which issues are addressed in the Plans? - What are the main pros and cons of the planned objectives and interventions, as regards inequalities? - Is there a way to monitor the effects regarding inequalities reduction in inadequate/substandard housing interventions?
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If all the possible elements are taken into account, the intervention/program is more likely to integrate environmental health inequalities and to tackle them. It is less likely to be negative or neutral, that is to say, to finally reinforce environmental health inequalities. To finish, it is possible to give a score to the project, program or intervention depending on whether it is negative, neutral or positive as far as environmental health inequalities are concerned.

The NEHAP2 and then all the 22 PRSE2 were analyzed thanks to this method. A matrix of results was elaborated for both the NEHAP2 and all the PRSE2, focusing on environmental health inequalities and inadequate housing. All the plans were read through and all the elements dealing with one of these issues were included in a matrix. Then, all the questions of the environmental health inequalities assessment tool were answered. In addition, the questionnaires were analyzed. The databases were elaborated with EPIDATA ® and the descriptive analysis was carried out with STATA ®.

Finally, the results coming from the interviews, the questionnaire and the personal NEHAP2 and PRSE2 analysis were put together to see the main content and direction of the answers. A critical analysis of the results was carried out and compared to the results from the literature review to elaborate some recommendations of action to be used to improve the monitoring of the current NEHAP2 and to potentially provide insights for next environmental health action plans to be elaborated and implemented in France.

IV. Interpretation according to an “equity lens” and discussion of findings

1. Definition of environmental health inequalities: how the concept is understood

As seen in the introductory part, the definition of environmental health inequalities is complex and varies according to authors. The second objective of the NEHAP2 is to identify and deal with environmental inequality, i.e. to reduce environmental nuisances likely to cause or worsen health inequality. Four categories of environmental health inequalities²⁹ are defined: unequal sensitivity to pathogens depending on age, unequal sensitivity to pathogens depending on health status, inequality due to socio-economic background and geographic inequality due to varying degrees of environmental deterioration across the country. It strongly highlights the idea of the vulnerability differential by focusing on the susceptibility due to age or health status. The Plan acknowledges socio economic inequalities but does not then refer to them very much in its objectives and planned interventions.

It is fundamental to highlight the specificity of the environmental health concept. Indeed, some environmental inequalities may only be disparities, as said in the introductory part. For example, the unequal distribution of environmental nuisances due to natural phenomena (e.g. radon or naturally occurring asbestos distribution) is not itself a source of inequalities but a “simple” disparity or difference. It does not mean that no intervention should be carried out but they represent a specific issue different from the concept of environmental health inequalities understood as unfair and avoidable. Generally speaking, NEHAP2 calls “environmental health inequalities” situations that are diverse and that refer to different situations, sometimes they just represent “disparities or differences” and in some other situations they really are inequities and the illustration of “environmental injustice”.

The idea by which environmental inequalities are both associated to and fuel social health inequalities is not mainstreamed in the NEHAP2 although it is present in some PRSE2s and more broadly a relevant aspect of environmental justice. Indeed, unequal distribution of environmental nuisances and exposure has to be tackled because it leads to adverse health effects. However, it is of the greatest importance that such an issue should be on the political agenda to address those exposures and susceptibility differentials and inequalities - which often are added and cumulative - as they occur systematically, are unfair and avoidable and often cross-cut by social health inequalities.

²⁹ In French, we use the term of « environmental inequalities » but in this case, it is suggested that it means environmental inequalities which have health consequences.

2. NEHAP2 and PRSE2 documents

a. Initial diagnosis and presentation of the issue

The NEHAP2 deals with environmental health but, in order to address all the issues related to it, it is also coordinated with the other Public Health plans which are concerned about environmental health issues³⁰. “Thanks to its cross-disciplinary and all-encompassing aspect, the NEHAP2 is interrelated with many Environmental Roundtable (*Grenelle*) commitments. It is also linked to the plans aimed at reducing human’s attacks to the environment or at protecting them from sanitary impacts they create” (Gentilini, 2009). The NEHAP2 is also translated at the regional level by the PRSE2s. Among the 22 regions which have one, 16 have a Regional Health Plan (PRS) and the others are preparing one. All PRSE2s are articulated with the PRS (a priority of which is the reduction of social health inequalities).

We will first assess whether these plans adequately describe the problem of environmental health inequalities and how they do it. The NEHAP2 is built around the strong central axis aimed at addressing environmental health inequalities. It is clearly stated that the reduction of health inequalities is one of the Public Health policy’s priorities and that the reduction of environmental inequalities will contribute to this objective. The Environment Charter (2005) gives precedence to environmental equality, as article 1 states that “each and every person has the right to live in a balanced, healthy environment” (NEHAP2, 2009).

As mentioned above, four different types of inequality are described in the national Plan. This description is mainly based on the NEHAP1’s evaluation (in which environmental inequalities were not addressed), the Environmental roundtable process of coordinated work and on the French Public Health Policy priorities.

However, the situation of inequalities is not characterized well enough. There is no diagnosis of the problem and of each issue (water, soil and air pollution, pollution black spots, population exposure, etc.) that could enable us to know about the baseline of it and what better situation the Plan aims at. It is also a problem in terms of selecting target zones or populations. In addition, the inequality in meaningful involvement in environment-related decisions is not addressed at all.

On the contrary, the questionnaire shows that, in 71% of the PRSE2 and in 55% of them in the personal analysis, there is a description of the problem. Some PRSE2 describe in an acute manner the different aspects of environmental inequalities (exposure differential, vulnerability differential, geographic disparities, socioeconomic inequalities and inequality in the ability to participate and influence environment related-decisions). Some describe the situation with maps or highlight the inequalities which exist in relation to the considered health or environmental issue. But they do not explain their mechanisms. Actually, only a small number of PRSE2s clearly focus their diagnosis on environmental health inequalities.

³⁰ Such as the Cancer Plan (2009-2013), the Occupational Health Plan, Ecophyto 2018, etc.

The description of the sanitary impacts of environmental degradations is short in the NEHAP2 and does not show how they can produce, maintain or reinforce health inequalities. There are no epidemiological data on environmental health inequalities. As a result, we do not know the baseline or indicators of results or impacts which would guide the action. In the Environmental Health Group (steering committee) meetings, the fundamental need for disaggregated information by subgroups or areas (at a low scale territory level - for example the IRIS³¹-) was stressed. It may be due to the NEHAP2's planning process itself³². For the PRSE2s, approximately half of them do have such information but 70% of the PRSE2s do not give information at the local level. In more than half of them, the description of environmental and social health inequalities is not based on theoretical and scientific data from the specialised literature.

b. *Intervention planning*

It is important to explain that the environmental health inequity issue was included in the NEHAP2 thanks to the will of experts and people coming from several backgrounds in the framework of the *Grenelle* roundtable though it was not a “natural” expected result. It meant a significant change in the paradigms and a clear progress as compared with the first NEHAP.

As regards the PRSE2, inequality was addressed in 85% of the cases, in 33% of them as an identified issue and for 57% of the ARS as a transverse issue, by the following actors.

