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ESTUDOS e RELATÓ-RIOS

ADDRESSING THE NEXUS CHALLENGE OF CLIMATE CHANGE, HUMAN HEALTH AND URBAN SUSTAINABILITY

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Addressing the nexus challenge of climate change, human health, and urban sustainability

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Abstract

This meeting report summarises the core discussion points and essential outcomes of the Lisbon Expert Meeting, which took place at the Portuguese Academy of Sciences during 19-20 September 2018. The Lisbon Expert Meeting was an in-depth inquiry of 15 internationally-known scientists and policy experts on the complex interconnection of uncertain climate change impacts, urban health, and well-being problems and sustainable development, as well as on adaptation strategies and challenges. The meeting report contains three parts: 1) general framing of contexts, 2) review of climate change-health policies, and 3) systems sciences unraveling the nexus between climate change and health, and proposed science-policy pathways. Among these parts, we further organised Part 3 according to the four thematic components discussed at the meeting by the form of panel presentations and Q&A. The first thematic part presents the nexus challenge of climate change impacts on health and the implications on urban sustainability. The second thematic part introduces integrated approaches to urban health provision and management. The third thematic part proposes a "health-centered" science-policy interface. Lastly, the fourth thematic part explores ways to better coordinate the implementation of health policies within the context of global climate change impacts. In this report, we also propose policy recommendations following each thematic discussion.

Em Português:

Este relatório resume os principais pontos de discussão e os resultados essenciais do Encontro de Especialistas que decorreu na Academia de Ciências de Lisboa entre 19 e 20 de setembro de 2018. Este Encontro consistiu numa refexão aprofundada de 15 cientistas e especialistas em política, internacionalmente reconhecidos, sobre a complexa ligação entre os impactos das alterações climáticas, problemas de saúde, bem-estar urbano e desenvolvimento sustentável, bem como sobre estratégias e desafios de adaptação. O relatório do Encontro consiste em três partes: 1) Enquadramento geral dos contextos, 2) Revisão das políticas de saúde relacionadas com as alterações climáticas, e 3) Contributo da Ciência dos sistemas na revelação do nexo entre alterações climáticas e saúde, e propostas de recomendações para a política científica a desenvolver nesta área. Entre terceira parte foi organizada de acordo com as quatro componentes temáticas discutidas na reunião através de apresentações em painel e respectivas perguntas e respostas. A primeira parte apresenta os desafios gerados pelos impactos das alterações climáticas no sector de saúde e as suas implicações na sustentabilidade urbana. A segunda parte introduz abordagens integradas ao acesso e gestão da saúde urbana. A terceira parte propõe um interface entre ciência e política "centrada na saúde". E finalmente, a quarta parte explora maneiras para

coordenar melhor a implementação de políticas de saúde no contexto dos impactos das alterações climáticas globais. Neste relatório, também propomos recomendações para políticas públicas inventariadas após cada discussão temática.

Venue: Lisbon Academy of Sciences. Address: R. da Academia das Ciências, 19, 1249-122.

Date: September 19-20, 2018

Host: Professor Filipe Duarte Santos, Director of the Ph.D. Programme on Climate Change and Sustainable Development Policies, University of Lisbon & New University of Lisbon, Portugal. The Ph.D. Programme also supports the Lisbon Expert Meeting.

Co-Host: Professor Franz Gatzweiler (UHWB Programme, Institute of Urban Environment - Chinese Academy of Sciences)

Organisers: Jieling Liu (ICS), André Oliveira (FCUL), Raquel Brito (FCUL)

Acknowledgment

joint Ph.D. Program in Climate Change and Sustainable Development Policies between the University of Lisbon and New University of Lisbon.

Current Framework Updating: One Year into the Expert Meeting

One year after the Expert Meeting on the nexus challenge of climate change, human health, and urban sustainability, we witnessed an increase in the global focus of climate change-induced public health issues.

First, the World Health Organization (WHO) declared climate change to be the most significant health challenge of the 21st century. Notably, the WHO considered air pollution as the most significant environmental risk to health and demanded national governments and health partners to pay the greatest attention to air pollution and climate change. In the meantime, the five-year period 2015-2019 became the warmest five-year period on record, according to the World Meteorological Organization (WMO), and Arctic sea ice minimum in 2019 remained among the lowest on record. Climate change increasingly affects people's health and well-being, as do other global environmental changes such as loss of biodiversity, growing urban density, and economic inequality.

For this purpose, the WHO also started a new 5-year strategic plan – the 13th General Programme of Work in 2019, with a triple billion target: ensuring 1 billion more people to 1) benefit from access to health coverage, 2) be protected from health emergencies and 3) enjoy better health and well-being. The UN also held its Climate Action Summit in September 2019 in New York. UN Secretary-General António Guterres called on all leaders to make concrete, realistic plans to enhance their nationally determined contributions by 2020, in line with reducing greenhouse gas emissions by 45 percent over the next decade, and net-zero emissions by 2050.

Reflecting on the Expert Meeting and the Policy recommendations, we identified the increasing recognition of the nexus between climate change and public health and urban sustainability globally. That means more policymakers are now able to consider this nexus within a complex social-ecological system framework. This is a positive signal. Given the accelerating rate of change in the climate, we suggest policymakers treat climate-related public health issues in cities as a hazard under the Sendai Framework for Disaster Risk Reduction. That means to make and implement policies that 1) are better informed by scientific evidence, and 2) trigger preventive actions in both the public and private sectors.

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General Framing

Cities are the homes for a majority of people on earth and have a significant impact on the planet, which provides the resources and ecological functions for urban health and wellbeing. As complex living systems, cities are the nodal points for innovation and knowledge production, which are crucial for addressing the challenges of sustainable development, such as climate change, resource scarcity, environmental degradation, and biodiversity loss.

