Tackling climate change in cities: The role of best practices

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The role of best practices

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Abstract

In recognition of their capacity to respond to climate change, cities around the world have engaged in best practices such as Green Infrastructure and integrated transportation policies to mitigate climate change impacts. Whilst, these common best practices that are discussed have benefits for human health, climate change is increasingly posing a greater risk to human health. Consequently, some cities have developed innovative best practices, that integrate science, technology, economics and politics to further enhance their climate resilience. The action taken by these cities highlights, how policy addressing climate change and human health needs to reflect the local context and engage citizens; and more importantly the role of innovation.

Introduction

Increasingly the burden of developing climate change policy with 'real' efficacy has shifted to cities. This paper does not disagree with this shift, policy at the city level can be and is effective, when implemented in carefully researched and devised processes. Particularly in the context of health and climate change, where an in depth understanding of causal pathways linking health outcomes and climate change is needed. The challenge for cities lies in interpretation. Research and practice have demonstrated the capacity of cities to address the economic and physical impacts of climate change[1]. Less understood is how cities can address the impacts of climate change on human health and well-being; which ranges from death and injury caused by extreme temperatures, to malnutrition caused by drought[2]. Cities now must interpret scientific findings into economic, and political terms then devise physical and social policy; they must also localize global ideas on climate change mitigation strategies. Fortunately cities can address climate change through multiple mechanisms, from plans and policies related to the physical nature of the city, to social policies[3]. Thus, this paper aims to present what cities are currently doing in the area of climate change policy, specifically the best practices that have impacts on human health. In addition to this, the paper will highlight practices that are innovative and demonstrate efforts that go beyond, what 'common' best practices set to achieve. Finally the paper will examine the policies holistically to identify how cities can further develop policies related to climate change and health.

Common Best Practices

Analysis of municipal plans from 51 cities across the globe, has highlighted commonalities in the efforts of cities to mitigate the adverse effects of climate change on human health. Given the predominant focus on greenhouse gas emissions reduction in the last 10 years, the vast majority of cities have well developed policies focused on transportation aimed at reducing emissions[4]. Under the umbrella of transportation cities are focused on improving access to transportation, public transportation routes and services, variety of transportation options such as trains, light rail systems, and buses; and promotion of alternatives to motorized transport, namely cycling and walking (active travel), thereby improving health outcomes[5]. While transportation has been proven to be the largest contributor to GHG emissions, reducing the number of cars on the road is not the only means by which cities can reduce emissions, and improve air quality and pollution[6].

Along with the focus on transportation, cities have focused on the built environment[7]. Through the employment of green building guidelines such as LEED and BREEAM, that are focused on increasing energy efficiency, using sustainable building materials and a rating system to encourage developers and cities to favor the construction of environmentally friendly buildings[8]. Cities have thus engaged been in a globally competitive race to have the most LEED approved buildings as well as the first LEED Platinum Building. Whilst a focus on green buildings; residential, commercial and industrial, is beneficial in the policy efforts made by cities to mitigate the impacts of climate change by altering the built environment it is not a panacea. The built environment has a measured health effect, changing building standards is not sufficient to mitigate the adverse impacts on human health[9].

[1] Tol 2009; WHO, 2010; UNHABITAT, 2009
[2] Corburn 2009
[3] Brown et al, 2012; Carter, 2011; Miller et al, 2010; Heltberg et al, 2009; Geddes et al, 2012; Zimmerman and Faris, 2011
[4] Younger et al, 2008;
[5] Barton, 2009; Younger et al, 2008; Campbell-Lendrum and Corvalan, 2007
[6] Barton, 2009; Younger et al, 2008
[7] Barton, 2009; Corburn, 2009; Tzoulas, et al. 2007
[8] Tzoulas et al, 2007 www.breeam.org; www.usgbc.org/leed
[9] Younger et al, 2008; Corburn, 2009

In somewhat of a recognition of this, cities have increasingly been focused on Green Infrastructure (GI), which coincides with or rather pairs well with green buildings; as often green building guidelines allot points for green roofs and green walls[10]. Beyond this though, GI is focused on bringing nature back into the city via the planting of trees, creation of green ways and green belts, and the construction of parks and green spaces to provide access to nature for physical health and mental well-being[11]. Furthermore, GI concentrates on the role of water in nature and urban environments. Water has played a critical role in cities throughout history, acting as a connector and a protective barrier. However, in the face of climate change, water is under threat. Thus GI includes blue infrastructure, namely protecting water resources such as rivers, lakes, and wetlands. Furthermore, GI works to foster the connections between nature and the urban environment by understanding the role and relationship between the human ecosystem and the natural ecosystem, in other words the ecosystem services provided by the natural environment to the urban environment.