Actors which raised the issue of environmental health inequality in the PRSE2 planning process	
Administration (ARS, DREAL)	71% of the regions
Associations	43%
<i>Conseil Régional</i>	33%
Actors which seem not to have participated enough in the elaboration process	
Town and elected representatives	57% of the regions
Trade unions	53%
Economics representatives	38%
DIRECCTE	33%
<i>Conseil régional</i>	29%
Associations	24%
Region <i>Préfecture</i>	20%
No partners having a specific experience in environmental health inequalities were associated	76% of the regions ³³

Grenelle roundtable brought the idea of having 5 committees participate in the elaboration and monitoring process of the NEHAP2 and the PRSE2, which should allow an increased involvement of those traditionally left out of these processes. It can be compared with the meaningful involvement idea promoted

³¹ «*Ilots Regroupés pour l'Information Statistique*»: Each city or rural area is split into smaller census block units (called IRIS by the Statistical institute INSEE) and smaller demographic cells (called *îlots* in France). IRIS are composed of around 2 000 inhabitants per IRIS.

³² Indeed, the five committees brought to discussion their experience and the information they had. The priorities were built on the pooling of information and arguments, which by the way may raise the issue of representativeness and objectivity in priority setting.

³³ If we combine those answering “disagree” (43%) and “disagree totally” (33%)

by the US EPA. It is an innovative initiative. However, we can notice that some partners are still not involved enough. The meaningful involvement of all actors and above all of target populations is a key to address inequality, as proven by some initiatives³⁴. This principle consists in ensuring the largest representation (e.g. associations, institutions, organizations, donors and target populations) as from the diagnosis step in order to encourage collective and intersectoral project elaboration (Basset, 2008). For the NEHAP2 planning process, several actors were involved. “This second NEHAP is the fruit of a real consultation: it is based on the report of the group in charge of elaborating proposals for a new NEHAP. This workgroup (...) started to work in January 2008 and was composed of representatives from associations, elected people, social partners, employers and the Government. A first draft was presented for a consultation at both national and local levels. (...) The *Conseils Régionaux*’s Presidents and the regions *Préfets* set up local workgroups on environmental health so as to give food for thought for the NEHAP2’s elaboration” (NEHAP2). Nonetheless, we cannot say that the target populations or the subgroups concerned by environmental inequalities were involved in this elaboration or that the population sub groups’ opinion was considered when describing the problem of environmental health inequalities, what is an important limitation of this process.

c. Objectives, main goals and expected results

To see whether environmental health inequalities are tackled, we then analyze the Plans’ objectives, expected results and interventions. In the NEHAP2, there is a central axis dealing with inequalities and several interventions to tackle environmental health determinants (fight against substandard housing, noise reduction, occupational settings, and pollution black spots). Out of the 12 flagship measures, 5 are directly linked with inequalities³⁵. In addition, the questionnaire results show that all PRSE2 have actions dealing with environmental inequalities³⁶. Nevertheless, both in the NEHAP2 and PRSE2s, although this is stated at the beginning, it cannot be explicitly found in the interventions concerning the specific issues (water, transportation, air quality, etc.). Only few of the PRSE2s clearly aim at reducing inequalities and most of them tackle them indirectly. Many operational objectives of the NEHAP2 remain neutral in terms of equality. Generally speaking the objectives are not always coherent with the problem analysis or are not based on any diagnosis as shown before³⁷. There is therefore a clear lack of information and of evidence-based practices on environmental determinants and exposures resulting in health inequalities to guarantee that the interventions will *in fine* reduce inequality.

³⁴ Example of the US EPA and Canada (see Potvin, Moquet & Jones, 2010)

³⁵ Set up a system to protect the catchment areas of the 500 water harnessing points most at risk; improve procedures for testing substances, products and items marketed in France, especially those aimed at children; reduce exposure to suspect substances in the home and in buildings used by children; pursue the program to combat substandard housing with the aim of cleaning up 20,000 homes a year; identify and deal with environmental black spots that are likely to cause over-exposure to toxic substances, notably by introducing black spot identification procedures (NEHAP2).

³⁶ If we combine the following answers: « agree » (67%) and “agree totally” (33%).

³⁷ There is no analysis of the problem in 40% of the PRSE2s.

To make sure that a Plan or an intervention really addresses environmental health inequalities, it should ideally target the reduction of the gap between more/less vulnerable, more/less exposed, richer/poorer populations, the exposure differential, the vulnerability differential, geographic disparities, socio economic inequalities, the unequal participation in environment and health-related decisions and the cumulative exposure to all of them. In the NEHAP2, the vulnerability differential is extensively tackled as well as the exposure differential through the sheets concerning the occupational exposure to CMR³⁸, the protection of children's health and environment, the protection of the population from water-related pollutions, the fight against pollution black spots and the exposure to radon and naturally-produced asbestos. All the PRSE2s also work on the exposure differential. They all try to reduce the unequal distribution of geographic disparities by acting on different exposures to contaminants for example. In nearly all of them the most susceptible populations are mentioned and some actions consisting in reducing allergies, protecting children, the youth and pregnant mothers are constant.

Overall, neither the NEHAP2 nor the major part of the PRSE2 has set specific objectives concerning inequalities but they often manage to address them indirectly. But, neither the reduction of the gap between different populations in terms of exposure or social differences or between different territories is considered nor is the gradient of inequality, at least in the objectives or actions. Although most deprived populations tend to suffer more from exposures and to be more vulnerable to them, the existence of a gradient means that, across the social scale³⁹, there is a gradient in the environmental exposures and/or susceptibilities. These inequalities are not concentrated in the extremes but exist for the entire population too in terms of health outcomes and are often related to social inequalities. For almost all regions, the questionnaire shows that the gradient of inequality is not considered⁴⁰. Nevertheless, we can say that this gradient is indirectly taken into account by targeting the whole population, but interventions are not planned in order to reduce inequality between different groups across the social or exposure gradient. Many NEHAP2's objectives include the whole population and plan to reduce potential exposures or improve environmental amenities for all, such as the interventions linked with the particulate matter emissions reduction, transportation, noise impact reduction, toxic substances reduction in air and water, thus permitting to address problems that concern the whole population. This approach towards the whole population may be useful to address environmental health inequalities but also present the risk of increasing the latter, by acting on the whole population through general plans without acknowledging the public policies effectiveness' differential across different segments of the population. Some evidence of

³⁸ Carcinogenic, mutagenic, repro toxic compounds (according to IARC Classification)

³⁹ Either considering socio economic status, income or education, etc.

⁴⁰ 67% answered that they do not take the gradient of inequalities into account and 24% do not answer, maybe because they do not manage this concept.

successful policies for the average population proves to have detrimental effects on some sectors or sub groups. In terms of policy planning the proportionate universalism approach⁴¹ comes as an alternative.

Environmental health inequalities are usually not characterized. That is why the chapter on environmental black spots plans to “identify the main areas in which over-exposure is likely and reduce the levels of contamination there, reinforce the management of polluted sites and soils, (...) rehabilitate or manage contaminated areas, especially overseas”, etc. However, environmental black spots still only encompass polluted sites and soils, infrastructures and the noise issue. Social aspects are not taken into account. A comprehensive analysis of the correlation (and subsequent concrete actions) on social determinants, environmental nuisances and health outcomes has not been used enough to orientate the actions.