Urban policymakers overall have made progress in the health and wellbeing of people worldwide, although we have also increasingly recognized the costs of these improvements. The special report from the Rockefeller Foundation–Lancet Commission on planetary health - Safeguarding Human Health in the Anthropocene Epoch (Whitmee, Haines, and Beyrer et al., 2015) has made the point. Among those costs are environmental pollution and lifestyle diseases affecting mental, social, and physical human health. Broader drivers of change such climatic and demographic changes are catalysts and accelerators of emerging risks to health and wellbeing in rapidly changing environments. Besides, the institutional infrastructure and governance systems that have been built to support past developments need to be adjusted to respond to increasing risks and changing human values. The inherent inertia of the institutional infrastructure to adapt and react appropriately to changing ecological and social circumstances is a severe risk itself.

These risks manifest themselves in the fundamental problem of acting on the knowledge we have to reach the goals we are aiming at in the future, among them, to reduce the risks to health and wellbeing in cities. To learn from the past and respond to increasingly interconnected urban health risks, the International Council for Science has suggested a systems approach to make cities healthier places to live in (International Council for Science, 2011).

Such a systems approach aims at understanding the complexity of a system and acting on that knowledge we have for improving key performance indicators (KPI) of cities, such as health and wellbeing. Taking a

systems approach, among others, requires implementing the systems science of cities by building systems that link knowledge to action and decision-making.

Knowledge-action systems (KAS) are the social networks of actors involved in the production, sharing, and use of knowledge for action and all other types of infrastructure facilitating the flow of resources, including data and knowledge, and thereby enabling feedback, response and learning for action. Such Knowledge-action systems (Muñoz-Erickson, 2018), once institutionalized, could be referred to as the collective mind or intelligence of a city, or the "urban brain," as stated in the Xiamen Call for Action (Ebikeme et al., 2019).

The relevance of this expert meeting has been confirmed by experts who united at the 9th UN-Habitat World Urban Forum in Kuala Lumpur, February 2018, in particular during the cross-sectoral dialogue on "Linking Health to Urban Innovation and Sustainable Development." The Scientific Committee of the Urban Health and Well-Being Programme (UHWB) has approved this expert meeting on May 29-30, 2018. Recent events further underlined the importance of this meeting. For example, members of the UN General Assembly of the high-level meeting recently approved the proposal on the effective implementation of the New Urban Agenda, to establish UN-Urban, a multi-agency coordinating mechanism. Another example is the recent calls from the scientific community to develop an international urban science platform, as well as high-level, intersectoral coordination platforms for urban health. Besides, the World Health Organization (WHO) has suggested, "Health as the Pulse of the New Urban Agenda" and significant global efforts are being made to make cities more resilient for health.

Recent engagement between the UHWB Programme with Public Health England in June 2018 has confirmed that the systems approach is well accepted in the urban and public health discourse and is increasingly in demand to be applied worldwide. This expert meeting will discuss existing examples and new opportunities for implementing a systems approach to urban health and wellbeing under climate change.

Purpose

The meeting aimed at exchanging knowledge and formulating recommendations on how to link the knowledge we have to the actions needed for improving health and wellbeing in cities under climate change. Experts discussed examples and opportunities for implementing a systems approach to urban health and wellbeing under climate change. The meeting followed up on the call for action drafted at the Xiamen Urban Health KAN meeting in December 2017 (Ebikeme et al., 2019). Experts identified the problem, agreed on a conceptual approach and formulated recommendations for urban policymakers and academia on how to not only build a science for cities ([Bai, 2018](), [Acuto et al., 2018]()) but how and with whom to collaborate to implement knowledge for action for [urban health and wellbeing](), in particular under climate change. A systems approach aims at transcending the realm of science to policy and practice.

Key elements of the meeting

What are the significant health risks and challenges to urban sustainability? Despite generally improving health conditions in cities and globally, health risks and inequality are on the rise (OECD, 2018). Improving health conditions and increasing risks and inequality are systemic. We hypothesize that health risks and disparities emerge from failures to manage complex, systemic, and global challenges, particularly under climate change dynamics. What are the underlying reasons for urban health risks to appear and what are the obstacles to act on the knowledge we have? Do we have insufficient data and knowledge, or do we lack the capacity to connect knowledge to action and learn collectively by implementing systems governance for urban health under climate change? What is integrated knowledge management for urban decision-making for health and well-being, and what is the "Urban Health Model" - does it fill a science-policy gap?

Another theme that guided the deliberations of the expert meeting was on institutional innovation. What are the bottlenecks and barriers for institutional innovation towards better complexity management for improving urban health and wellbeing? How are global policies for climate change, urban development, and the environment, integrated into urban decision-making with response mechanisms for local particularities? The experts presented examples for integrated decision and resilience management for urban health intending to formulate recommendations for strategic action on how to implement a systems science for urban health and wellbeing under climate change.

Meeting goals and themes

The Lisbon Expert Meeting "Implementing systems science for urban health and wellbeing under climate change" was organized in four-panel presentations, each focusing on one sub-theme. After each round of presentations, there was a short Q&A guided by moderators. The Meeting aimed to understand the nexus challenge, to learn from the lessons of examples which experts in the field of urban health and wellbeing presented, and to formulate recommendations for how a systems approach for implementing urban health policies under climate change.

The four panels together cover the following discussions:

1. **The Nexus Challenge: Climate Change, Health, and Sustainability.** The failure of developing sustainably in the global human-environment system goes hand in hand with climate change and the negative impacts it has on human health and wellbeing. In this sub-theme, the context was set, and systemic sustainability challenges were identified.

