# Human health in *The London Plan*: How health is framed in a world city's spatial development and climate action strategy

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**Abstract**

Human health is among the original justifications for town planning, but it has been under-examined as one of the myriad benefits motivating cities to plan for climate change. A conceptual content analysis of the July 2011 version of *The London Plan: Spatial Development Strategy for Greater London* was performed to reveal how health was portrayed in a world class spatial development strategy that includes climate change mitigation and adaptation goals and actions. The coding of the 317 page plan resulted in eight distinct health frames and nearly 200 instances of the keyword 'health.' There are at least three conclusions that can be drawn from this analysis. First, the stated threats to health are truly localised. Second, the policies that address health acknowledge the health benefits derived from both adaptation and mitigation. Third, addressing health inequalities and creating an environment supportive of health are the most salient cross-cutting issues.

**Contents**

## Introduction

Planning for sustainable urban development and climate change adaptation is, at a very fundamental level, an attempt to protect ourselves and our social systems from harm. In our attempts to adapt to a changing environment, there are many inter-related elements that must be considered. One of the most indispensable is the protection of human health and well-being. Therefore, it is critical to consider human health impacts and their relationship to the many social, political, economic, and environmental considerations in sustainable spatial development and climate change plans. In contrast to the many climatic phenomena and subsequent outcomes that require great speculation on current and future climate variability, sea level rise is a measured certainty that will affect the health and lives of the billions of persons living within coastal zones worldwide (Creel, 2003). Whether from sea level rise, flooding, drought, heat, or other extremes, the health of billions of people will be greatly influenced by the quality of the physical infrastructure designed to adapt to and mitigate severity of these events. The research conducted here addresses the following questions: How is the local co-benefit of human health portrayed in a world class spatial development plan, and how is health tied to the plan's climate change mitigation and adaptation actions? Is health tied to climate mitigation and adaptation actions in the plan and not yet being addressed by research examining the health impacts of climate change? These questions are addressed through a content analysis of the 2011 *Spatial Development Strategy for Greater London* (UK). London, as the capital of a nation leading climate change planning and as a world city, can act as a model for other major urban areas preparing for climate change and aiming to prevent its deleterious effects. There are lessons that

may be learned from a city with a history of connecting urban form and public health (Ashton and Ubido, 1991; Hebbert, 1999).

The apparent solution to addressing the effects of climate change has been to 'think globally by planning locally for public health' (Coutts, 2010, 54). Much like other climate vulnerabilities, the health impacts of climate change vary by location and are often most accurately considered at smaller geographic scales. Even municipalities within the same county, district, or province might face very different health impacts from drought, flooding, and heat due to proximity to surface water and micro-climatic effects. The scales at which the Intergovenmental Panel on Climate Change (IPCC) proposed adaptation included national/regional and individual responses, but no direction is given on more localised city-level efforts (Confalonieri et al., 2007). Despite this, '…a number of urban leaders have decided to take matters into their own hands, adopting solutions that already exist or inventing new ones for limiting greenhouse gas emissions and preparing for the effects of ongoing global warming' (Rosenzweig, 2011, 70). It is cities who have taken the lead in planning for their specific climatic vulnerabilities, and it is a city plan that is examined here to determine how city residents will be protected.

**Health and Planning for Climate Change**

Macintyre, Ellaway, and Cummins (2002) challenge us to better conceptualise and operationalise 'place effects' on health outcomes. Their suggestion—brilliant in its simplicity and fundamental importance—is to use a framework of universal human needs to examine how place influences one's ability to meet these needs and live a healthy life. Planning has a significant influence on many of the items in a hierarchy of human needs (Maslow, 1968). At a very fundamental level is the quality of the air, water, food, and shelter needed to maintain and perpetuate life. But beyond merely subsisting, planning provides the contextual support for

meeting other needs such as public hygiene, work, and transportation. Climate change poses a unique and long-term threat to the resiliency of urban centres to meet human needs and protect health. With impending climate variability, the ability to meet many of these needs will be threatened, and it is the duty of planning to propose actions that will allow the continued satisfaction of these needs amidst a changing environment. Failing to provide an environment in which these needs can be met will result in increased morbidity and mortality. The nascent literature connecting climate change to health offers planners some guidance on the impending threats to the health of the populations they are planning to protect.