The PRSE2 deals with socio economic inequality in its diagnosis	57% of the PRSE2
It undertakes actions linking social inequalities with environmental exposure or susceptibility	14%
It deals with cumulative exposure ⁴²	64%
It deals with the promotion of a healthier environment ⁴³	41%
It deals with strengthening population’s empowerment	23%
It deals with knowledge on environmental health inequality	23%

Populations’ empowerment strengthening and their meaningful involvement is clearly not a priority but some regions have promising approaches, for instance: Nord Pas De Calais which promotes citizens’ expertise while paying attention to their perceptions about their environment⁴⁴. In Ile de France, they encourage citizens to participate in the environmental nuisances’ evaluation. The questionnaire results however show that 58%⁴⁵ of the regions seem to be convinced that the planned interventions do contribute to strengthening target populations’ capacities, most probably because they work at the local level and tend to coordinate actions with them. This aspect may not be part of the PRSE2 but, in fact, this principle seems to have been applied while implementing interventions. An interesting example is in French Guyana, where they work with the community in order to raise people’s environmental hazards awareness (French Guyana PRSE2). Finally, many planned interventions refer to increasing information and data on environmental issues, as for example in the case of environmental black spots⁴⁶ (see for example the development of the *PLAINE* tool by the INERIS, 2011).

⁴¹ Actions must be proportionate to the degree of disadvantage, and hence applied in some degree to all people, rather than applied solely to the most disadvantaged (Commission on Social Determinants of Health, WHO).

⁴² But the planned interventions often consist in diagnoses and identification of the problem rather than in concrete actions to change adverse situations.

⁴³ Through actions on occupational exposure (Auvergne and Bourgogne) urbanism documents (Rhône-Alpes) and food-related actions (Franche-Comté) for example and in the NEHAP2 (actions on substandard housing and on means of transportation).

⁴⁴ It deals with making populations participate, with listening to their demands and with providing them with clear information.

⁴⁵ If we combine 19% of « totally agree » and 38% of « agree ».

⁴⁶ PRSE2 of Alsace, Aquitaine, Champagne Ardenne, Haute Normandie, Ile de France, Languedoc Roussillon, Lorraine, Midi Pyrénées, Nord Pas de Calais, Pays de la Loire, Picardie, Rhône Alpes.

d. Target zones or populations

The NEHAP2 considers all the population, it has a universal approach but it also targets areas that are considered more exposed to environmental nuisances, like overseas territories or some specific regions. It also targets specific populations, namely children, pregnant women etc., i.e. the so called most susceptible populations.

The PRSE2 targets the whole population	67%
It focuses on vulnerable populations	33%
It targets the social and health gradient of environmental nuisances	0%
The target groups are coherent with the analysis of the problem	52% ⁴⁷ - 54% ⁴⁸
The interventions are not targeted to most deprived or socially vulnerable populations (as characterized by deprivation indexes)	86%

It is still a challenge to answer this question as the different conditions of specific sub groups of population are not characterized yet. The target groups' identification is not based on the analysis of environmental health inequalities in the NEHAP2.

e. Activities and implementation methods

As said above, not all the operational activities are coherent with the analysis of the problem of environmental health inequalities since in most cases there is no initial analysis of the problem. Broadly speaking, the NEHAP2 and 68% of the PRSE2s⁴⁹ really aim at tackling inequalities and it is the first attempt for an environmental health plan in France - and a good practice for public health in France because this was planned before the initiative on the PRS, etc. However, although it has been announced it has not been fleshed out yet. Below are the types of activities that are carried out in the PRSE2s; according to the results of the questionnaire and the personal analysis (the latter focuses only on activities clearly oriented towards environmental health inequality).

	Questionnaire	Personal analysis
Communication, information and awareness raising	71%	86%
Studies, investigations, evaluations ⁵⁰	66%	95%
Coordination and organization of actors and plans ⁵¹	57%	64%
Promotion	47%	23%
Information and observation systems and indicators	47%	68%
Rules and regulations	47%	27%
Actions on health determinants	47%	27%

⁴⁷ Questionnaire results.

⁴⁸ Personal analysis result.

⁴⁹ If we combine 23% « totally agree » and 45% « agree ».

⁵⁰ For example, in the region *Centre* they have planned a zone impact assessment (HCSP, 2010).

⁵¹ For example, in Languedoc Roussillon, they will carry out a shared diagnosis of the problems

Education/training	43%	54%
Professional training	43%	23%
Police actions	33%	68%
Action Plans	28%	72%
Health and/or health equity impact assessment	19%	27%
Needs assessment	19%	9%
Research	19%	4%
Incentives to increase target populations' involvement	19%	13%

Needs assessment, capacity building measures, incentives and health and equity impact assessment are the least used interventions, despite their being adequate tools to address inequalities.

Nevertheless, interventions' soundness is not supported by quantitative &/or qualitative data. Indeed, most of the planned interventions are not based on an analysis of the existing tools and the ARS explain that they do not have such tools to address specifically environmental health inequalities. They do not always know how to do it and they lack national support on this problem. There is no sufficient evidence on the best practices and lessons derived from what may and may not work in France.

Not only the analysis of the types of interventions is relevant to see whether environmental health inequalities are adequately tackled but the way they are implemented is as important. One of the most important things is to favour target population's involvement and empowerment⁵². In the NEHAP2, it is not one of the main expected results, nor is it in the PRSE2s (77%). In 20% of the PRSE2, it is clearly stated. Incentive measures are not used to make sure target populations participate either. Methods to take into account target populations' inputs and contributions are used, such as users committees, training sessions and the consultation and involvement of the five committees in the *Grenelle* roundtable as well as the participation of some associations and groups' representatives in the NEHAP2 and PRSE2 monitoring. 47% of the regions answered that they do have methods to have them participate. Whether this has led to decisions and changes is not specified.

Common leadership between the different actors and stakeholders can be seen as a positive feature: in the NEHAP2, for each program and intervention, an Institution or organization is appointed as pilot but this leadership tends to be shared.

For the interventions to be effective, communication tools have to be adapted to the different target sub groups. Indeed, sometimes it is not the action itself which is negative but it is the way the communication is performed that reinforces inequalities (e.g. prevention campaigns geared towards the general population whereas it should be focused on specific sub groups in order to be successful). In the NEHAP2, no such emphasis is planned. There are no specific initiatives to make sure target groups can participate or actually

⁵² People's empowerment process i.e. the ability for individuals and populations to have a control over health determinants, over their environment or to evolve along with them to maintain or improve their health status favors the social health inequalities reduction (Basset, 2008).

receive adequate prevention or information messages on environmental nuisances, possible health outcomes or useful information to influence decision making processes. In the regions, 9% totally agree that the communication tools or messages are adapted to those who need to receive them, 38% only agree with it - in Bretagne, there is an attempt to adapt communication messages to the target population - whereas 43% partly disagree and 5% totally disagree.