2. **Integrated Approaches to Public Health and Urban Planning.** How and why does climate change urge public health officials and agencies to take an integrated approach? What are the institutional shortages, scale mismatches, and communication barriers that public health agencies are facing when dealing with this radical environmental reality? This sub-theme focuses on challenges and opportunities for implementing a more systemic public health management.

3. **A "health-centred" science-policy interface.** Policymakers have used health as an integrating theme across scientific disciplines and policies. A central idea of a systems approach is to connect the components of systems (or sectors in cities), which enable them to perform their functions. Health is a natural integrator to do so (WHO, 2016). How can we implement systems science for urban health and wellbeing by strengthening a health-centered science-policy interface?

4. **Towards a systemic urban health science implementation and communication.** What actions are needed and how to move from systemic urban health science to action. How should science communication change, and how can it help to grasp the benefits from an inter- and transdisciplinary systems approach for health and wellbeing under climate change?

2. Climate Change-Health Policies – a Review

Climate change impacts on health

Over the last 50 years, anthropogenic exploitation of fossil fuels has released significant quantities of carbon dioxide and other greenhouse gases, which trapped excessive heat in the lower atmosphere and affected the global climate. The Fifth Assessment Report of the Intergovernmental Panel on Climate Change (2014) concludes that in the last 130 years, the world has warmed by approximately 0.85oC. Each of the previous three decades has been successively warmer than any preceding decade since 1850 (IPCC, 2014). With such significant atmospheric warming, sea levels have been rising, glaciers melting, and precipitation patterns are also changing. Extreme weather events are becoming more intense and frequent.

These symptoms manifested by the Earth's natural environment also affect the social and environmental determinants of human health - clean air, safe drinking water, sufficient food, and secure shelter. One of the primary impacts of climate change on health is extreme heat. Extreme high air temperatures contribute directly to deaths resulting from cardiovascular and respiratory diseases, especially among elderly. For example, more than 70,000 excess deaths were recorded during the 2003 European summer heatwave (Robine et al., 2008). Extreme rainfall and drought can impact our health. In the U.S., floods are the second deadliest weather-related hazards – second only to heat (American Public Health Association). Besides, climate change also decreases the quality of the air we breathe and increases the risk of vector-borne diseases, warmer water, and flooding, as well as wildfires prompted by warmer and drier conditions, which could increase the risk of illness or injury. Towards a warmer climate in the future, data from the World Health Organisation (WHO, 2018) tell us that:

- Assuming continued economic growth and health progress, between 2030 and 2050, climate change is expected to cause approximately 250,000 additional deaths per year, 38,000 due to heat exposure in elderly, 48,000 due to diarrhea, 60,000 due to malaria, and 95,000 due to childhood undernutrition.

- The direct damage costs to health (i.e., excluding costs in health-determining sectors such as agriculture and water and sanitation), is estimated to be between USD 2-4 billion/year by 2030.
- Areas with weak health infrastructure, especially in developing countries, will be the least able to cope without assistance to prepare and respond.
- Reducing emissions of greenhouse gases through better transport, food, and energy-use choices can result in improved health, mainly through reduced air pollution.

International climate change-health policies

Health is a critical element of the UNFCCC legal framework (United Nations Framework Convention on Climate Change), and the right to health is a fundamental human right in the preamble of the Paris Agreement. The Paris Agreement was framed as "the strongest health agreement of the century" by WHO (2018). It specifies that, when taking action to address climate change, parties should respect, promote, and consider their respective obligations on the right to health. Besides, the Paris Agreement recognizes the central role of mitigation actions and their co-benefits for adaptation, health, and sustainable development in enhanced response before 2020 (UNFCCC, 2015). The Paris Agreement also prompted health to be connected to and defined in the Nationally Determined Contributions (NDCs) for both mitigation and adaptation.

In its *COP24 Special Report on Health and Climate Change* (2018), the WHO further identified valuable policy opportunities for improving health through mitigation and adaptation. Policymakers could achieve potential health gains from mitigation activities across sectors, e.g., energy supply and electricity production, households and buildings, transport as well as agriculture and food systems. Policymakers could also seize opportunities in climate adaptation for urban health by building the capacity in these three areas:

a) Improve the software - e.g., using climate services to strengthen health information systems

b) Improve the hardware - green climate-resilient health care facilities, and

c) Conduct better governance and stronger leadership.

The Report also emphasized the importance of making policies that can mobilize the health community, ensure economic support for health and climate action, as well as track and monitor progress and impact.

Built on the Millennium Development Goals, the 2030 Agenda for Sustainable Development with 17 Sustainable Development Goals (SDGs, and 169 targets) puts people, planet, prosperity, peace, and partnership into focus (United Nations, 2015). Among them, SDG 3 "Good health and well-being" seeks to ensure healthy lives and promote well-being for all at all ages. SDG 11 "Sustainable cities and communities" strives to make cities and human settlements inclusive, safe, resilient and sustainable. Finally, SDG 13 "Climate action" endeavors to take urgent action to combat climate change and its impacts. Many scientists commissioned by the International Council for Sciences demonstrated the significant interconnections between health, cities, and climate change by examining the interactions between the SDGs and identifying synergies and tradeoffs. SDG 3 interacts positively with SDG 11 "Sustainable cities and communities" as the impact of 'place' on health is well recognized. Adequately planned cities contribute positively to health, while inadequately planned cities form unhealthy environments that discourage physical activity, expose people to hazards such as air pollution and dangerous traffic, and contribute to mental illness and non-communicable diseases. SDG 3 also interacts positively with SDG 13 (Climate action), as climate change is already having significant impacts on health. Many mitigations as well adaptation measures are increasingly found to be immediate or long-term co-benefits on health (International Council for Science, 2017).