Over the past five years, there has been a small surge in the literature exploring the potential health impacts of global climate variability. Although the volume of literature has increased, it is still sparse and the outcomes examined have largely been limited to the health effects of heat waves and air pollution (Ebi et al., 2009). A number of articles have provided a litany of anticipated health effects (Frumkin, 2008; McMichael, Woodruff and Hales, 2006), environmental health indicators (English et al., 2009), and have focused on the childhood populations that are most vulnerable to anticipated events (Kisten et al., 2010; Sheffield and Landrigan, 2011). Table 1 is a synopsis of the climate change and variability events and the corresponding health effects.

**[Table 1 about here]**

Although we can state with relative certainty that climatic norms are changing, expert opinion is also of the mind that the level and type of disease burden in all countries and regions will progressively increase with a changing environment (Confalonieri et al., 2007). Of course, projecting the level of increase in morbidity and mortality caused by climate change is extremely complex and fraught with uncertainty. Taking this difficulty, if not futility, into account, there

have been some efforts by public health researchers to quantify the added incidence of disease burden (Watkiss et al., 2003; WHO, 2003). In the Fourth Assessment from Working Group II of the IPCC, it was noted that 'at this early stage the effects are small but are projected to progressively increase in all countries and regions' (Confalonieri et al., 2007, 393). McMichael et al. (2004) calculated that in the year 2000 increased climate variability was reported to be responsible for over 150,000 deaths worldwide. Almost 90% of this increase in the disease burden fell upon children. Based on IPCC projections, these numbers are likely to rise as more people become susceptible to more severe climatic shifts. Although a precautionary approach would lead one to take these trends seriously, there are those who note the lack of definitive evidence to support an alarmist attitude (Rohr et al., 2011).

Most European countries either have a national climate change strategy or are creating one. The US, embarrassingly, has no national adaptation strategy (Ebi, 2010). The UK released an assessment of the health threats related to climate change in 2008 (Kovats, 2008). The perceived greatest threats to the health of UK residents included heat waves, flooding, drinking water contamination, increased ground level ozone, and UV radiation. The noted effect of increased heat on water- , food-, and vector-borne diseases was less daunting.

Likely motivated in no small part by the UK's heightened susceptibility as an island nation (Ebi et al., 2006), the UK Climate Change Act of 2008 was passed as '…the first legislation of its kind in the world, establishing a long-term legal framework to underpin the UK's contribution to tackling climate change' (Kovats, 2008, iii). This Act established the Committee on Climate Change. A report by this committee in September 2010, *How Well Prepared is the UK for Climate Change*, found that while information capacity is high, its translation into action has been minimal, and failing to act was noted throughout as detrimental to human health. The

report also touched on the scale of interventions to combat climate change, concluding that climate change mitigation and adaptation should be primarily a local function with national governments playing a supporting role. London's climate change planning is an example of how a local government, a very significant one on a global scale, is planning for actions that will ultimately have local, global, and both immediate and long-term influences on human health.

There exists analyses on the potential threats to health of global climate change, but there has been little, if any, attention given to how health is approached in our spatial development and climate change adaptation and mitigation plans, the plans that guide the development of cities and influence the actions which exacerbate climate change. This paper hopes to begin to address the lack of extant literature by examining how health is framed in the spatial development and climate change strategies of a world city. As the first major world city to produce a Climate Change Adaptation Strategy and as the birthplace of contemporary planning and public health collaboration, the London case holds great promise in not only guiding plan formation elsewhere but also in exposing new areas of research.

**Data and Methods**

Under the rules of the Greater London Authority Act of 1999, the Mayor of London is required to produce a Spatial Development Strategy for the 32 boroughs and the Corporation of the City of London that looks ahead approximately 20 years. The first London Plan was published in 2004. Development plans in the 32 boroughs must be in general conformity with this plan, and any planning decisions within London are legally required to take the plan into account. The plan must also conform to European Union (EU) legislation including the European Spatial Development Perspective.

