

# HEALTH CO-BENEFITS OF CLIMATE ACTION THROUGH CO-PRODUCTION AND SYSTEMS THINKING

Audrey de Nazelle, Gudrun Weinmayr, Aina Roca-Barceló, Charlie Roscoe, Maya Negev, Kristie Ebi, Mark Nieuwenhuijsen, Carlos Dora and Giselle Sebag

*on behalf of the International Society of Environmental Epidemiology (ISEE) and the  
International Society of Urban Health (ISUH)*

## | Key messages

- Evidence on **health co-benefits**<sup>1</sup> of climate change mitigation and adaptation strategies is abundant.
- Health co-benefits are rarely considered as targets in climate change policymaking or city planning efforts, such as urban land use planning.
- **Co-producing**<sup>2</sup> scientific knowledge, alongside a **system-thinking** approach<sup>3</sup>, offers a way towards better health through climate action.
- Our specific suggestions include:
  - Form transdisciplinary teams, i.e., policymakers, health and medical professionals, researchers, urban stakeholders, and civil society, for sustainable solutions with broad based support.
  - Collaborate and create transparent alliances between governmental departments and with external organizations.
  - Devote funds and infrastructure to facilitate co-production and to ensure long term success.
  - Facilitate knowledge transfer, both horizontally, across different groups, and vertically, within the same group across projects.
  - View cities and regions as complex, dynamic and interconnected systems. Consider the geographical, behavioural and social aspects.
  - Assess successes and failures and adapt measures and policies accordingly, together in the transdisciplinary team.

<sup>1</sup> “co-benefits include health gains from strategies that are directed primarily at climate change, and mitigation of climate change from well-chosen policies for health advancement” (IPCC, 2014)

<sup>2</sup> Systems thinking has been defined as “a set of ‘synergistic analytic skills’ used to help describe a complex set of interacting factors that produce outcomes, to predict their behaviour and to formulate interventions to achieve desired (and avoid pernicious) results” (Berry et al, 2018).

<sup>3</sup> Co-production has been defined as “an asset-based approach to public services that enables people providing and people receiving services to share power and responsibility, and to work together in equal, reciprocal and caring relationships. It creates opportunities for people to access support when they need it, and to contribute to social change.” <https://copronet.wales/>

## | Health in climate action

In November 2021, Glasgow will host the 26<sup>th</sup> Conference of the Parties (COP26). The outcome of the conference will define our future, as Parties formalize their commitments to tackle climate change. Targets for climate mitigation and adaptation will be at the centre of COP26 discussions, and the Parties will strategize on ways to achieve targets via financial, ecological, and social justice principles. This statement builds upon a WHO-led initiative on climate change and health to specifically call for co-production and systems thinking in climate action to improve the health of all people.

Cities have a great potential to benefit from these synergies, As major contributors to climate change that also suffer the consequences of climate change, cities can have multiple benefits from synergistic strategies. For example, the impacts of rising temperatures on health are magnified by the urban heat islands effect, which disproportionately burdens the most vulnerable population groups. For more examples see [Box 1](#).

### **Box 1: Health burden avoidable through climate action**

*(Nieuwenhuijsen et al. 2020 and references within)*

- Ambient air pollution kills 4–9 million people each year.
- Lack of physical activity kills 3.2 million people each year.
- Traffic accidents kill 1.2 million people each year.
- Noise exposure is associated with >1.8 million DALYs a year in Europe.
- Heat may cause as much as 0.4% of premature mortality, annually.

If cities do not see clear and direct local benefits, they have little incentive to implement action to mitigate climate change. Properly accounting for health benefits in action plans allows cities to recognise large, direct benefits to their populations. Currently, climate actions that integrate health research findings are at best implemented in a piecemeal way, falling short of immense potential population health gains. This approach consequently misses large economic and social benefits that are possible when health is supported and promoted.

Integrated city planning, for example, has the capacity to improve public transport and active transport networks, which in turn provides space to create accessible green spaces, while reducing individual motorization, which yields large health co-benefits to the city population. These benefits are achieved by the lowering of air pollution and heat island effects, increased opportunities for physical activity, social cohesion, and benefits of natural spaces for physical and mental health. Energy efficiency, especially eliminating heavily polluting fuel combustion and waste management, are additional examples of synergistic strategies that can contribute substantially to achieving climate targets. These approaches reduce air pollution outdoors and indoors, thereby substantially improving population health by protecting all people (for examples see [Box 2](#)).