The Healthy Cities program initially launched by WHO in 1986 to be implemented in developed nations has now been widely applied, thousands of cities worldwide have been using its resources, strategies, and networks for promoting health. The program aims to set health as an overarching goal on the agendas of decision-makers and to develop comprehensive local strategies for health protection and sustainable development. It has proven successful in many cities, including communities and increasing their understanding of health and environment linkages, creating intersectoral partnerships, and improving participant equity (Boonekamp et al., 1999).

At the 61st World Health Assembly in 2008, WHO was requested to develop and implement a work plan to support member states in the protection of human health from climate change. This led to the creation of the *WHO Work Plan on Climate Change and Health*, which sets four priorities and areas of work in climate and health, including the advocacy of the topic in concern to raise awareness, the strengthening

of partnerships, the enhancement of scientific evidence as well as health systems. In its recent endorsement for the Work Plan to enter in function for 2014-2019, WHO emphasized a particular implementation focus on promoting health equity (WHO, 2015).

3. Implementing Systems Science for Urban Health and Well-being under Climate Change

Part 1: The Nexus Challenge: Climate Change, Health and Sustainability

Prof. Filipe Duarte Santos, Senior Climate Change Scientist and President of the Portuguese National Council of Environment and Sustainable Development, host:

"One of the main foci of our proposed research could be the increasing fragmentation and inequality driven by mainstream neoclassical economics."

Present and future climate change impacts and adaptation at the global level and in particular, on human health, is a complex field for research and action that benefits from a systems approach. Urban health in this context is a more restricted but increasingly relevant field since the urban area population is expected to reach 68% of the total population in 2050 (UNDESA, 2018). The understatement of the climate change risks by a scrupulous and professional climate change research community unaccustomed to deal with existential risks has been recently emphasized (Spratt, 2018). In part, this message has contributed to the fact that climate policymaking has been for years a flagrant violation of reality. The likelihood of complying with the 2º C of the Paris agreement is close to zero. However, the IPCC is diligently publishing a report emphasizing that it still is possible to remain below 1.5º C. To achieve the 2º C goal the present CO_2 emissions from fossil fuels and industry, of about 35 GTCO2 in 2017, have to be reduced in the next 33 years by 72% to 9.7GtCO2. Still, they have increased by nearly 100% in the last 33 years (Le Quéré, 2018). Maybe urban health and wellbeing under climate change could be an effective vehicle to convey the urgency of action both in terms of mitigation and adaptation.

The connection between health and behavioral sciences, in particular, behavior disorders and their impact on health, needs to be further explored. It is unlikely that we can reach the sustainability required to achieve planet health and human health if we continue to promote, through mainstream neoclassical economics, an individual behavior based on rational egoism. Rational egoism will probably be one of the main driving forces leading to the acceptance of an increasingly fragmented and unequal world divided into populations that managed to adapt to the impacts of climate change, particularly on health, and vulnerable people unable to cope with them. In my opinion, this challenge could be one of the main foci of our proposed research.

Prof. Liu Qiyong, State Key Laboratory of Infectious Disease Prevention and Control, director of the National Institute for Communicable Disease Control and Prevention, China CDC, Chief Scientist for Climate Change and Health in China

"The Healthy City program could be the way forward to integrate a systems approach for managing urban health against climate change through multidisciplinary platforms and multisectoral partnerships."

With rapid urbanisation and climate change in China, health risks are emerging for urban populations. Amounts of research findings have indicated the complicated relationship between and among climate change, health, and sustainability in complex urban environments. From research, we can draw some conclusions which may offer a better understanding of their relationship and inspiration about further study for strategies and solutions on urban health. The Chinese Hygienic City and Healthy City programs provide platforms for adaptation and mitigation for urban population health. A report published by the National Bureau of Statistics of China said, during the period 1978-2015, the total population, urban population, and total built-up area in China have significantly increased, especially the total built-up area, which has been more than tenfold than before. Along with the accelerated urbanization, climate change has also become a severe public health threat in China.

A study forecasted the average temperature in 2050 in China would be significantly higher than the global average temperature. According to IPCC AR5, mediating factors including environmental conditions, social infrastructure, and public health capability and adaptation could affect health through three primary exposure pathways. Studies of climate change impacts on health and adaptation mechanisms founded by the National Basic Research Program of China focused on five goals, including climate-sensitive diseases,

vulnerable populations, the excess burden of disease, regional discrepancy, and above all, adaptive mechanism. The risk of infectious diseases, chronic non-infectious diseases, and heat-related diseases has significantly increased due to climate change and will increase substantially under different climate scenarios. We also found out that aging, socio-economic factors, and interactions among various eco-environmental factors would amplify the impacts. However, these impacts can be moderated through proper adaptation. From these findings, we realized the significant challenges we faced are non-communicable disease burden, emerging infectious disease, aging population, rising health expenditure, health inequity. On the other hand, GHG mitigation brings distinct health co-benefits, which is a unique opportunity that we could seize. A study funded by China Prosperity Strategic Program took advantage of a systematic review, questionnaire survey, focus group discussion, qualitative and quantitative analysis, and finally summarized the significant gaps as follows.

- The complexity of urban health inadequately comprehended and piecemeal actions
- Primarily top-down approaches and insufficient participation
- Insufficient intersectoral collaboration
- Need more actions to improve health equity
- Inadequate knowledge about health risks and health co-benefits of low carbon transition

In conclusion, we should take the Healthy City program as the way forward, which takes a systems approach for managing urban health against climate change. In this way, we could get the whole government and the entire society involved in and address the environmental and social determinants of urban health. Besides, it is necessary to create favorable political and socioeconomic conditions and be supported by advancements in science and technology. More specifically, we should implement systems science for urban health and well-being under climate change. Successful multidisciplinary platforms and multisectoral partnerships will allow us to research for a better understanding of the complex urban environment-health relationship and provide sustainable, integrated adaptive and mitigation strategies to minimize the adverse effects of climate change.