Water is also considered outside the context of green infrastructure, especially in cities located in Africa, Asia and the Middle East, and Australia. Cities in these regions address issues related to water through Integrated Water Resource Management (IWRM), which involves addressing access to water, water safety, water harvesting, desalination, waste water treatment/sanitation. As water is essential to human health, IWRM in the context of urban planning and climate change mitigation is beneficial.

Considering the above best/common practices utilized by cities in the race to mitigate the impacts of climate change there is an inherent challenge with the above policies. All address the physical/constructed environment of cities. Whilst this is critical and essential in the efforts of cities to become resilient to climate change it is not enough. Making urban environments resilient and healthy is also about resilient people[12]. Improving transportation, greening the built environment all have benefits to the physical health of citizens, whilst mitigating the impact of climate change[13]. However, the health impacts of climate change go beyond the physical environment. Green buildings cannot prevent an outbreak influenza, nor prevent the transmission vector borne diseases such as SARS, malaria, dengue and west nile.

Table 1. Best Practices

Region (# cities)	Best Practices				
	Integrated Public Transport	Bike Shares	Green Infrastructure (Parks & Tree planting)	Integrated Water Resource Management	Green Design (LEED, BREEAM etc)
Americas (17)	15	2	15	13	10
Europe (12)	12	6	9	6	9
Asia (7)	6	0	6	4	4
Africa/Middle East (9)	7	1	7	8	3
Australasia (6)	6	2	6	4	5

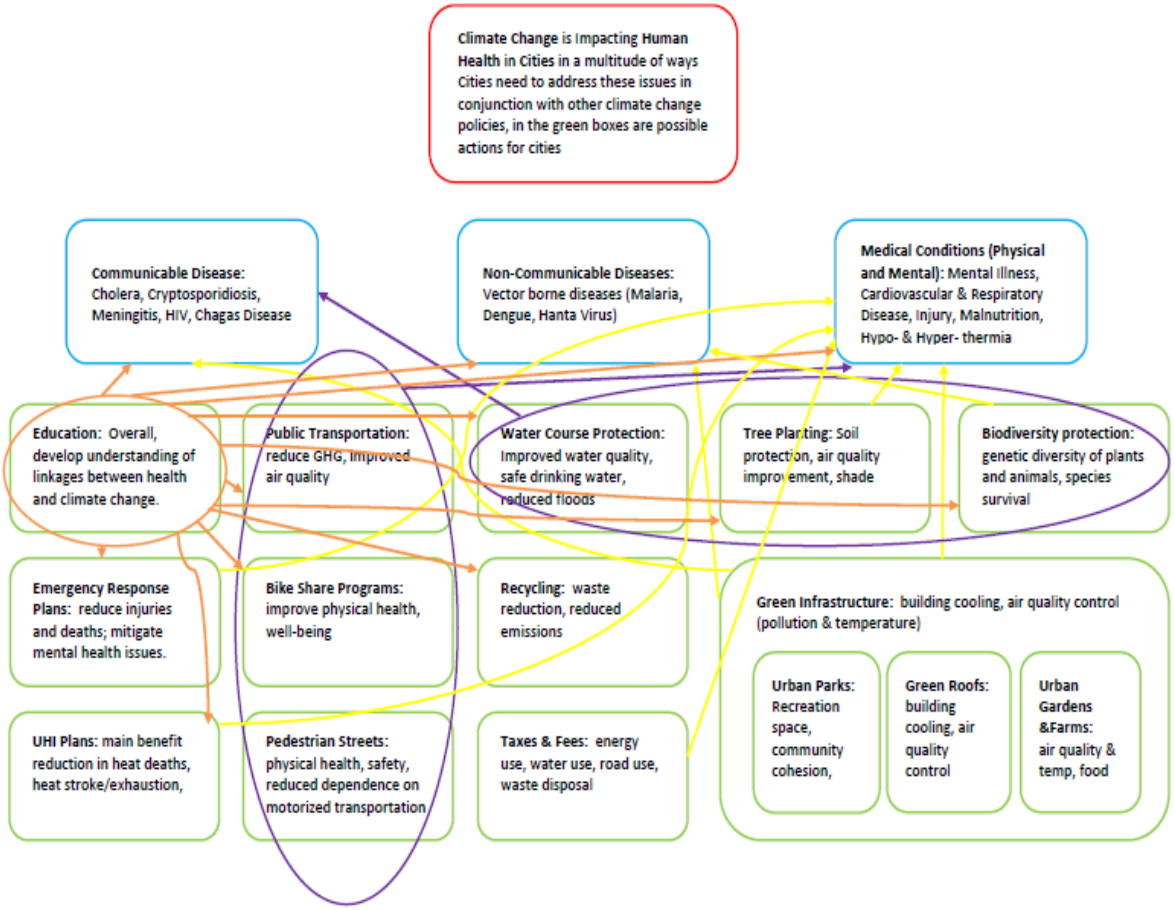
[10] Corburn, 2009; www.breeam.org; www.usgbc.org/leed
[11] Whiston-Spirn, 2012; Wolf, 2003; Tzoulas et al, 2007
[12] Corvalan et al, 2006; Wolf, 2003; Tzoulas et al, 2007
[13] Barton, 2009; Keune et al, 2013; Corvalan et al, 2006; Wolf, 2003