**Box2: Examples for health co-benefits of climate action**

- In 3 Austrian cities: a **Green Exercise scheme** was estimated to cut down 30,000 t CO<sub>2</sub> eq and prevent up to 1,538 deaths (*Wolkinger et al. 2018*).
- In Nairobi (Kenya): a **Waste treatment project** was estimated to cut down 111,669 t CO<sub>2</sub> eq and result in savings of 4.35 million USD (*Rashidi et al 2017*).
- In Balikpapan (Indonesia): a **tram introduction project** was estimated to cut down 20,194 t CO<sub>2</sub> eq and result in savings of 0.72 million USD (*Rashidi et al 2017*).
- In Colombo (Sri Lanka): an **electric bus rapid transit project** was estimated to save 3,716 t CO<sub>2</sub> eq and result in savings of 0.31 million USD (*Rashidi et al 2017*).

This brief describes the most important barriers to implementing comprehensive and synergistic climate actions that incorporate health benefits. These barriers relate to the production and use of scientific evidence, political prioritisation, and institutional structures. We offer a **way forward** through a combined climate-health agenda by using **co-production and systems thinking**. Our approach echoes the COP26 call for “Parties to promote and cooperate in research, including through exchange of information and supporting international programmes, networks and organizations and improving research capacities of developing countries (United Nations Climate Change, 2021. Science in the negotiations). Our call stresses that all COP26 campaigns are intertwined with health (see **Figure 1**).



**Figure 1.** COP26 goals linked to some relevant urban planning actions that have the potential to lead to health co-benefits. The role of financial support through the different levels is emphasized (in grey). Adapted from <https://www.who.int/publications/i/item/cop26-case-studies-climate-and-health>

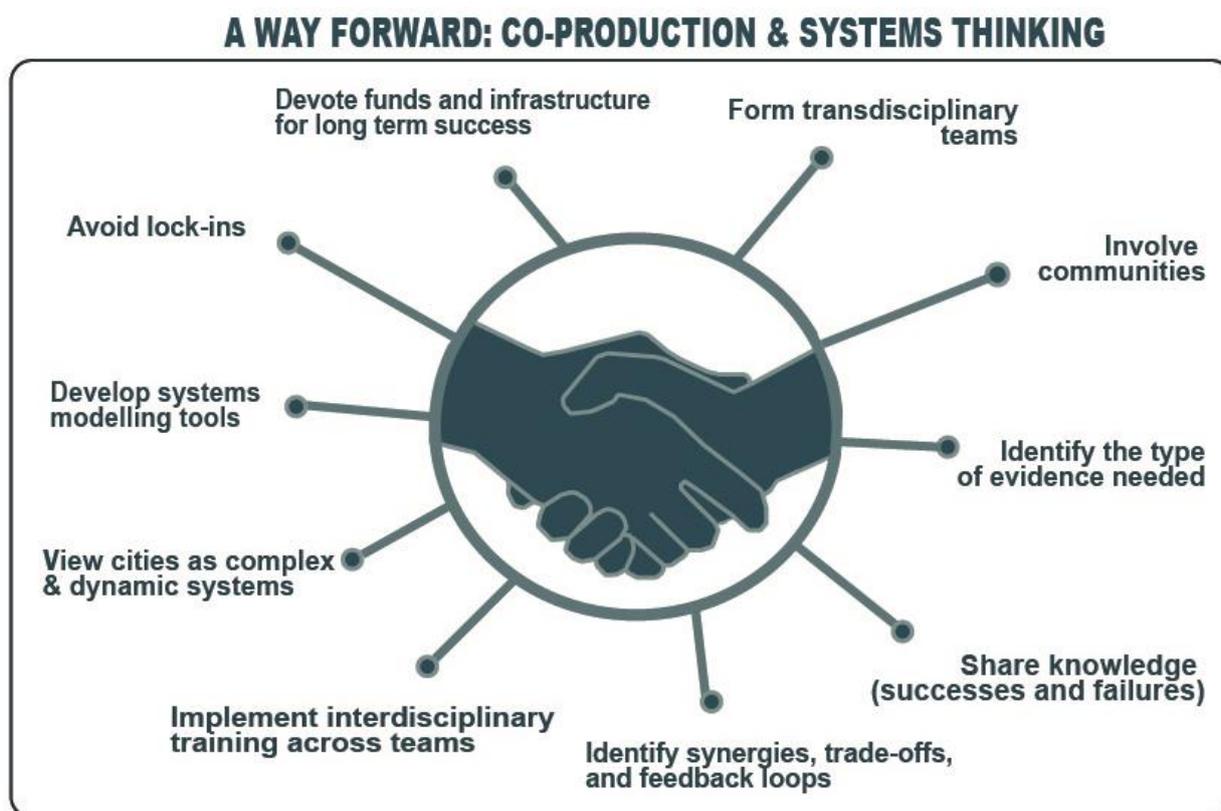
## | Barriers to implementing comprehensive and synergistic action