Dr. Olivia Bina, Principal Researcher, Institute of Social Sciences - University of Lisbon

"*What if…we never tried?*"

This contribution is intended as a thought-provoking perspective on some of the framing of commonly held views relevant to UHWB. I built on the description of the Workshop's Panel 1. I sought to raise two main arguments: one around the transformative potential of the sustainability agenda, and the other around the notion of goals as opposed to means. First, I question whether 'The failure of developing sustainably…' is even correct, arguing that perhaps we (rich nations) should start thinking about our performance to date as falling well short of really trying to implement sustainability in our socio-economic and socio-technical systems. To fail, you need to have tried! This allowed me to introduce the whole notion of strong sustainability, of transition and transformation theories, and argue, with many notable scholars, that the time has come to name the 'elephant in the room' of unlimited growth as a challenge that needs to be confronted. Better still, that the unspoken goal of GDP growth, which continues to drive national and local agendas, needs to be reframed into a means, not an end (concerning Herman Daly's Means and Ends Continuum).

Fortunately, our gathering coincided with a remarkable return of the Beyond GDP agenda in the European Parliament. Nonetheless, its noteworthy nature highlights the unsatisfactory progress made to date, even in such a wealthy part of the world. The lack of vision, with reference to the work of Donella Meadows, undermines real progress to a just and ecologically sustainable future. Second, I suggested that the agenda of UHWB could usefully contribute to redressing some of these fundamental critiques, but reframing its focus not (only) as a set of undesired negative impacts, or as indicators of qualities that need to increase (i.e.: 'climate change and the negative impacts it has on human health and wellbeing'), but (also) as an overarching goal. Alternatively, to use Daly's framework: an ultimate goal that informs and shapes our socio-economic, socio-ecological systems. Here the UHWB program would refer to 'all life,' including humans and non-humans. Hence the recommendation would be to add or make explicit this dimension of 'goal' in the UHWB programme and build a vision for the 21st cities that is designed, managed, and lived to fulfill it.

Policy Recommendations

1. Urban health and wellbeing under climate change could be an effective vehicle to convey the urgency of action both in terms of mitigation and adaptation and hence needs to be further explored.

2. Climate change risks need to be further emphasized since the research community has long understated them due to their conscientious scientific ethos.

3. The significant challenges we faced are non-communicable disease burden, emerging infectious disease, aging population, rising health expenditure, health inequity.

4. The complexity of urban health and the health co-benefits of low carbon transition need to be further comprehended, and actions need to embrace intersectoral collaborative and participatory approaches.

5. Set managing urban health under climate change with systems approaches as an overarching goal for achieving sustainability in our socio-economic-ecological systems.

Part 2: Integrated Approaches to Public Health

Prof. Manuel Limonta, Director of International Science Council Regional Office, Latin America and the Caribbean (ISC-ROLAC)

"The main problem to overcome the Urban Health conditions in El Salvador was the lack of inter-sectoriality among the different ministries."

This meeting provided a variety of approaches and presentations of the Urban Health work. In my case, it was interesting to realize the vital work done by the natural sciences. Climate change and global warming are causing damage to all regions of the world. It was also fascinating to learn the studies and efforts that many countries such as China and others are making to help to reduce this problem. During the Expert Meeting, I presented the Salvadoran Urban Health Model, which is the result of a comprehensive work done in San Salvador since October 2016. This work started with the aim of gathering people of different institutions to develop the Urban Health platform in the country.

ISC-ROLAC started with an Urban Health workshop in October 2016, with the participation of two UH experts, Franz Gatzweiler from the UHWB program and Jose Siri from the International Institute for Global Health at United Nations University (UNU-IIGH). The main objective of this workshop was to diagnose the

situation of Urban Health in El Salvador. As a result, we concluded that the main problem to overcome the UH conditions in the country was the lack of inter-sectoriality among the different ministries. An Urban Health Working group was created as the main output of this first meeting composed by: Ministry of Health, Ministry of the Interior, Ministry of Environment and Natural Resources, Ministry of Education, Ministry of Culture, Ministry of Justice and Public Safety, Ministry of Public Works, Vice Ministry of Science and Technology, Vice Ministry of Transport, Vice Ministry of Housing and Urban Development, Council of Mayors and Planning Office of the Metropolitan Area of San Salvador, National Institute of Youth, National Institute of Sports, National University of El Salvador. This group meets regularly to discuss the possibilities to contribute to the programs that every institution is running related to Urban Health.

In September 2017, ISC ROLAC organized a two-day Urban Health International Workshop in El Salvador. Many countries in the region as Guatemala, Honduras, Haiti, Panamá, Jamaica, Bolivia, Dominican Republic, Spain, Cuba, Brazil, and El Salvador were invited to exchange information about the situation in the area of Urban Health in their countries. El Salvador had the opportunity to show the advances achieved with the Salvadoran Urban Health Model with the presentation of each member of the Urban Health Working Group. This Model began to have an impact on the metropolitan area of El Salvador. It transformed from an idea of integration to become a project with a set of methodologies implemented in the municipalities with the integrated work of the Ministry of Health, Medicus Mundi, OPS/OMS, Mayors, and the UH WG. We worked with a tool provided by PAHO as an instrument to organize and plan the work involved for municipalities to implement the Model. In this way, we have managed to be working in the application of the Model with seven municipalities out of 14 that compose the metropolitan area of El Salvador; this work is in progress.