While the science linking human health and climate change, demonstrates the complexity of the causal pathways that link health to climate change[14]. The figure below is an attempt at illustrating how climate change impacts contribute to diseases and medical conditions. It is simplified. The causal pathways linking health and climate change can range from simple direct relationships to highly complex relationships with multiple factors and variables. The subsequent figure summarizes the policies currently in place and how they act to mitigate the impacts of climate change on health. Notably the vast majority of the policies currently in place address the medical conditions that result from climate change. Prevention of death and injury, improving physical health and well-being and reducing the rates of asthma and cardiovascular diseases are priorities of the majority of cities. Little has yet to be done by cities on the more complex health issues such as communicable diseases, and vector borne diseases. This perhaps is because they are perceived as public health issues left to public health authorities who have knowledge of epidemiology. However, cities do have the potential to do more.

Figure 1. Health and Climate Change: Probable Causal Pathways

[14] WHO, 2010; Campbell-Lendrum and Corvalan, 2007; Keune et al, 2013; Wolf, 2003

Figure 2. Best Practices and Causal Pathways



Innovative Best Practices

Looking at the practices that are currently being implemented, it is apparent that the actions are effective and viable options. Thus the question is not a matter of "Are these policies effective?" but questions of "how can these policies be more effective?" and "what else can be done to strengthen the policies and be done in addition?". In reviewing the plans of cities to identify the common best practices by cities, it is evident that the approaches to these policies vary. Specifically the level of integration of policies and how they align with the vision of the city as a whole and policy direction in other areas, such as economic policy. This could be for a number of reasons, however, what is common in these cities is that integration and cooperation on policy development goes beyond working across city department into the broader context of the community; working with citizens, private sector, community based organizations and other public sector entities, namely, schools to develop comprehensive policies.

In North America, Portland (US), Vancouver (Canada) and New York (US), are three cities that tend to dominate in the realm of being green, with the City of Vancouver setting out to be the Greenest