In other words, 62% of the ARS answer that they do not have any specific tool to take inequalities into account in their daily work. Those who do have them refer to the Health Impact Assessments, the CLS which are Local Health Programs, Agenda 21, the territorial approach consisting in adapting the interventions to specific territories, diagnosis-based actions, integrating the PRSE2 into the PRS and territorial action plans and links with the PRAPS.

f. Key actors

The actors involved in programs tackling inequality are key elements. As aforementioned, target subgroups of population should be involved. Moreover, a diverse representation of actors should be guaranteed. In the PRSE2, the pilots selected to carry out environmental health-related interventions are for 90% of them the ARS, the DREAL (81%), the *Conseil Régional* (28%) and associations (28%). It is important to acknowledge the diversity of actors involved. The main partners concerned by the actions have participated in the interventions planning and are often involved in their implementation. However, it would be interesting to evaluate their participation modalities⁵³ and degree. Generally speaking a great deal of actors has participated, which represents a potentiality.

g. Monitoring and evaluation measures

The last point that is assessed in this analysis is the way the NEHAP2 and all PRSE2s are monitored and how the evaluation process is understood. Environmental health inequalities - either understood as unequal exposures and susceptibilities or strong inequalities due to social inequalities and/or cumulative exposure and impact because considered unfair - can be tackled by considering them from the beginning of a program, by planning specific activities and by coordinating actors and policy areas etc. But, above all, any program or intervention of this type has to be monitored adequately, so that environmental health inequalities remain the main focus to be considered through its action means. In this case, the NEHAP2 and the PRSE2s lack inequality indicators, i.e. indicators which would show what the baseline situation (*ex ante*) was and what the *ex post* situation is. They should highlight the relative result/impact on the different population subgroups according to their specific needs and their characteristics (gender, age, place of residence, ethnicity, SES, occupation) and they would be a proxy indicator to the alterations on given

⁵³ "Participation" is the individual or collective process by which members of the community "a) develop the capability to assume greater responsibility for assessing their health needs and problems, b) plan and then act to implement their solutions, c) create and maintain organizations in support of these efforts and d) evaluate the effects and bring about necessary adjustments in goals and programs on an ongoing basis" (David, Zakus & Lysack, 1998).

environmental nuisances or health outcomes. They should be given at a small geographic scale. Currently, there are no such inequality-oriented indicators in the NEHAP2 and from 23 to 33%⁵⁴ only of the PRSE2s have more or fewer indicators able to show inequalities and/or differences between two situations or two or more groups/areas⁵⁵. The GSE wishes environmental health inequalities were more taken into account in public health law indicators from now (GSE, 2011). But one of the main problems is the availability of such data.

On the other hand, during the monitoring process, it is necessary to investigate whether the intervention has potential negative consequences or side effects on environmental health inequalities. Should it happen, it would be important to be able to re orientate the intervention and give it the necessary adjustments. The NEHAP2 steering committee, divided into three workgroups, has this role. As a matter of fact, during this practicum in the DGS, a methodology to strengthen the monitoring process on environmental health inequalities was elaborated, so that the workgroup has clearer tools to organize its debates, thoughts and recommendations. The idea is to assess, over the NEHAP2's implementation, what contributes to tackling environmental inequalities and what limitations are faced, so as to provide adequate recommendations and orientations. However, this work should be strengthened and a systematic analysis and review of what is done needs to be carried out, not only by the inequality-focused group but also by the two other groups. 71% of the ARS answered that they experience some difficulties in the PRSE2 implementation and 52% of them specific difficulties with environmental health inequalities. They express a lack of implementation tools, of resources and of data on disparities between regions. They also explain that it is a challenge to work on long term policies dealing with inequality and to be able to measure what has been done.

For the evaluation of such a Plan, the questions may concern the reduction of the exposure to contaminants for the average population. If there happens to be a decrease, such a policy can be regarded as a successful one. Nevertheless, the intervention's final objective may as well be to lower this exposure for all but without "leaving aside" any population sub groups, should they not experience this reduction in the same proportions. In this case, the final objective would consist in decreasing inequalities. If it works, then it is a success. But, if some sub groups are still more exposed than the rest of the population, then it is a program/policy failure. The conclusions will then vary according to the initial evaluation question. For an intervention geared towards reducing environmental health inequalities, the question is whether this particular program helps widen or narrow health inequalities. We then compare inequalities as such with inequalities as they would have been without the program/policy or with the population affected by the program vs. where the population who was not (preferably at random). In the NEHAP2 and in the PRSE2s,

⁵⁴ 23% according to the personal analysis and 33% according to the questionnaire.

⁵⁵ Example of Poitou Charente: they have indicators allowing to seeing the situation before and after the intervention.

there is no such approach. Evaluation modalities are not clearly explained (there are no instructions to perform them) and they cannot highlight changes in inequalities. Moreover, potential changes cannot be noticed among different sub groups or geographic areas. We should also point out that neither mid-term nor final evaluation has been carried out yet for the NEHAP2 and that nearly all PRSE2s are too recent to implement any type of evaluation yet. It offers an opportunity to insert equality-focused approaches in the evaluation process from now.

h. The example of inadequate housing

To illustrate the findings of this analysis, this paper focuses on the way substandard housing is addressed at the national level and in the PRSE2. 81% of the PRSE2 deal with it, with varying degrees of importance (43%: top priority, 9%: high priority, 24%: medium importance). In most cases, before the PRSE2, a policy on substandard housing had already been implemented, although hindered by a lack of coordination and of common tools together with insufficient link with the social aspects, etc.

This example is striking as it is the perfect example of a double burden: environmental exposures having health consequences and social deprivation. NEHAP2 reminds us of the universality of the right to have a decent home and relevantly announces several measures to “reinforce and develop the national program to combat substandard housing”. The main measures are the following: setting up district-level organizations to combat substandard housing across France and creating a dedicated task force⁵⁶, which favors a better cooperation between institutions and local actors. Setting up a substandard housing observatory in each district and quantifying the number of unhealthy dwellings (and identifying and describing their occupants) makes it possible to identify and describe the problem. However, no description of the link between substandard housing, health and inequalities is given and there is no information disaggregated by socio economic status (the Plan only mentions “deprived people”). It would be interesting to cross cut available data on substandard dwellings and neighborhoods characterized by CUCS and ZUS. There is no analysis either of the mediating effect of the vulnerability differential in the relationship between environmental exposure (in this case to unhealthy housing) and health outcomes. Certifying organizations to conduct substandard housing surveys, in order to increase the number of orders issued by prefects and the number of reports submitted to the public prosecutor, thus reinforcing law enforcement by central and local government strengthens the fight against this situation, hence taking inequalities into account.

This example shows that many actions tackle environmental health inequalities in both the NEHAP2 and the PRSE2s: in the description of the problem, in the initiative to coordinate actions and strengthen enforcement, with the actions on intermediate health determinants (building low-rent housing suitable for large families and many people without the risk of overcrowding, proper access to water, social subsidies, link with judiciary field, the promotion of supervised self refurbishment thus promoting empowerment, etc.) and on proximate health determinants (lead poisoning (by 20% of the PRSE2s), ventilation, fuel poverty

⁵⁶ With the ambitious goal of meeting the national objective of cleaning up 20,000 substandard housing units a year.

(by 32% of the PRSE2s and in the NEHAP2), mould, etc.). They also try to act on the population subgroups' social vulnerability by providing them social subsidies, by adapting communication messages issued by authorities and by helping people needing temporary accommodation while their house is undergoing renovation. This action is also oriented towards the most socially vulnerable populations ("low-income" tenants or owner occupiers) but the degree of social vulnerability is not given which makes it difficult to know if only the most affected people benefit from it or if a certain gradient in this population is addressed. Finally, they focused on specific areas where the problem is more acute, like in the West Indies departments, by elaborating a report on the issue and voting a law to tackle the problem (see "*Law Letchimy*" in 2011⁵⁷).