ISC ROLAC is an active member of the Urban Health working group and acting together with the Vice Ministry of Health, in the planning, technical work, and cooperation with the different activities that the implementation of the model requires, as the popularization and communication of the model in El Salvador. Currently, ISC ROLAC is planning the third International UH Meeting with the cooperation of the UH commission in El Salvador in 2019.

Prof. Virginia Murray, Public Health England (PHE)

"Monitoring and evaluation of climate change adaptation to provide simple messages about urban health and wellbeing is a major issue."

Notable outcomes for me include: 1) The commitment of all to the issues around implementing system science for urban health and wellbeing under climate change; and 2) The value of the commitment by PHE to the implementation of urban health and wellbeing under climate change was mirrored in the discussions by Portuguese partners including the Directorate General of Health, Portugal, CDC China and the International Science Council collaboration with El Salvador and wider partners including Guatemala, Honduras, Haiti, Paraguay, Jamaica, Bolivia, Dominican Republic, Spain, Cuba and Brazil. Of note was the commonality of implementation analysis and planning for heatwaves and the need to understand mortality and morbidity impacts for climate change adaptation.

Monitoring and evaluation of climate change adaptation to provide simple messages about urban health and wellbeing was identified as a significant issue with the statement used by oy PHE Chief Executive being seen as a helpful model: "A decent home, a job, and friends are more important to good health than the health care [NHS]. ….. Reports highlight how we can build places and communities that encourage healthier choices."

Areas for development include: 1) Value of mapping UHWB and climate change aims and objectives onto the four UN Landmark agreements; 2) Need for the development of UHWB international centres of excellence to develop to build the networks for partnership to share learning and good practice together – maybe PHE could engage here; and 3) Possible need for a more extensive pilot site to test UHWB under climate change and disaster risk reduction to observe more active engagement and implementation.

Policy Recommendations

1. Inter-sectoral and inter-departmental platforms are needed to overcome the complexity of urban health conditions in many countries.

2. Management of urban health and wellbeing under climate change could benefit from aligning with the aims and objectives of major UN agreements.

Part 3: A "Health-Centred" Science-Policy Interface

Prof. Anthony Capon, inaugural Professor of Planetary Health - University of Sydney

"In implementing a systems approach, it is essential to invest effort in understanding the local context, including the decision making culture, process, and power relations."

The importance of culture

In achieving a health-centered science/policy interface, we are not proposing a

singular approach. There is no single model for a sustainable and healthy city. Cities should reflect their unique histories, geographies, economics, politics, spirituality, and cultures. In implementing a systems approach, it is essential to invest effort in understanding the local context, including the decision-making culture, process, and power relations.

Ultimately, transformations to sustainable and healthy cities will require cultural transformations. One prerequisite for transformation is to imagine different ways of living, for example, to imagine a city with improved conditions for walking and cycling as Copenhagen did in the 1970s. Some decades later, the physical structure of the Copenhagen transport system has changed, and it is now a leading example of a healthy and sustainable urban mobility culture.

A note of caution about the term 'systems' in everyday communication

When used in everyday conversation (rather than in an academic context), the term 'systems,' and indeed the terms 'complexity' and 'uncertainty,' can sometimes cause people to switch off. In communicating about systems approaches to city officials and other decision-makers, we need to be able to boil down our messages to the kind of statement that an elected official can make to the media at a doorstop interview. As an alternative to 'using systems approaches,' other framings that may be useful are 'working across portfolios,' 'avoiding silo thinking, 'using integrative approaches' and finding 'Win-Win-Win' strategies. In this context, it can be useful to illustrate the value of systems approaches through practical examples.

Dr. Baltazar Nunes, Instituto Nacional de Saúde (National Institute of Health, Portugal)

To develop an adequate environmental health protection policy and to meet the sustainable development objectives, we point out the need to:

- Develop new observation and surveillance systems and to maintain or expand existing ones;
- Regularly evaluate the functionality and adjustment of current surveillance systems;
- Evaluate these systems efficacy and impact on urban population health integrated into the adaptive management cycle;
- Deepen the complex adaptive approach to urban environment effects on health.

Dr. André Oliveira, Ce3C-CCIAM - Climate Change Research group – Faculty of Sciences, University of Lisbon

This Expert Meeting contributed to reinforce a shared consensus on the need for adopting a systems approach to manage urban health under climate change, but also on the difficulties, both technical and political, of putting it in practice. A widely acknowledged issue amongst the participants was the communication problem of "passing the message" on the advantages of this approach, from scientists and technicians to both policymakers and a wider audience.

There are also issues to sort regarding the technical part of this approach.

Such an implementation should integrate a robust public health surveillance component, strengthened by the application of risk models for major threats to urban population, in a climate change context. These threats and their essential risk assessment rationale have already been identified by several accredited international institutions, such as the Intergovernmental Panel on Climate Change. This strategy aims to guarantee that any initiatives are correctly prioritized, not only immediate actions in terms of public health, but also medium and long-term interventions. With a focus on adapting the urban tissue (both private and public spaces) to deal more effectively with the challenges of climate change, this strategy thus significantly improves the health and well-being of the resident population and visitors. A practical

example is to make the population of European cities (particularly in southern Europe) more resilient to the projected increase in heatwave episodes, by expanding green/natural areas within the urban tissue. This is a task that also involves targeting the most critical urban locations first, based on irrefutable evidence.