A conceptual content analysis of the July 2011 version of *The London Plan: Spatial*

*Development Strategy for Greater London* was performed to determine the prominence and context of human health throughout the plan with particular attention to London's planned response to climate change. Content analysis is often used to 'reveal the focus of individual, group, institutional, or societal attention' (Weber, 1985). In this case the content analysis was performed to reveal the attention paid to health in the Mayor of London's comprehensive planning document. The 317 page document is organised into eight chapters: 1) Context and Strategy, 2) London's Places, 3) London's People, 4) London's Economy, 5) London's Response to Climate Change, 6) London's Transport, 7) London's Living Places and Spaces, and 8) Implementation Monitoring and Review. Preceding these eight chapters is the Mayor of London's Foreword and an Overview and Introduction chapter front matter. All eight chapters including this front matter were included in the analysis.

The entire portable document format (pdf) plan was digitally searched to determine the prevalence and context of the keyword 'health.' The number of occurrences of the keyword 'health' was summed for each section. The context of each occurrence of the keyword was evaluated to determine how health was framed within the plan. A number of frames were created after determining the similarities and discrepancies in the context surrounding health. The frame coding was performed solely by the author. Therefore, threats to reliability due to varied interpretations by multiple coders were eliminated. The validity of the frames is similarly robust. Unlike some forms of content analysis which seeks to organize text around various constructed themes that are prone to varied interpretations, the health frames here were created almost exclusively using explicit language from the plan itself. Very little subjective interpretation of the context in which the keyword 'health' was found was required.

Chapter 5, London's Response to Climate Change, was examined in great detail. The

occurrence of 'health' in the 22 policies in this chapter was measured to determine which policies considered health outcomes. A complete list of these policies is displayed in Table 2.

**[Table 2 about here]**

**Results**

There were a total of 176 instances of the keyword 'health' throughout The London Plan. The coding of the plan resulted in eight distinct health frames. Table 3 displays the distribution of the health frames per plan chapter. The descriptive distribution reveals that the health inequality and healthy environment frames are found in most of the plan chapters. Other frames are not as consistently distributed. Figures 1 and 2 also display the distribution of the health frames by plan chapter (Appendix A).

**[Table 3 about here]**

The *Health Inequality* frame was prevalent throughout the London Plan with particular, and expected, prominence in Policy 3.2, Improving Health and Addressing Health Inequalities. Reducing economic and racial disparities in health outcomes and access to care was integral to the plan and in line with the Mayor's Health Inequalities Strategy. The *Healthy Environments* frame was also quite prevalent. In line with the London Plan being a spatial development strategy, this frame encompassed elements of the built environment put forward as affecting health. Improved housing, brownfield redevelopment, the reduction of air pollution, and the promotion of non-motorised forms of transport were all seen as ways to create an environment supportive of the health of London residents. *General Health Promotion* captured all instances where improving the health of Londoners was mentioned in general terms. For example, in phrases such as '…promoting health and welfare' unaccompanied by detailed actions or outcomes. Within this frame was language from Policy 3.2 and mentions of mental health and

the health of children. *Health Facilities Infrastructure* captured not only the infrastructure of health care centres but also the health care delivery services. Among the *Health Policies* recommended to guide health promotion among Londoners were the *Mayor's Best Practice Guidance on Health Issues in Planning*; *Healthy Lives, Healthy People: Our Strategy for Public Health in England*; and the *Health and Social Care Bill*. There was also mention of the need for coordinated planning with other existing environmental and climate change policies. The *Health and Green Space* frame captured a number of clearly stated connections between the conservation of green space and the health of city residents. The ambitious green belt designed to surround London and curb sprawl was also held up as necessary to support health. Green spaces were also integral to London becoming a city that 'delights the senses.' A *Health Impact Assessment* (HIA) is a tool used to evaluate environmental threats to health. HIA was often used in conjunction with 'health checks' performed in local communities. Finally, the *Health and Economy* frame included mention of not only the maintenance of the overall health of the economy but also the role of the health sector jobs and research in supporting a robust economy.