Nevertheless, no action is aimed at improving the general environment and environmental amenities (e.g. neighborhood, green spaces, infrastructures, etc.). In brief, it is never stated neither in the NEHAP2 nor in the PRSE2s that this action will help reducing environmental health inequalities. Actions to improve communication are done but they may not reach some populations (e.g. from squatters, illegal migrants, homeless and jobless people) because the means that are used are not specific nor always adequate. Data on substandard housing still lack and substandard housing tracking-related actions are now one of the regions' objectives.

In addition, not all the relevant actors of this large field are mobilized and coordinated; there are still coordination and common actions problems indeed (between all actors from the Ministries of Health, Environment, Housing, "*Politique de la Ville*" and especially with the social field actors), despite all the recent efforts and mechanisms (at the local level, the PDLHI). "Individuals are not considered, only the buildings are"⁵⁸: social aspects are not considered (only in 18% of the PRSE2s).

Moreover, individual semi directed interviews evidenced many challenges, among which the problem of announcing measures and not implementing them all, despite the availability of many useful tools to do so). One of the main problems today in France as regards the fight against substandard housing are the poverty, expensive rents, the lack of roomy cheap housing, the disregard of DALO⁵⁹ appeals, the social and geographic segregation etc. Overseas territories strongly experience the problem because they are affected by specific difficulties as they have substandard multi-storey blocks of flats, shanty towns and substandard housing scattered all around the territory.

⁵⁷ Law n° 2011-725 (23rd June 2011) « portant dispositions particulières relatives aux quartiers d'habitat informel et à la lutte contre l'habitat indigne dans les départements et régions d'outre-mer ».

⁵⁸ Quoted from several key respondents to the individual interviews.

⁵⁹ DALO: "Droit au Logement Opposable" : principle by which the State has to guarantee the right to housing and to provide housing to some priority populations (Law n° 2007-290 (5th march 2007) « instituant le droit au logement opposable et portant diverses mesures en faveur de la cohésion sociale »).

Finally, specific goals on environmental health inequalities reduction concerning interventions on substandard housing are specified neither in the NEHAP2 nor in the PRSE2s and no indicators on inequality reduction are provided. The only way to know whether substandard housing has been reduced is an information system, called *ORTHI* and *Ariane Habitat*, which gives information on the procedures that are ongoing and on the distribution of inadequate housing. However it does not provide information on social health inequalities. And, briefly speaking, it remains to know whether the implemented actions really reduce environmental health inequalities.

V. Overall discussion of the study

When tackling this issue, we can reach the conclusion that the problem of environmental health inequalities can hardly be solved and that there are many reasons not to act. Indeed, the concept itself is very complex and still much debated by some actors. It consists in an all-encompassing issue whose main challenge is to apply concrete tools for action. It is difficult to sort out the different determinants because multiple chronic exposures as well as socially adverse conditions may occur at the same time and get worse over time (e.g. substandard housing conditions, environmental black spots, individual susceptibility, etc.). Furthermore, mechanisms operating at the individual level cannot be adequately understood without reference to group-level data. The effect of each determinant is minimal and time frames for their development and effects are protracted over time. This sets methodological challenges for environmental health inequality assessment, characterization and the fight against them (Rauh et al., 2008). The statistical systems have not evolved as quickly as the scientific findings (HCSP, 2009 & 2012). Consequently, evaluating of interventions is also more difficult, as the time frame is too long compared with the political time. The types of study designs for evaluating practices are not adapted either: the gold standard represented by randomized controlled trials cannot be the solution⁶⁰.

It is also a challenge to act both on environmental health disparities and environmental health inequalities - related to social inequalities-. And, to date, we lack an appraisal tool that would be used by all concerned actors and for helping decision making. Finally, the health sector actors may say that this responsibility does not lie directly in the sanitary sector's hands.

The inadequate housing issue is a perfect example of this complexity as it gathers several actors with different fields of expertise not easily coordinated. There are strong links with social aspects and an effective intervention cannot only focus on unhealthy housing; it should consider the people who live there along with their health problems. Many distal determinants (e.g. social and geographic segregation, social housing policy, etc.) often end up with hampering every single intervention aimed at proximal factors

⁶⁰ The Measurement and Evidence Knowledge Network report states: "Taking an evidence-based approach does not mean relying on or privileging only one kind of method, such as the randomised controlled trial. It does not mean that there is only one hierarchy of evidence, and it does not mean an epistemological rejection of subjective positions or methods." When moving beyond establishing the efficacy of drugs and vaccines, narrow inclusion criteria that focus only on randomised controlled trials risk overlooking relevant studies. This will exclude, for example, most upstream interventions that address health inequities. Most population-level interventions have not yet been subject to controlled studies, but other designs do provide an evidence base to inform practice and policy (...). (We) must therefore consider the "fitness for purpose" of criteria for evidence inclusion, considering which study designs will provide meaningful evidence to answer the (...) question." (Tugwell et al., 2010)

(mayor's order to the owner to renovate a damaged dwelling for example). Nevertheless, the situation compels us to act and try to find solutions because inequality is going to be one of the main health and social issues in the near future.

Limitations of the methodology

This paper presents a study that has limitations. First, the semi directed interviews were individual interviews thus implying subjectivity in the interlocutors' answers and the impossibility to cover the whole aspect of the issue tackled by their respective institutions or organizations. However, objectivity and representativeness was not the first objective of it. It was a way to understand mechanisms better, the history of the plans' elaboration and their perceptions and experiences.

In addition, there are only 21 PRSE2s and for each, only one person (or two) answered, so they may have overlooked some aspects. The extent of the issue's scope did not make it possible to gather all the details and available literature.

Finally, we may regret the lack of data or case studies on what can be done. But this was done in the framework of the practicum for the General Directorate for Health (a methodology meant to improve the NEHAP2's monitoring on environmental health inequalities was elaborated and presented as well as an appraisal tool including the equality/inequality perspective in environmental health programs), which would also represent another step forward in supporting the implementation of environmental health inequality interventions.

VI. Recommendations and conclusion

Any policy or intervention aimed at tackling environmental health inequalities should focus on the reduction and prevention of health inequalities (CSDH, 2008). Policy makers and people in charge of monitoring policies should always ask themselves whether a policy provokes, reduces or corrects health inequalities, by understanding the impact it will have on specific sub groups (CCNPPS, 2010).

The orientation of the Plan or intervention can be: 1. towards the whole population, taking into account the social gradient, 2. towards the gap between high and low SES or more/less exposed or susceptible populations, 3. focused on most vulnerable populations.

The concept of proportionate universalism can be considered as a key one: by addressing environmental nuisances and hazards for the whole population (access to good quality water and resources, field actions in high density industrial zones/areas, on noise-related nuisances, on air quality, exposure to some naturally occurring agents—e.g. asbestos and radon-) while focusing on the specific ones that are overburdened (cumulative exposure). It would be a mixed approach considering general actions on environmental nuisances coupled with actions focused on those who need it most. They should be aimed at lowering the risks of exposure and the differential effects that are due to a vulnerability differential, at redistributing risks through compensation mechanisms. For example, interventions on children to alleviate, as soon as possible the effects of environmental exposure to contaminants would probably prove relevant.

The initiatives dealing with environmental black spots' characterization should be continued within an environmental, social and sanitary approach.