Despite the abundant scientific evidence of its benefits, integrated climate-health co-benefits policies are still rarely implemented. One reason reported is that policymakers do not see the direct relevance of research to aid in complex decision making at the local context, which would enable them to make judgements on trade-offs and synergies between different sectors. Often, research that embraces complexity and the realistic dynamics of urban systems is lacking, including limited information on social, political, and economic relationships. Employing effective communication to ensure knowledge translation between all stakeholders is essential. Co-production as a joint community–policy–research effort is key to these ends. Tools available to practitioners such as integrated environmental health impact assessment or sector-overarching common indicators can aid implementation and transparency.

Political will, prioritisation and leadership are essential to putting evidence into practice. Climate policy outcomes are profoundly shaped by struggles for power and influence and there is an urgent need to overcome the resistance of vested interests and lobby groups, such as the fossil fuel and car industry, to move towards a more transformative policymaking to benefit the common good. Between the different groups, there are important power imbalances and health practitioners are generally not closely and consistently involved in policy processes. Public opinion, especially if it turns into outrage associated with the perception of inequity, including intergenerational and racial inequity, can be an important driver or barrier to political action. It is therefore important to understand the powers at play, identify leverage points, and develop convincing arguments tailored to these realities. Stakeholder and community involvement are an integral part of the co-production approach, that can strengthen political will. This approach has the potential of fostering the urgently needed long-sighted and innovative political leadership, as well as greater social mobilisation.

Designing and putting into practice climate action with health co-benefits is also hindered by important institutional barriers. A major barrier is the siloed structure that still exists in most national and city governments. Indeed, a lack of urgently needed intersectoral collaboration and communication is reported together with a lack of awareness of potential mutual co-benefits of such a collaboration. This is deeply rooted in obstacles that separate disciplines such as different professional vocabularies, training in a siloed approach and/or different agendas and goals. A lack of coordination and resources for intersectoral collaboration is also common place.

## | A way forward: co-production and systems thinking



**Figure 2.** Illustrative representation of some of the key actions required to achieve health co-benefits from climate action, involving the contribution and collaboration of researchers and stakeholders alike.

### **1** Take advantage of co-production between scientists, policymakers, and urban stakeholders for best policies

#### **Work together: policymakers, researchers, stakeholders, the broader civil society ...**

Working together will avoid a short-sighted and narrow focus and help to identify the different angles of a challenge in the local context. Involving public health professional alongside a wide range of stakeholders from planners to air quality officers can ensure health co-benefits are realized and potential harms avoided. Raising public awareness and finding relevant local needs will strengthen support for resulting policies which may otherwise be difficult to implement. Our recommendations are to:

**Work across disciplines:** Engage with researchers from several disciplines (public health, medicine, environmental and social sciences, urban/land-use planning, engineering, etc.) as well as stakeholders from different backgrounds.

**Co-produce research from its inception:** It is important to identify the evidence that best serves the local community and the way it should be communicated to all stakeholders.

**Acknowledge complexity:** Emphasize that the complex dynamics and interrelationships present in cities need to be incorporated into research and monitoring e.g. using systems thinking (see below).

**Use appropriate tools:** the final use of the outputs needs to be considered when deciding on the best tools and the outputs to produce.

**Engage in a participatory process:** Involve the different stakeholders and end-users' input, to define the right questions and goals for research, policy options and evaluation. Include civil society, community-based organizations, local businesses, community centres, NGOs, tribal leaders, etc.