In addition to 'health' there were also five instances of the term 'well-being' and six instances of the term 'welfare.' Four out of the five of the instances of 'well-being' were found in conjunction with 'health.' The remaining instance was used in conjunction with 'prosperity.' All instances of 'welfare' were found in conjunction with 'health' in phrases such as '…improving Londoners' health, welfare, and development' (e.g. Greater London Authority [GLA], 2011, 210) accorded to the *General Health Promotion* frame in the analysis.

***A focus on the local health benefits of climate change mitigation and adaptation***

London is striving to become a '…world leader in improving the environment locally and globally, taking the lead in tackling climate change, reducing pollution, developing a low carbon

economy, consuming fewer resources and using them more effectively' (GLA, 2011, 137). With this explicit goal, London recognizes its global role as a contributor to the emissions that exacerbate climate change and as an exemplar of city planning. Although the business conducted in London certainly influences global markets and behaviors, the spatial development and climate action strategies are decidedly local.

London is looking to its own vulnerability to flooding, higher average temperatures, and drought. The probability of sea level rise, heavier winter rainfall, higher tidal surges, hotter summers, and less summer rainfall increases with climate change (GLA, 2011). The latest UK climate projections support these trends (Jenkins et al., 2009). Heat, flooding, and drought '…could seriously harm Londoners' quality of life, particularly the health and social and economic welfare of vulnerable people' (GLA, 2011, 138). This language is consistent with what is found in other chapters and what was classified under the *General Health Promotion* or *Health Inequalities* frames.

Health is tackled more specifically in seven of the 22 policies listed in the climate change chapter of the plan (full list of policies listed in Table 2). The first one of the seven climate change policies that explicitly mentions health pertains to sustainable design and construction. The 'sustainable design and construction' of buildings is intended to ensure that they are 'healthy and adaptable' (Policy 5.3). This policy recognizes that structures are important for both climate change mitigation and adaptation. Reducing emissions through more efficient interior climate control and reducing the use of natural resources in construction will aid in mitigating future climate change. Reducing the urban heat island effect through green roofs and the use of shade and also enforcing construction standards designed to withstand natural hazards are adaptation strategies. Excessive ambient heat and flooding carry with them immediate and potentially

severe health hazards. Mitigating against future effects may reduce the severity of these hazards.

The use of green infrastructure to reduce the deleterious effects of the urban heat island (Policy 5.10) is not only an adaptation to increasing temperatures, but also a mitigation strategy. Green infrastructure reduces temperatures through evapotranspiration and also traps airborne greenhouse gases that may exacerbate future climate variability (Gill, Handley, Ennos and Pauleit, 2007).

Maintaining a sustainable water supply in the face of drought (Policy 5.15) is a public health issue with severe consequences, especially in dense urban environments where the city system is the sole source of potable water.

The most unique connection between health and climate change found in the plan deals with waste management. Waste is addressed in the climate change chapter due to its potential as an energy source and in the importance of promoting recycling and recovery. In addition to encouraging the minimisation of waste, the plan states that waste processing facilities should take into account the health and safety of those working within them and also that of adjoining neighbors (Policy 5.17). A more direct threat is hazardous waste, but the plan does not deal with the health threats associated with exposure to hazardous waste but rather the public concern over health and environmental impacts of the facilities that handle the waste (Policy 5.19).

Another unique aspect of the climate change strategies chapter of the plan is that this chapter includes brownfield remediation (Policies 5.21). Preventing environmental and health threats from contaminated brownfield sites is how health and brownfields are connected in the plan, but brownfield remediation also has indirect climate change mitigation benefits in that scarce urban land unusable with brownfield status can be used for redevelopment upon remediation of contaminants. This may alleviate pressure for greenfield development that consumes green

infrastructure and creates the need to consume fuels to reach development at greater distances from existing goods and services. Lastly, health is addressed in Policy 5.22, but only in the title of a directive that should be taken into account when there is exposure to hazardous substances and installations.