Following the HCSP recommendations, tackling environmental health inequalities should go on being a central axis and become part of the PRSE2s which do not have such axis yet; it should be measured more accurately by adapting the information system and indicators (e.g. environmental health inequality index allowing setting up priority interventions according to area and population priorities). The use of a logical framework which integrates equality can be a useful tool. Evaluation processes will also have to include inequality reduction targets.

Tackling inequalities and especially environmental health inequalities and disparities is an obvious example of the necessity to include health in all policies (HiAP) through an intersectoral work at every level, through population's empowerment and "meaningful involvement" and by performing health and equity impact assessments - environmental health being an adequate sector offering an opportunity to add environmental practices (QHRA and EIA⁶¹) to the health sector's.

As an example, substandard housing is an important proximal health determinant to be stressed, by elaborating better diagnoses (taking into account inequality impact, different results and means of action for different sub groups, etc.), by using the HIA tool in the *Politique de la Ville*, the DATAR, the CLS, the ASV and in the PDLHI, by coordinating all these actors, by sharing positive proven experiences, by including a more social approach in inadequate housing strategies, by adapting to local needs (as with the Loi Letchimy or with the different regional specific actions on fuel poverty, radon, lead poisoning, rural owner occupiers or illegal migrants in cities who are captive of substandard housing, according to their needs), by acknowledging urban development and life settings as health determinants (and planning coordinated actions at all levels), by fighting against urban segregation among other useful innovative initiatives.

Conclusion

The NEHAP2 and several PRSE2s address environmental health inequalities but lack a comprehensive set of instruments to do so. Still, they are exemplary as they represent one of the first attempts to address environmental health inequalities. More work is needed on elaborating, implementing and evaluating the effectiveness and impacts of concrete tools and interventions to help decision-making and implementation processes aimed at environmental health inequalities relief.

⁶¹ Quantitative sanitary risk assessment, Environmental impact assessment

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List of appendices

Appendix 1 - Concept of Environmental Health Inequalities

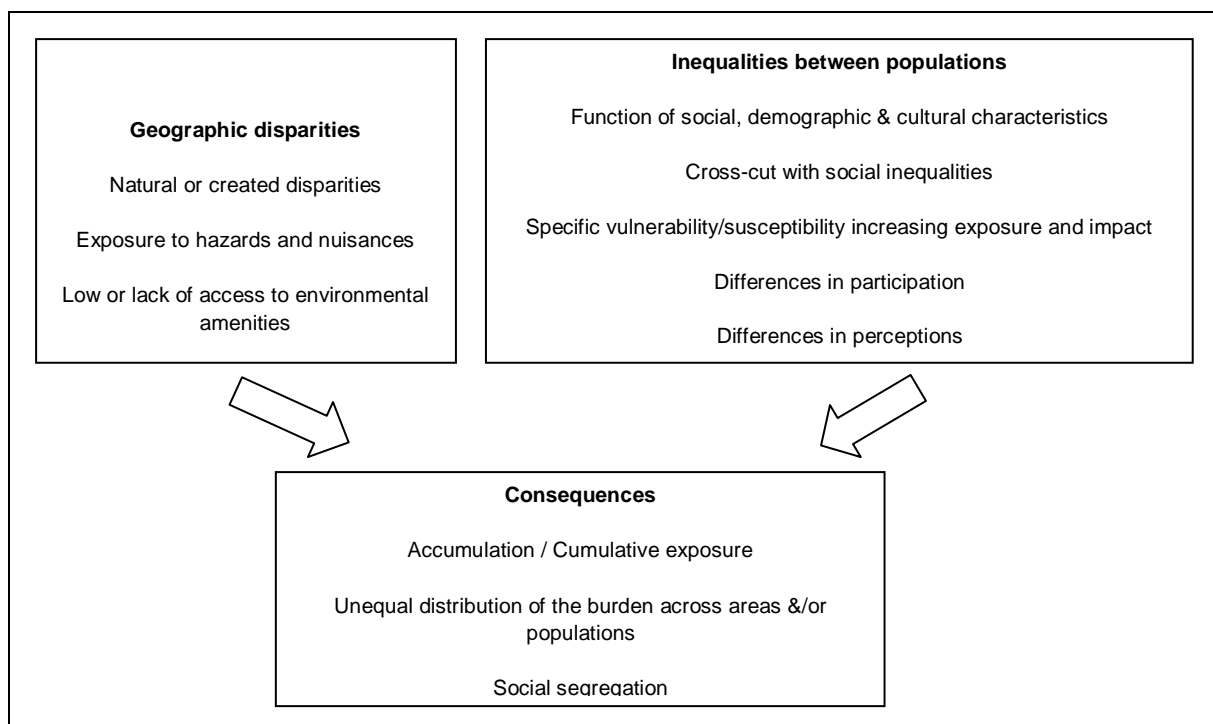
Appendix 2 - Mechanisms of Environmental Health Inequalities

Appendix 3 - Conceptual framework of Health Determinants

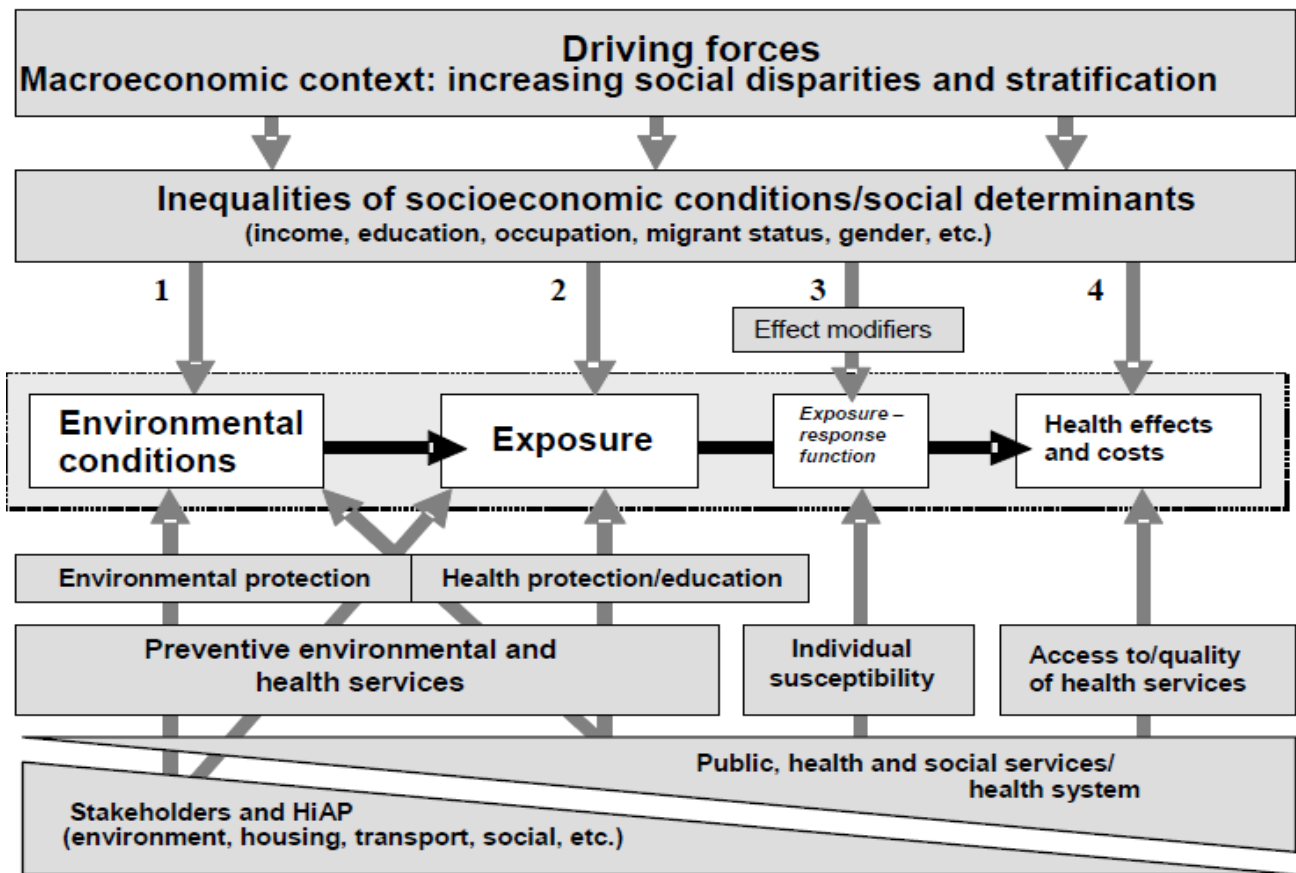
Appendix 4 - Questionnaire sent to the ARS