It is also fundamental that public health surveillance tasks are executed periodically and systematically, and those risk models are developed to deal with different urban contexts, specifically cities in widely varying geographic and socioeconomic backgrounds. The development of different risk models adapted to different urban settings raises; however, the question of their comparability in a more regional or global perspective. Therefore, there should also be an effort to develop and apply methods and metrics allowing to compare the results of different models, not only in terms of their efficiency and accuracy but also to make possible the joint evaluation of risk assessments obtained from widely different contexts. This way, we can gain more comprehensive and accurate regional or global perspectives on the present and projected impacts to urban human health and well-being under climate change. An example to consider, amongst others, is the statistical approach developed for the Global Burden of Disease Project.

Policy Recommendations

1. In implementing a systems approach, it is essential to invest effort in understanding the local context, including the decision-making culture, process, and power relations.

2. Ultimately, transformations to sustainable and healthy cities will require cultural transformations, one prerequisite for which is to imagine different ways of living.

3. Implementation of a systems approach for urban health under climate change should integrate a robust public health surveillance component executed periodically and systematically, and strengthened by the application of risk models for major threats to the urban population within different geographic and socioeconomic contexts.

Part 4: Coordinating Health Policy Implementation and Communication

Prof. Montira Pongsiri, Senior Research Associate, Planetary Health Science Policy, Cornell University

In practice, the interconnections and feedback loops that are core to a systems-based understanding can reveal tradeoffs and unintended consequences of policy decisions – at the outset, these revelations present essential opportunities for mitigation of any adverse effects to health, wellbeing, long-term environmental sustainability, etc. Health (SDG 3) is central to delivering on the 2030 Agenda. As one participant noted, "health is the natural integrator." This is a critical entry point.

The value of taking a systems approach to understanding and identify solutions to current and future urban health and wellbeing challenges can in practice be demonstrated by valuing the environmental and health costs of not taking a systems approach; and, by evaluating the ecological and health benefits of taking a systems-based, co-benefits approach. Demonstration studies are critical for illustrating multi and transdisciplinary cooperation to build systems-based understanding and to apply that understanding to inform decisions. To this end, invitations are open for scholars who are interested in collaborating on a proposed ASEAN UN project, "Using Environmental Health Data and Tools to Advance the SDGs in ASEAN.

Prof. Luísa Schmidt, Principal Researcher, Institute of Social Sciences - University of Lisbon

Public Health and Communication

Public health issues and the new risks generated by climate change require action at two levels: specific public policies in this area and a population that is better prepared to be a protagonist in its own protection and defense. For this to happen, it is necessary to have a public commitment to provide good information and to invest in education and public participation. Environmental issues, and particularly climate change, are an excellent laboratory for thinking about these issues.

Climate change is a complex problem, but it has been possible to do some important work in order to mobilize populations and municipal officials, especially at the local level. As an example, the

ClimAdaPT.Local project, which took place in 26 Portuguese municipalities, is an experiment and a good example to replicate. Revisiting the results obtained in this project on the issue of public health, it was possible to 1) identify the main problems according to the municipalities; 2) recognize the most exposed and vulnerable social groups; 3) evaluate the alert systems and preventive policies; 4) install an integrated and participatory governance model, articulating entities and stakeholders, in order to minimize problems and prepare populations.

From the communicational point of view, some fundamental points were highlighted: facilitating access to information and disseminating it; identifying key actors in the field who can act as knowledge brokers; adapting communication to each social group considering its own characteristics.

To communicate knowledge in the field of Public Health, it is necessary to avoid alarmism, which means increased liability and responsibility. It requires to inform people without alarmism; to warn and raise awareness, without causing despond; it implies keeping a delicate balance that requires techniques and 'technicians' to be well communicated.

When we address the impacts of Climate Change on Public Health, the decisive matter lies on the "Public" and, therefore, it is important to communicate awareness and a culture of prevention and self-protection; to implement new practices and better habits; to increase responsibility, but without generating paralyzing fears or scepticism. That means finding the right record for communicating about CC. Communication in 'subtherapeutic doses' may be counterproductive, or even create resistant strains, triggering public rejection. While communication in 'over-therapeutic doses' can kill the virus of curiosity and create rejection again (the issue is so serious and severe that people might prefer not to think about it...).

It is essential for people to have the idea that they can (and should) participate in the process of thinking about solutions and be a part of it. On the one hand, participate in a shared way right from the start (to share uncertainties and motivations – think together) in order to co-create knowledge. On the other hand, addressing the complexity as something that belongs to the nature of facts, and not as a stratospheric subject that only experts or a magic step will solve.

Policy Recommendations

1. Health (SDG 3) is central and can be a critical entry point to delivering the 2030 Sustainable Development Agenda.

2. Environmental and health costs could serve as a counterintuitive incentive for implementing a systems approach for urban health.

3. Demonstration studies are critical for illustrating multi- and transdisciplinary cooperation to build systems-based understanding and to apply that understanding to inform decisions.

4. When we address the impacts on Public Health, the decisive matter lies in the "Public" and, therefore, it is important to communicate awareness and a culture of prevention and self-protection; to implement new practices and better habits; to increase responsibility.

5. To communicate knowledge in the field of Public Health requires to inform people without alarmism; to warn and raise awareness, without causing despond; it implies keeping a difficult balance that requires techniques and 'technicians' to be well communicated.

Final Policy Recommendation Highlights

Under climate change impacts, we are facing significant urban health challenges such as non-communicable disease burden, emerging infectious disease, aging population, rising health expenditure, and health inequity.

The complexity of urban health and the health co-benefits of low carbon transition need to be further comprehended, and actions need to embrace intersectoral collaborative and participatory approaches.

Systems approaches could contribute to managing urban health under climate change, and understanding the local context, including the decision-making culture, process, and power relations are essential.

Changes in the cultures of public awareness-raising and decision-making are needed to build sustainable and climate-healthy cities.