City by 2020[15]. Beyond the targets and goals though, each of these cities has engaged in initiatives that are unique and have long-term feasibility. CityStudio[16] is an initiative between the City of Vancouver that connects university students and community groups with the city. The objective is to foster an environment whereby groups can develop projects that will progress the city's vision and goals. Projects fall under the following categories: Green Economy, Safe city, Active Transportation, Climate Leadership, Green Buildings, Transportation, Zero Waste, Access to Nature, Lighter Footprint, Clean Water, Clean Air, and Local Food. The program is intended to engage people and enable them to influence how their city impacts their livelihoods, and thus far is proving to be successful. Portland, is another city long held up as **the exemplar** of sustainable living. Perhaps the key to its success lies in the value the city places on environmental education. Through the city, children have access to a range of environmental education programs and even the opportunity to have birthday parties[17]. Central to the city's environmental education, through its year-round Outdoor Conservation School, is getting children into healthy habits, by encouraging them to engage in physical activities outside that they will carry with them throughout their lives. New York, has a wide range of programs and initiatives aimed at mitigating the impacts of climate change. Most notable of these is the city's Environmental Public Health Tracking[18] program. The initiative includes a Tracking Portal which includes a database of indicators related to health and climate change shows how the indicators are linked to goals with in the city's broader policy objectives laid out in the city's official planning document, PlaNYC, which also won the ICCG contest for Best Climate Practices in 2013[19]. NYC is demonstrating how cities can merge scientific knowledge, with economics and political interests to formulate policy that benefits and improves the well-being of citizens.

In Europe, while the vast majority of cities have engaged in best practices related to climate change and health, there are some cities that have taken additional steps to improve health outcomes and mitigate climate change. Paris, after the 2003 heat wave, recognized the importance of preventing heat related deaths. As part of their heat plan, they developed CHALEX (Chaleur Extreme) a registry of vulnerable individuals and their addresses that would enable municipal worker to visit or call these individuals during extreme heat events to ensure that their health is not compromised. In Glasgow, the city has recognized the opportunity presented by brownfield sites to be valuable temporary green sites (or eventually permanent). The city has launched SAGE – Sow and Grow Everywhere, an initiative that sees the use of empty, derelict and brownfields for community gardens which provide an opportunity for and support the consumption of locally grown food. The initiative is also intended to promote biodiversity in the city.

In Asia and the Middle East, two cities are at the fore of innovation and research into the mitigation of climate change, and more over are prime examples of adapting ideas to meeting the local context. Abu Dhabi is more than Masdar[20], while Masdar is an innovative project, Abu Dhabi itself has engaged in a range of policies to mitigate climate change and improve health and well-being. Recognizing the environment the city in habits Abu Dhabi in its official plan, Plan Abu Dhabi 2030[21] has adapted concepts from other cities to fit the urban context, such as the Sand Belt to limit the growth and urban sprawl of the city. The Sand Belt is also part the city's Ecological Framework aimed at preserving the natural environment that supports livelihoods in the city. Another critical component of this is the ecosystem services provided by the mangroves that grow in a thin strip and are part of a natural park vital to biodiversity in Africa and Asia. Further, the natural area that the mangroves protect is also a critical part of the city's effort to improve the physical health and well-being of its citizens. Another unique aspect of Abu Dhabi's planning is its housing strategy. While housing is common to all plans, Abu Dhabi has again, focused on the cultural context, the form of the Emirati family which is about the relationship with the extended family. Housing is also

[15] City of Vancouver, 2009
[16] http://citystudiovancouver.com/
[17] http://www.portlandoregon.gov/parks/38295
[18] http://a816-dohbesp.nyc.gov/IndicatorPublic/Default.aspx
[19] http://www.bestclimatepractices.org/EventDetails.aspx?IDEvento=35&Lan=en-US&FromHome=Yes
[20] http://www.masdar.ae/en/
[21] http://gsec.abudhabi.ae/Sites/GSEC/Navigation/EN/publications,did=90378.html

inclusive of schools and gardens within the complex, thus there is the underlying focus on creating an environment that supports health and well-being.

Singapore is a unique city, in that it is a city state, thus planning is the responsibility of the national government[22]. Further, Singapore's geography and political context lend themselves to the city-state's ability to do more than the average city. Irrespective of these factors Singapore has since its beginnings strived to be at the forefront of urban innovation and best practices, learning from other cities and bettering policies for the benefit of their citizens. One such project is NEWater[23]. Water as a scare resource for the island nation has forced Singapore to innovate in the area of water management. As such Singapore has 4 national taps, the 1st being a comprehensive system of urban water catchments, the 2nd is a bilateral agreement with Malaysia for water imports, the 3rd is NEWater, and the 4th is desalination. It is the 3rd tap that demonstrates Singapore's commitment to finding a sustainable means by which to provide a scarce essential resource. NEWater, involves the purification of waste water to potable quality through reverse osmosis. The success of NEWater is linked to the government's commitment to invest in technology that was thoroughly researched and developed, recognizing that in the long run the costs would be outweighed by the benefits.