There is at least one health impact of climatic change *not* noted in The London Plan policies but supported in the literature. An increase in mean temperatures causing an increase in suitable habitat for the vectors that carry infectious disease (eg. mosquitos, ticks) has been put forward as a serious health concern (Table 1). Countries where a colder climate has kept diseases like malaria at bay could eventually host a climate that could harbor disease. One explanation for the omission of vector-borne diseases in the plan is a belief that since the UK eradicated malaria once, it is unlikely to reemerge (Kovats, 2008).

**Conclusions**

There are at least three conclusions that can be drawn from addressing the first of the two research questions: How is the local co-benefit of human health portrayed in a world class spatial development plan, and how is health tied to the plan's climate change mitigation and adaptation actions?

First, the threats to health and actions to address these threats are truly localised, but there is explicit recognition of London's influence on the global environment. The planning policy actions promise benefits to average Londoners but also situate London in a global context. It is beyond the scope of this paper to address fully, but the fact that London, as a local municipality, has taken steps to mitigate global climate change adds to the paradox of collective action witnessed in other cities worldwide. Local municipalities, namely cities, are taking the lead in planning for climate change even though the benefits of mitigation are global in nature and

shared. London operates in a country with national level leadership, but many of the countries responsible for the highest levels of greenhouse gas emissions do not. Still, in countries without this leadership and mandate handed to local municipalities, such as the US, it is cities who have taken the lead in planning for climate change. Untested but possibly driving this apparent collective action paradox is the realisation of local benefits. Health is certainly one of these benefits, and its role in driving local action is ripe for future research. How this research might be approached is presented briefly in the Discussion section.

Second, the policies that recognize health in the plan acknowledge the health benefits derived from a balance of adaptation and mitigation strategies. London's climate change mitigation strategies include its global contribution to improving health and welfare beyond the UK, but its adaptation strategies have more immediate and local health benefits. Current estimates reveal that even with serious mitigation efforts, the next 100 years of climate change will be determined by an atmospheric composition that cannot be changed (GLA, 2011, 138). Therefore, London appears resolved to adapt to what is to come over the next century, and likely beyond, considering concerted global mitigation efforts have been slow in coming. The most notable policies that explicitly tie health to adaptation and mitigation are those which address building design and construction and green infrastructure conservation. These policies will protect London residents from the risks associated with rising temperatures and flooding by adapting to these projected conditions in the near term and mitigating against their increased severity and frequency in the longer term. Adaptation and mitigation are not two opposing alternatives and rather must be viewed as complementary (Adaptation Sub-Committee, 2010).

Third, addressing health inequality and the creation of healthy urban environments are cross cutting issues throughout The London Plan. As opposed to a specific health condition, it was

health inequalities and increased susceptibility by vulnerable populations that was granted the most attention. The health and welfare of those who already bear the burden of the poorest health will likely be at the greatest increased risk of injury and disease from climatic events. The content analysis revealed that health language was strewn throughout the document, but it typically appeared as one among many benefits of a prescribed action. Although there exists a commendable recognition of health as an outcome of changes to the built, social, and economic environment, health certainly did not crowd out other important outcomes. Health tended to appear alongside the broader outcomes or education, welfare, development, and quality of life. It most often remained as a higher level goal.

The climate change policies that address health can be tied to the framework of human needs (Macintyre, Ellaway, and Cummins, 2002) because they were essential to meeting the basic human needs for water, shelter, and hygiene. The importance of the continued delivery of potable water likely needs no explanation. Shelter delivered by green construction practices not only provides protection from the elements like other non-green practices, but green practices also have the added benefit of employing materials that can sustain the natural resources needed to meet other needs. Green infrastructure in the form of protected open space also ensures the quality of natural resources necessary to maintain life. It can also provide a forum to meet the lower order needs for recreation and play. The remaining policies of waste management, brownfield reclamation, and reducing exposure to hazardous substances are hygiene issues in that they are aimed to reduce disease through protection from environmental toxins and pollution. It is by connecting these proposed spatial development and climate action strategies to human needs that their fundamental importance is revealed and the goal of planning to protect humans from harm and deliver on these needs affirmed.