**Work towards common goals and identify trade-offs transparently:** It is important to limit lobbyist influences and account for the variety of views to avoid dominance of certain (vested) interests. The process must be systematic and rigorous to ensure transparency and acceptability.

### Collaborate and create alliances across departments and agencies

Gain a comprehensive view of problems and solutions and create alliances across sectors to work towards common goals. Our recommendations are:

**Assure knowledge transfer:** Use the knowledge of your colleagues from different departments and sectors to overcome typically narrow professional views, which fall short to encompass all the complexities of urban planning and, importantly, its consequences. Create a common vision and pertinent solutions with health as a core goal.

**Balance power and participation:** Traditionally underrepresented sectors in urban decision making (e.g. health and environment) need to have the same power as dominant sectors to ensure efficient co-production.

**Collaborate vertically (local to national):** Cities do not exist in isolation—get support from relevant administrative structures and look for alliances.

### Devote funds and build institutional structures for long-term success

Create the infrastructure needed to establish, ensure, and maintain comprehensive and long-lasting co-production. Our recommendations are:

**Coordination:** Ensure devoted staff to organize and facilitate first contacts, meetings, (in)formal exchanges and ensure continued collaboration.

**Building trust:** Establish the solid, trustful relationships between collaborators that is invaluable for a successful exchange and collaboration. Foster also common informal encounters, but remain transparent! Ensure that communication is not hindered by misunderstandings due to different professional language usage.

**Long-term collaboration:** Devote, and if necessary, acquire, long-term funding for these collaborations. City planning activities have long-term consequences - also on health.

## Learn together from successes and failures

**Monitor progress:** Greenhouse gas emissions, air quality, welfare, and health indicators need to be monitored. This ensures accountability, evaluation of achieved benefits and detection of unwanted consequences.

**Engage in knowledge transfer platforms:** Join networks such as the C40 Cities or Healthy Cities to profit from others' experiences and share your experiences so that others can benefit.

## 2 Take advantage of systems thinking to achieve climate action and health

### Approach cities as complex, interconnected systems

Cities are complex systems. Failing to take this into account may lead to inefficient, transient, symptomatic and/or partial approaches, or even to a series of unwanted long-term consequences, including lock-in phenomena. On the contrary, application of systems thinking allows for the identification of multiple co-benefits, and thereby augment the well-being and health of the urban population. Our recommendations are:

**Find synergies and trade-offs:** This can be done by visualising the different processes and their links, including drivers, as well as feed-back loops. Importantly, there are a broad variety of pathways to health. Health professionals are invaluable to identify these pathways.

**Avoid pitfalls:** Example are replacing one ailment with another (e.g., simple restitution of diesel cars by electric cars) and measures that create a lock-in effects that may hinder future actions (e.g., long-lasting infrastructures tailored to individual motorized vehicle traffic instead of small-scale connectivity, active transport and green public spaces).

**Consider different sectors and geographical scales:** All cities' services to their citizens can contribute to achieving an improved city system by providing climate action and improving health and should therefore be considered. In addition, a city is interdependent with the area surrounding it or even greater as with long-range transport of air pollution and supply of foods and goods.

**Consider behavioural and social aspects: Assess and make transparent the dynamic linkages between** politics, ideology, culture, policy options, individual and collective behaviour, and health. Consider social groups and especially vulnerable populations for achieving health co-benefits.

**Account for the dynamic nature of systems:** Dynamic processes are of paramount importance to achieving the desired policy outcome. The framework should thus allow flexibility and possibilities to react to unforeseen processes. A timely monitoring of key outcomes will allow to detect such processes and to react in a timely manner.

### To make it work: facilitate implementation of systems thinking

Systems thinking is very different from the usual isolated work across different administrative units that focuses uniquely on the immediate legally defined tasks and where input may be mainly restricted to

interest groups and self-contacted experts. Application of systems thinking therefore needs openness and training which should be facilitated. Many aspects mentioned for co-production hold true here as well. Our recommendations are:

***Cooperation of administrative units:*** Cross administrative boundaries, combine the respective expertise and establish long-term collaborations. Again, building trust is key to success and efficiency.