Table 1. Innovative Practices

City	Practice
Glasgow	SAGE
Paris	CHALEX
Singapore	NEWater, Green Vehicle Rebate
Abu Dhabi	Ecological Framework (Sand Belt; Mangroves)
Vancouver	CityStudio
Portland	Outdoor Conservation School; Natural Resources Inventory
New York City	Environmental Public Health Tracker; NYC Panel on Climate Change; Ready New York
Seattle	Walkshed Methodology
Montreal	Eco-Montrealer
Sydney	Activity Hubs
Auckland	Manukau Food Innovation Centre
Cape Town	Environmental Healthcare Programme

Future Directions:

To varying extents each of these innovative practices demonstrates how policy needs to integrate science, economics, and politics, especially in the context of climate change and health. Further they highlight how policy and practice around climate change and health are still in the development stages. There is immense room for growth and innovation in the area. Especially, as while current practices are aligned with what needs to be done at the moment; scenarios of future impacts provide breadth and depth for innovation. However, there still remain the questions around what will strengthen current policies and what other policies and practices can be introduced by cities and the various stakeholders to address future predictions around climate change and health? Critically looking at the current practices it is evident that their audience is a homogenous population.

There are assumptions underlying many of the policies namely everyone will want to take public transportation, or embrace cycling to work. However, as previous reflection papers[24] have

[22] http://app.mewr.gov.sg/web/Contents/ContentsSSS.aspx?ContId=1034

[23] http://www.pub.gov.sg/water/newater/Pages/default.aspx
[24] http://www.iccgov.org/FilePagineStatiche/Files/Publications/Reflections/20_Reflection_March_2014.pdf
http://www.iccgov.org/FilePagineStatiche/Files/Publications/Reflections/19_ICCG_Reflection_February_2014.pdf

discussed the factors that determine and influence decisions around livelihoods are numerous. Policy needs to account for these possible variables, and it needs to reach and appeal to individuals (and families)[25]. The projected success of policies can be modelled, however, if real success is the goal, policy makers must understand the psychology, the behaviors of their real life policy implementers[26].

A rather critical missing piece from the vast majority of current policy is education. Portland is on the right track with the incorporation of environmental conservation into school curriculums. Education though is not about the ages from 5 to 18, it is lifelong. Moreover, the nature of learning evolves. Policy makers need to be astute to what will grasp their audience and teach them about the importance of climate change policies on a range of levels. Health as previously discussed is a critical entry point. The policies discussed here have links to physical health, however, climate change is also playing a role in other adverse health outcomes, for which cities still need to develop policies to address. This is where public education policy implemented by the city has a role. Cities need to explore the potential of education as a policy tool and the various mechanism by which it can be achieved. Moreover, education can be a cost effective means mitigating climate change. Possible means by which cities can achieve this are marketing, recreation programming, collaboration with postsecondary institutions, and utilizing technology namely smart phone apps. Ultimately, cities have the capacity to innovate and develop policies related to climate change and health that are suited to the current needs of their populations and can evolve to the future needs.

Conclusion:

Overall, as the demand has increased for cities to formulate climate change mitigation and adaptation plans and policies, cities, have shown their ability to respond. While policies are currently broad and focused on systems within the urban ecosystem, particularly transportation policies, they have showcased the ability of cities to influence and achieve targets. More importantly several cities, have demonstrated the potential for policy to evolve, a necessary characteristic as it become increasingly evident that climate change policy needs to increase its breadth and depth.

The handful of cities highlighted in this paper, have made efforts to develop policy that responds to human health impacts of climate change. They are not the only cities engaging in health and climate change policy; however, these cities provide valuable lessons for other cities particularly in how policy can integrate economics, health science, climate science and politics into effective place based policy. As cities progress in the formulate of climate policy, it will be important for policy makers to understand the local context and how global scientific recommendations can be adapted to meet the present and future needs of their city.

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[25] Friedmann, 2010; Kenzer, 1999; Ernston et al, 2010; Rees, 1997; Rees and Wackernagel, 1996
[26] Pickett et al, 2011; Friedmann, 2010; Corvalan et al, 2006; Ernston et al, 2010

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