***Research needs uncovered by content analysis***

In answering this paper's second research question pertaining to the plan's ability to elucidate research gaps in the planning for health and climate change literature, all but one of the health outcomes recognized in London's climate change policies are supported by the nascent public health literature. The one policy yet to be examined closely for its health effects, and with significant potential to affect both mitigation and adaptation responses to climate change, is brownfield reclamation. Exposure to the toxins that define a brownfield can certainly be detrimental to health, but reusing brownfield sites can contribute to climate change induced health outcomes in at least two other ways. First, reclaiming brownfields allows infill and greater urban density. Greater density creates shorter distances between trip origins and destinations and lower greenhouse emissions expended in travel. This would help mitigate future climate variability. Second, the conversion of brownfields to greenfields could reduce the urban heat island effect and help in adapting to increasing temperatures. There is great potential in research which tests the efficacy of geoengineering techniques using land use scenarios aimed at climate change adaptation and mitigation. The reclamation of brownfields, along with land conservation and connecting residential and commercial uses, could be one of these techniques.

Additional research needs could also be addressed by extending the study performed in this paper. A larger comparative study between The London Plan and the comprehensive plans of other major metropolises could reveal the prevalence of health as a global theme, its ubiquity in lofty goals or measureable objectives, its potential usefulness in justifying contentious action, and whether it is more often associated with either climate change adaptation or mitigation strategies.

**Discussion**

Some important questions remain as to the role of health in spatial development and climate change plans. First, can the immediacy and localness of health benefits be used as a vehicle to make sustainable development efforts more politically tolerable? It may be easier to 'sell' concepts such as fuel efficiency, waste reduction, and reduced consumption if they are framed as health and not solely environment driven even though the reality is that they are inseparable. The greater prevalence of health in sustainability/climate action plans in the US (American Planning Association, 2011) could stem from a greater acceptance of the health and environment connection, or it could be that health is taking its rightful and significant place as a motivation for protecting the environment human welfare is dependent upon. In the US, where private property rights are vehemently defended, it was the protection of public health that provided the legal foundations for the planning and zoning of land uses (Shilling and Linton, 2005, 96).

The question remains as to how national-level climate threats made their way into the localised planning of London's future. There has been progressive national leadership on the issue in the UK, but this is not the case elsewhere. The proliferation of climate change plans around the globe and in places with rather weak national leadership suggests that this national level leadership is not necessary to spur local governments to take action. The US has no national policy, but the latest *Global Climate Change Impacts in the US* report released in 2009 includes an abundance of health language (US Global Change Research Program, 2009). National level leadership may be important to guide local efforts and encourage health to be considered uniformly across the country. If the number of early-adopter local municipalities begins to wane and a national level strategy proves necessary to drive local plans, could it be the apparently forgotten core mission of government to protect health and welfare that is the impetus to devise a national strategy?

Lastly, similar to much of the health and climate change literature, the London Plan contains no quantifiable projections of the negative health effects of climate change strategies, only general talk about health outcomes and inequalities. There is no attempt at quantifying the negative health outcomes and suffering that will be avoided if the preventive measures in the plan are heeded. Watkiss et al. (2009) boldly begin to provide some quantitative basis from which planners can begin to prepare.