Appendix 5 - Environmental Health Inequalities Assessment Tool (Bibliography)

Appendix n° 1 Concept of Environmental Health Inequalities

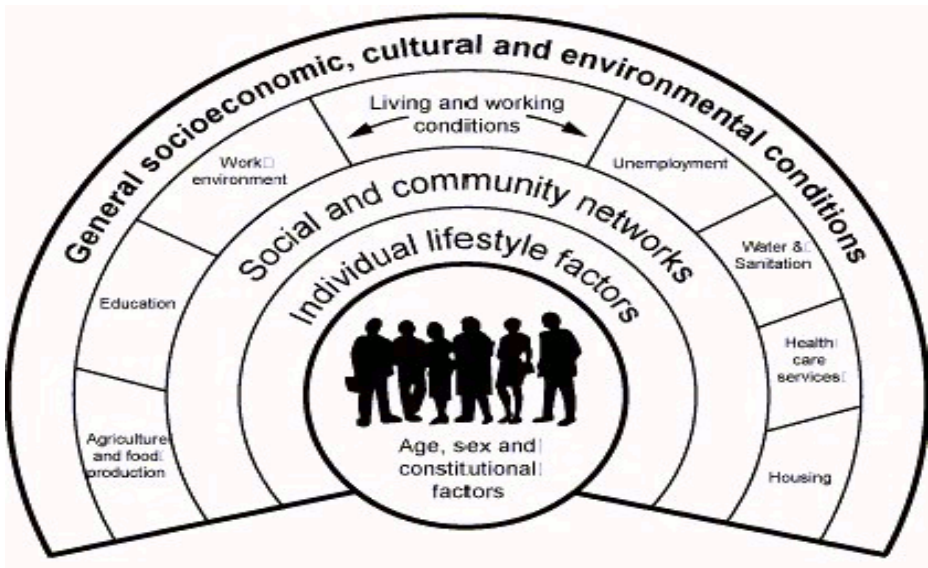


Appendix n° 2 Mechanisms of Environmental Health Inequalities



Source: WHO, 2009

Appendix n° 3 Conceptual framework of Health Determinants



Sources: <http://www.healthgain.eu/> and Parliament of Canada

Appendix n° 4 Questionnaire sent to the ARS

Questionnaire « Environnemental Inequalities and Substandard Housing »		
This questionnaire is divided into two parts: the first one deals with environmental inequalities and the second one with substandard housing.		
Tick the boxes or fill in the blanks.		
General Informations		
Name of the person who fills in the questionnaire		
Does your region have a PRS (Regional Health Project)?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Date of publication of the PRS		
Are the PRSE2 and the PRS interconnected?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Environnemental Inequalities		
Your region's PRSE2 document		
Does the PRSE2 of your region describe your region's social &/or environmental inequalities?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
If yes, does the description refer to epidemiological data?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Give your opinion:		
My region's PRSE2 undertakes actions dealing with environmental inequalities.	<input type="checkbox"/> Totally agree <input type="checkbox"/> Somewhat agree	<input type="checkbox"/> Somewhat disagree <input type="checkbox"/> Totally disagree
If yes, which type of actions is it? (You can tick several boxes)	<input type="checkbox"/> Communication, information, awareness raising <input type="checkbox"/> Education, prevention <input type="checkbox"/> Professional training <input type="checkbox"/> Promotion <input type="checkbox"/> Monitoring tools (information systems, indicators, etc.) <input type="checkbox"/> Studies, investigations, evaluations <input type="checkbox"/> Rules and regulations <input type="checkbox"/> Police actions <input type="checkbox"/> Research	<input type="checkbox"/> Coordination, organisation and actors' structuration <input type="checkbox"/> Empowerment <input type="checkbox"/> Needs assessment <input type="checkbox"/> Health impact assessment <input type="checkbox"/> Incentives <input type="checkbox"/> Work plan <input type="checkbox"/> Provision of services <input type="checkbox"/> Action on health determinants <input type="checkbox"/> Other Precise.....
Does the PRSE2 deal with susceptibility/vulnerability inequalities?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Does it deal with socio economic inequalities?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Does it deal with geographic inequalities?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Does it take the « inequality gradient» into account?	<input type="checkbox"/> Yes	<input type="checkbox"/> No

Does it take into account the whole population in its interventions or does it focus more on the most precarious/vulnerable sub groups?	<input type="checkbox"/> the whole population	<input type="checkbox"/> focus more on precarious/vulnerable sub groups
Was/were the target group(s) identified based on the analysis of environmental health inequalities?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Does the PRSE2 have indicators which take into account environmental inequalities &/or indicators that will show the impact of the intervention on the reduction of environmental inequalities?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
If yes, can you give an example of an indicator which fulfills these criteria?	<div>.....</div> <div>.....</div> <div>.....</div>	
If the PRSE2 takes into account environmental health inequalities, what are the pilots selected to do so?	<input type="checkbox"/> ARS <input type="checkbox"/> DREAL <input type="checkbox"/> DIRECCTE <input type="checkbox"/> Region <i>Préfecture</i> <input type="checkbox"/> <i>Conseil régional</i> <input type="checkbox"/> Elected representatives <input type="checkbox"/> Associations <input type="checkbox"/> Trade unions	<input type="checkbox"/> Economics representatives <input type="checkbox"/> Other administrations (Please precise: <div>.....</div> <input type="checkbox"/> Others: <div>.....</div>
PRSE2 Planning		
Among the following actors, which of them do you reckon did not participate enough throughout the PRSE2 planning process? (You can tick several boxes)	<input type="checkbox"/> ARS <input type="checkbox"/> DREAL <input type="checkbox"/> DIRECCTE <input type="checkbox"/> Region <i>Préfecture</i> <input type="checkbox"/> <i>Conseil régional</i> <input type="checkbox"/> Elected representatives <input type="checkbox"/> Associations <input type="checkbox"/> Trade unions <input type="checkbox"/> Economics representatives	<input type="checkbox"/> Citizens <input type="checkbox"/> Other administrations <input type="checkbox"/> Other entities (CODERST, Environnemental Authority, etc.) <div>.....</div> <div>.....</div>
When elaborating the PRSE2, was the issue of environmental inequality &/or social health inequality addressed?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
As an identified issue?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
As a mainstreamed issue?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
If yes, by which actors? (You can tick several boxes)	<input type="checkbox"/> Administration <input type="checkbox"/> Région <i>Préfecture</i> <input type="checkbox"/> <i>Conseil régional</i> <input type="checkbox"/> Elected representatives <input type="checkbox"/> Associations <input type="checkbox"/> Trade unions <input type="checkbox"/> Healthcare professionals <input type="checkbox"/> People affected by environmental nuisances <input type="checkbox"/> Experts	<input type="checkbox"/> Economics representatives <input type="checkbox"/> Citizens <input type="checkbox"/> Other administrations <input type="checkbox"/> Other entities (CODERST, Environnemental Authority, etc.) Please precise: <div>.....</div> <div>.....</div>