***Build-up of expertise:*** This includes interdisciplinary education and interchange. This may be supported by rotating of staff between departments.

***Systems thinking science and evaluation:*** This will be interdisciplinary science that addresses the complexity of reality and supplies policy relevant research and tools. At its best, it will be transdisciplinary evidence involving in addition stakeholders and citizens as described above for the co-production approach.

## Final remarks

Cities across the globe are already starting to realise many aspects of the way forward that we suggest. Even though they often still fall short of achieving the enormous potential health co-benefits of climate change mitigation, these changes are invaluable stepping stones for building the kind of initiative that we propose. One example of this approach is the “Future Streets” initiative in a disadvantaged areas of Auckland, New Zealand. Policy makers and scientists, together with multiple actors from the local community developed transport infrastructure changes to foster (travel) safety and active transport and thus to benefit the local community suffering from chronic disease, traffic accidents and violence. This initiative shows that several of the Sustainable Development Goals (SDGs) are addressed through systems thinking. Further initiatives using systems thinking and co-production are to be encouraged and may encompass additional aspects such as sustainable building and energy infrastructure, nutrition and others.

In conclusion, this International Society for Environmental Epidemiology (ISEE) and International Society of Urban Health (ISUH) Policy Brief urges all policymakers to co-produce policy and city planning efforts with scientific research, including urban stakeholders and public health researchers, to adequately account for the health impacts of climate action. It is crucial that morbidities and deaths associated with climate change and associated inequities are reduced through evidence-based policy and decision making, and health co-benefits are maximized through adequate health accounting. This approach can turn the threat of climate change into an opportunity to develop thriving cities and improve public health through co-production and systems thinking.

## References

- Berry HL, Waite TD, Dear KBG, Capon AG, Murray V. 2018. The case for systems thinking about climate change and mental health. *Nat. Clim. Chang.* 8(4):282–90.
- MacMillan A, Smith M, Witten K, Woodward A, Hosking J, Wild K, Field A. 2020. Suburb-level changes for active transport to meet the SDGs: Causal theory and a New Zealand case study. *Science of the Total Environment*, p.136678.
- National Cooperative Highway Research Program. 2019. A Guidebook for Communications between Transportation and Public Health Communities. <https://archive.org/details/nchrp-25-25-task-105-guidebook>. Last accessed: 07 Oct 2021.
- Negev, M., Zea-Reyes, L., Caputo, L., Weinmayr, G., Potter, C., de Nazelle, A., 2022. Barriers and Enablers for Integrating Public Health Cobenefits in Urban Climate Policy. *Annu Rev Public Health* 43, x–x. <https://doi.org/10.1146/annurev-publhealth-052020-010820>.
- Nieuwenhuijsen MJ. 2020. Urban and transport planning pathways to carbon neutral, livable and healthy cities; A review of the current evidence. *Environment International*, <https://doi.org/10.1016/j.envint.2020.105661>
- Rashidi K, Stadelmann M, Patt A. 2017. Valuing co-benefits to make low-carbon investments in cities bankable: the case of waste and transportation projects. *Sustain. Cities Soc.* 34:69–78.
- Te Ara Mua - Future Streets. <https://www.futurestreets.org.nz/>. Last accessed: 28 Oct 2021.
- WHO 2017: Health economic assessment tool (HEAT) for walking and for cycling. Methods and user guide on physical activity, air pollution, injuries and carbon impact assessments [https://www.euro.who.int/\\_data/assets/pdf\\_file/0010/352963/Heat.pdf](https://www.euro.who.int/_data/assets/pdf_file/0010/352963/Heat.pdf). Last accessed: 28 Oct 2021.
- WHO fact sheet: Household air pollution and health, 22 September 2021. <https://www.who.int/news-room/fact-sheets/detail/household-air-pollution-and-health>. Last accessed: 13 Oct 2021
- WHO 2021: COP26 special report on climate change and health: the health argument for climate action. Geneva: World Health Organization; 2021. Licence: CC BY-NC-SA 3.0 IGO. Last accessed: 13 Oct 2021
- Wolkinger B, Haas W, Bachner G, Weisz U, Steininger K, et al. 2018. Evaluating health co-benefits of climate change mitigation in urban mobility. *Int. J. Environ. Res. Public Health.* 15(5).