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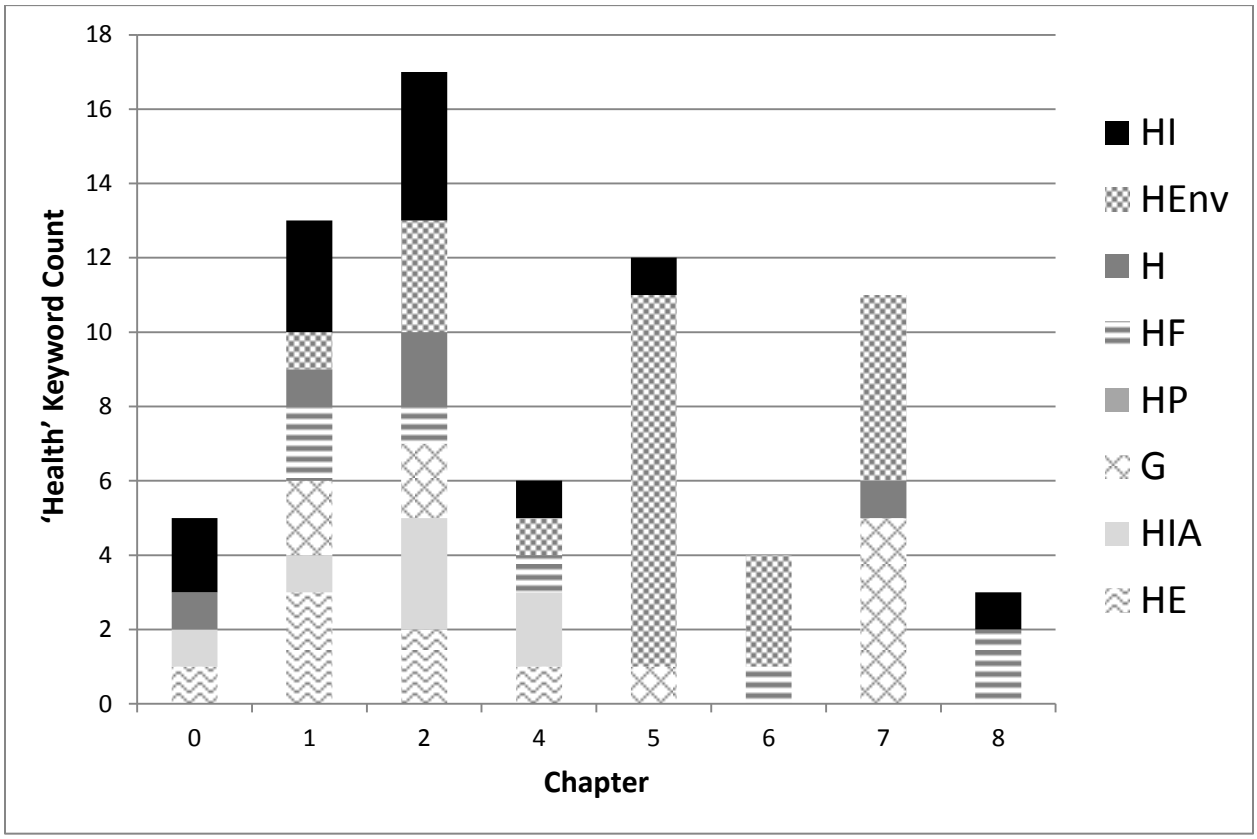
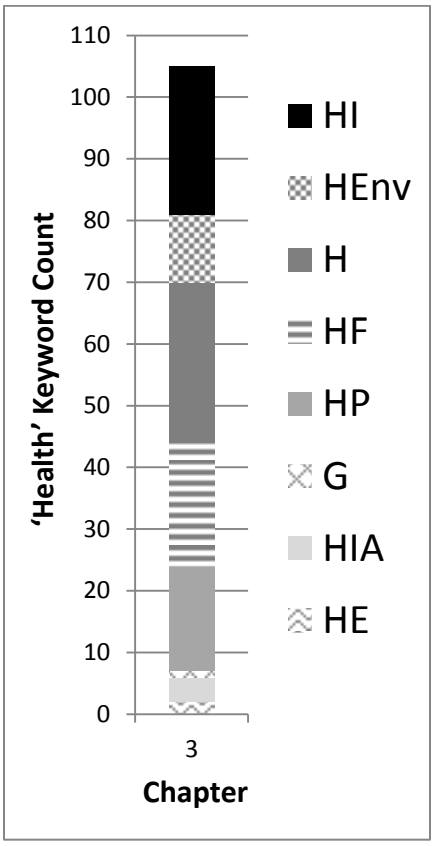
## APPENDIX A

Chapter 3 is isolated in a separate figure because its range of values was much greater than that of other chapters. Including it with other chapters hindered the interpretability of the y-axis scale. The legends in both figures are ordered identical to Table 3 in that they are descending in the overall prevalence throughout the document.