Is the description of environmental and social health inequalities based on theoretical and scientific data from the specialized literature ⁶² ?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
<i>Give your opinion :</i>		
Partners having a specific experience in environmental health inequalities were associated to the planning process.	<input type="checkbox"/> Totally agree <input type="checkbox"/> Somewhat agree	<input type="checkbox"/> Somewhat disagree <input type="checkbox"/> Totally disagree
PRSE2 implementation and monitoring		
What is the GRSE meetings frequency?	
Is there a monitoring/steering committee smaller than the GRSE?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
<u>In case actions are ongoing:</u>		
At the local level, are methods to take into account target populations inputs and contributions used?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
<i>Give your opinion :</i>		
The PRSE2 favors target population's involvement and empowerment at the local level.	<input type="checkbox"/> Totally agree <input type="checkbox"/> Somewhat agree	<input type="checkbox"/> Somewhat disagree <input type="checkbox"/> Totally disagree
The communication tools are adapted to the different target sub groups concerned by environmental health inequalities.	<input type="checkbox"/> Totally agree <input type="checkbox"/> Somewhat agree	<input type="checkbox"/> Somewhat disagree <input type="checkbox"/> Totally disagree
Do you have difficulties while implementing the PRSE2 in your region?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
If so, which ones?	
Do you have specific difficulties regarding the environmental health inequalities management?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
If so, of what kind? Please precise.	
If so, what do you think it is due to?	
In the ARS or for the PRSE2 monitoring process, do you use specific tools to address environmental &/or social health inequalities?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
If so, which ones?	
According to you, is there an issue that may help address environmental health inequalities which has not been included in your region's PRSE2?	

⁶² (e.g. studies, evaluation reports, needs assessment, epidemiological studies, theoretical models of social health inequalities)

Substandard Housing		
Does the PRSE2 deal with substandard housing?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
If not, was this issue addressed during the PRSE2 elaboration?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
If not, why do you think this issue was finally not included in the PRSE2?	
If so, in the PRSE2, how important is this issue?	<input type="checkbox"/> Top priority <input type="checkbox"/> High priority	<input type="checkbox"/> Medium <input type="checkbox"/> Low <input type="checkbox"/> Very low
Why was this issue included in the PRSE2?	
Was there a policy to fight against substandard housing before the PRSE2?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
If so, was it evaluated?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
If it was evaluated, what were the conclusions?	
In the PRSE2, are the interventions consistent with the previous program on substandard housing?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Were new axes developed?	<input type="checkbox"/> Yes	<input type="checkbox"/> No

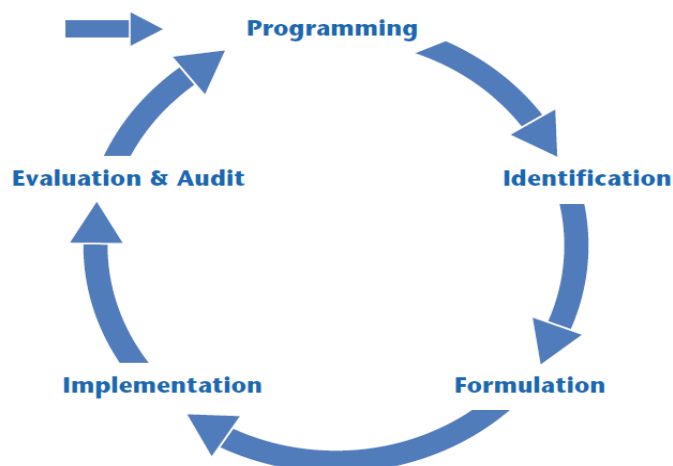
You may add here elements that would appear relevant to you for the understanding of the environmental health inequality inclusion process in your region’s PRSE.
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Appendix n° 5 Environmental Health Inequalities Assessment Tool

Method

The analysis is based on an environmental health inequalities evaluation or analysis grid, thanks to some pre existing tools that are adapted and intertwined.

This analysis is carried out according to the different stages of the project elaboration, from the Plan's conception to its implementation. The project or program cycle forms a basis structuring the thought, as represented in the illustration below.



The tool that is presented in the methods part is the fruit of a personal reflection; based on the following tools and documents⁶³ :

- The first tool is presented in the following book: « **Reducing social health inequalities** », published by the INPES (Guichard & Ridde, 2010). « *Cette grille s'inscrit dans une démarche qualité des actions afin d'orienter et de stimuler une réflexion sur le déroulement du projet et les pratiques au regard de composantes se rapportant plus particulièrement à une problématique d'inégalités sociales de santé. Elle peut être utile aux intervenants pour planifier leurs interventions, étudier leurs pratiques ou vérifier qu'elles ont le potentiel de réduire les inégalités sociales de santé* » (Guichard & Ridde, 2010). In this case the tool is adapted to think precisely about environmental health inequalities, as understood by the PNSE2. **Grid for the analysis of actions aimed at reducing social health inequalities**, resulting from three tools: the « Closing the gap » one, « Preffi » and the tool by the Canadian consortium for health promotion research. This grid was elaborated in coordination by the INPES and the Social and Preventive Medicine department (CHU Montreal). Dialogue tool build in order to analyze actions aimed at tackling social health inequalities, 5 areas, 51 questions.
- Tool « **HEAT** » - Health Equity Assessment Tool. Elaborated by the New Zealand Health Ministry in 2004 to take into account social health inequalities in public health programs, it has 12 criteria.

⁶³ See INPES webpage. <http://www.inpes.sante.fr/10000/themes/ISS/index.asp>

- Quality criteria from « **Closing the gap** », **questionnaire** of the European project «Closing the gap » elaborated to select projects aimed at reducing social health inequalities in Europe, 11 criteria.
- Tool **Lens SHI**. Inspired from the « HEAT » tool, elaborated by a Gand University team (Belgium) for the *Roi Baudouin Foundation*, to help take into account social health inequalities in local projects. It is built to monitor a project in three steps. For each step, the questions follow the same five categories. 1. Your project starts (21 questions), 2. Your project is on going (24 questions), 3. Your project finishes (27 questions) (Guichard & Ridde, 2010).
- Basset B. (sous la direction de), **Agences régionales de santé. Les inégalités sociales de santé**, Saint-Denis : INPES, coll. Varia, 2008.