Furthermore, implementation of a systems approach for urban health under climate change should integrate a robust public health surveillance component executed periodically and systematically, and strengthened by the application of risk models for significant threats to the urban population within different geographic and socioeconomic contexts.

Finally, *Health* (SDG 3) and 'Health in All Policies' can be a critical entry point for delivering the 2030 Sustainable Development Agenda.

References

1. Whitmee, S., Haines, A., Beyrer, C., Boltz, F., Capon, A. G., De Souza Dias, B. F., … Yach, D. 2015. Safeguarding human health in the Anthropocene epoch: Report of the Rockefeller Foundation-Lancet Commission on planetary health. *The Lancet*. Lancet Publishing Group. https://doi.org/10.1016/S0140-6736(15)60901-1

2. Acuto, M., S, Parnell & K. C. Seto. 2018. Building a global urban science, *Nature Sustainability* volume 1, pp 2–4.

3. American Public Health Association, Fact Sheets - Extreme rainfall and drought. Available at: https://www.cdc.gov/climateandhealth/pubs/PRECIP-Final_508.pdf

4. Bai, X et al. 2018. Six research priorities for cities and climate change, *Nature* 555, 23-25 (2018) doi: 10.1038/d41586-018-02409-z

5. Bina, O. 2018. *What if…we never tried?* Presented at: Implementing systems science for urban health and wellbeing under climate change, UHWB Programme International Workshop, Lisbon Academy of Sciences, 19-20 September.

6. Boonekamp GMM, Colomer C, Tomás A, and A Nuñez. 1999. Healthy Cities Evaluation: the co-ordinators perspective, *Health Promotion International*, 14(2): 103-110.

7. Ebikeme, C., Gatzweiler, F., Oni, T. et al. 2019. Xiamen Call for Action: Building the Brain of the City - Universal Principles of Urban Health, *J Urban Health*, Springer, Online ISSN: 1468-2869, https://doi.org/10.1007/s11524-018-00342-0

8. International Council for Science (ISC). 2017. *A Guide to SDG Interactions: from Science to Implementation.* International Council for Science, Paris. DOI:10.24948/2017.01.

9. Intergovernmental Panel on Climate Change (IPCC). 2014. Summary for Policymakers. In: Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to *the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. Available at: https://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_summary-for-policymakers.pdf

10. Le Quéré et al. 2018. Global Carbon Budget 2017, *Earth Syst. Sci. Data,* 10, 405-448, https://doi.org/10.5194/essd-10-405-2018

11. McPhearson, T and X Bai et al. 2016. Scientists must have a say in the future of cities. *Nature* 538, 165–166 (13 October 2016) doi:10.1038/538165a

12. Public Health England (PHE). 2017. *Spatial Planning for Health An evidence resource for planning and designing healthier places*, PHE publications gateway number: 2017151

13. Robine JM, Cheung SL, Le Roy S, Van Oyen H, Griffiths C, Michel JP, et al. 2008. Death toll exceeded 70,000 in Europe during the summer of 2003, *C R Biol,* 2008;331(2):171-8. Available at: https://www.ncbi.nlm.nih.gov/pubmed/18241810

14. Spratt, D. and I. Dunlop. 2018. *What lies beneath.* The understatement of existential climate risk, Breakthrough.

15. Summary by the President of the General Assembly of the high-level meeting on the effective implementation of the New Urban Agenda and the positioning of UN-Habitat in this regard. 5-6 September 2017. New York. Available at: https://www.un.org/pga/71/wp-content/uploads/sites/40/2017/07/Summary-Report-of-HLM-of-NUA-and-UN-Habitat.-final.pdf

16. The "Urban Health and Well-Being - A Systems Approach" programme official webpage: https://sites.google.com/view/uhwb

17. United Nations Department of Economic and Social Affairs (UN-DESA). 2018. *World Urbanization Prospects: The 2018 Revision*, United Nations Department of Economic and Social Affairs, Population Division

18. United Nations University International Institute for Global Health (UNU-IIGH). *Linking health to urban innovation for sustainable development: a cross-sectoral dialogue.* 11 February 2018. World Urban Forum 9. Available at: http://wuf9.org/programme/one-un-room/linking-health-to-urban-innovation-for-sustainable-development-a-cross-sectoral-dialogue/

19. World Health Organization (WHO). 2016. Health as the pulse of the new urban agenda, United Nations Conference on Housing and Sustainable Urban Development, Quito. ISBN: 9789241511445

20. World Health Organization (WHO). 1 February 2018. Climate change and health. Available at: https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health

21. World Health Organization (WHO). 2018. COP24 Special Report: Health and Climate Change. Available at: https://apps.who.int/iris/bitstream/handle/10665/276405/9789241514972-eng.pdf?ua=1

22. United Nations Framework Convention on Climate Change (UNFCCC). 2015. Paris Agreement, New York City (NY), available at: https://unfccc.int/sites/default/files/english_paris_agreement.pdf

23. United Nations (UN). 2015. Transforming our world: the 2030 Agenda for Sustainable Development. New York: United Nations (A/Res/70/1) Available at: https://sustainabledevelopment.un.org/post2015/transformingourworld

24. World Health Organization (WHO). 2015. Work Plan on Climate Change and Health Aims and Objectives: 2014-2019. Available at: https://www.who.int/globalchange/health_policy/climate-change-and-health-workplan-2014-2019.pdf?ua=1

25. World Health Organization Regional Office for Europe. 2013. *Health 2020: a European policy framework supporting action across government and society for health and well-being*. Copenhagen. Available at: http://www.euro.who.int/en/publications/abstracts/health2020-a-european-policy-framework-supporting-action-across-government-and-society-forhealth-and-well-being

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