Health Inequalities (HI)
Healthy environments (HEnv)
General health promotion (H)
Health facilities infrastructure (HF)
Health policies (HP)
Health and green space (G)
Health impact assessment (HIA)
Health and economy (HE)




110
100
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70
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30
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HI
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HF
HP
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HIA
HE

Table 1. Health effects of climate change

| Climatic Event | Intermediary | Health Outcome |
|---|---|---|
| Heat waves | direct to → | Heat stress, stroke |
| | Increased ground-level ozone, pollen | Respiratory disease exacerbation |
| Increased mean temperature | More hospitable to disease vectors (e.g. mosquito, ticks) | Vector-borne diseases (e.g. Lyme, malaria, dengue) |
| | More hospitable to infectious disease agents (e.g. bacteria) | Food-poisoning, infectious disease (e.g. cholera) |
| | direct to → | Positive: Less hypothermia |
| Ozone depletion | UV radiation | Skin and eye maladies |
| Drought | Food/water shortage | Dehydration, malnutrition |
| | Lack of food/water safety | Food/water-borne disease |
| Extreme weather event (e.g. flooding, tornado, hurricane) | direct to → | Injuries, drowning |
| | Population movement | Conflicts |
| Sea-level rise | direct to → | Injuries, drowning |
| | Population movement | Conflicts |
| | Water/soil salinization | Dehydration, malnutrition |
| Climate change generally | Stress | Mental health |

*Source:* Adapted from Confalonieri et al., 2007; Frumkin 2008; McMichael, Woodruff, and Hales, 2006

Table 2. Complete List of Policies within Chapter 5, London's Response to Climate Change

| Policy | Title | Policy | Title |
|---|---|---|---|
| 5.1 | Climate Change Mitigation | 5.12 | Flood Risk Management |
| 5.2 | Minimising Carbon Dioxide Emissions | 5.13 | Sustainable Drainage |
| 5.3 | Sustainable Design and Construction | 5.14 | Water Quality and Wastewater Infrastructure |
| 5.4 | Retrofitting | 5.15 | Water Use and Supplies |
| 5.5 | Decentralised Energy Networks | 5.16 | Waste Self-Sufficiency |
| 5.6 | Decentralised Energy in Development Proposals | 5.17 | Waste Capacity |
| 5.7 | Renewable Energy | 5.18 | Construction, Excavation, and Demolition Waste |
| 5.8 | Innovative Energy Technologies | 5.19 | Hazardous Waste |
| 5.9 | Overheating and Cooling | 5.20 | Aggregates |
| 5.10 | Urban Greening | 5.21 | Contaminated Land |
| 5.11 | Green Roofs and Development Site Environs | 5.22 | Hazardous Substances and Installations |

Table 3. Frequency of health frames per plan chapter

| | Chapter | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Frame** | **0** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **TOTAL** |
| Health Inequalities (HI) | 2 | 3 | 4 | 24 | 1 | 1 | 0 | 0 | 1 | 36 |
| Healthy Environments (HEnv) | 0 | 1 | 3 | 11 | 1 | 10 | 3 | 5 | 0 | 34 |
| General Health Promotion (H) | 1 | 1 | 2 | 26 | 0 | 0 | 0 | 1 | 0 | 31 |
| Health Facilities Infrastructure (HF) | 0 | 2 | 1 | 20 | 1 | 0 | 1 | 0 | 2 | 27 |
| Health Policies (HP) | 0 | 0 | 0 | 17 | 0 | 0 | 0 | 0 | 0 | 17 |
| Health and Green Space (G) | 0 | 2 | 2 | 1 | 0 | 1 | 0 | 5 | 0 | 11 |
| Health Impact Assessment (HIA) | 1 | 1 | 3 | 4 | 2 | 0 | 0 | 0 | 0 | 11 |
| Health and Economy (HE) | 1 | 3 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 9 |
| **TOTAL** | 5 | 13 | 17 | 105 | 6 | 12 | 4 | 11 | 3 | 176 |

*Note:* Chapter 0 is the Foreword, Overview and Introduction to the plan.