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G20 INSIGHTS

Urban Health Governance for Sustainable Development

Data-Knowledge-Action Systems for Urban and Planetary Health

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Abstract

Urban health can be seen as a microcosm of global health and urban health governance is important to achieve sustainable development globally. According to the UN, "Our struggle for global sustainability will be won or lost in cities". Cities host the majority of earth's human population, are the largest contributors to economic growth and global greenhouse gas emissions and they consume about 75% of global primary energy. Due to their role in the global economy and their impact on the health and well0being of people and the planet, the ways in which cities' knowledge is governed for health and well-being, is critical for their own prosperity and for achieving sustainable development.

Urban health knowledge governance needs to respond to the challenges of a big world on a small planet. Economic progress, previously measured in GDP, dependent on cheap energy, and at the expense of planetary health (the economy of 'a small world on a big planet'), is no longer an affordable option. Further progress in health and well-being needs to be created within tighter earth system boundaries by better mobilizing knowhow. Cities can achieve that by creating the enabling environment for putting knowledge into productive use. This requires a framework for urban governance which reconnects knowledge cocreation and collaborative decision-making.

Three policy relevant lessons from the International Science Council's decade-long Global Science Programme on "Urban Health and Wellbeing: a Systems Approach" are conveyed: First, progress in urban health must be achieved within planetary boundaries. Second, cities have a potential to respond to urban and planetary health challenges by creating enabling environments for attracting and putting knowledge into use. Data-Knowledge-Action Systems are simple actionable frameworks to do so, and sustainability missions have been proposed by the global science community to implement the approach. Third, by responding to various urban health problem-solving demands of cities, economic value is created and scenarios for future progress of cities can be identified.

Diagnosis of issue

The global urban health challenge is about cities having to secure the health and well-being of their populations within planetary health boundaries (Figure 1). As the world approaches to becoming 70% urban, urban health becomes the main determinant of planetary health.[1] Due to rapid urbanization, cities are increasingly confronted with health challenges which result from:

1) their own internal function and form, e.g., inadequate housing, congestion, pollution, unemployment, violence, non-communicable diseases, lacking capacities in public service provisions, which include health care, security, transport, and others,
2) planetary health feedback, e.g., water and food shortages, floods, energy supply, heat islands, infectious diseases, and
3) urban impacts on the environment, e.g. GHG emissions, water pollution, waste production.

For responding to these systemic health challenges, a more intelligent health governance mechanism is needed beyond the aim of improving people's health and well-being in cities. Such a mechanism is the basis for enabling productive knowledge governance.

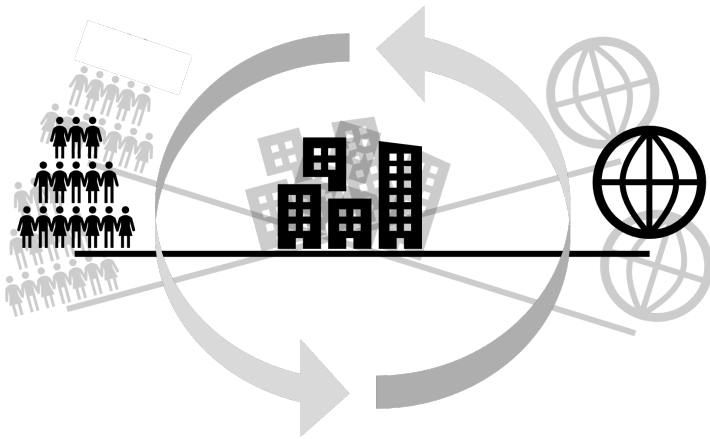

Figure 1: Urban health governance addresses human, urban and planetary health challenges.

The design and measurement of urban health provides a mechanism for measuring 'OneHealth' in cities. Malfunctioning urban health knowledge governance systems disconnect decision-making from knowledge cocreation. It is the inability to rapidly access and make use of data and knowledge resources for an adequate response to complex urban health problems. Lessons from COVID have taught us that complex urban health problems at the community level can best be addressed at the level at which they emerge. Depending on the nature of the issue, less centralized and more participatory approach[2] can be successful. Better urban health governance can therefore also be seen as a response to the recent decline in democracy.[3]

The global urban health knowledge challenge is complex but not complicated. Firstly, it is about data that is not findable, accessible, interoperable, or reusable (FAIR).[4] Further, data which cities are asked to collect by central/federal governments are not fit for purpose. Data are too often aggregated at a level that cannot inform local decision making. It is heavily reliant on statistical data categories which are increasingly irrelevant as they do not reflect reality on the ground. For example, most cities in the world are shrinking economically and demographically. This is causing unprecedented levels of inequality in access to housing, infrastructure and basic services and safety, which statistical data cannot detect. Cities that are not shrinking are growing exponentially. Again, statistical data, collected at best every 5 to 10 years, is inadequate as findings, by the time they are analyzed, are overtaken by reality. New forms of data and analysis are needed. Urban health data, to be useful at the local level, needs to be geo-spatially specific both at a macro scale (satellite imagery to detect trends in, e.g., land use, sprawl, congestion, density, proximity, heat sink effect, etc.) and at the community level, with mobile telephone data, local mapping and by means of community-based deliberations.[5]

Here, the subsidiarity principle is about getting the right data at the right level of aggregation, which requires knowledge about specific urban health issues, how they are perceived by people in their communities and how they are connected to planetary health (Figure 2).

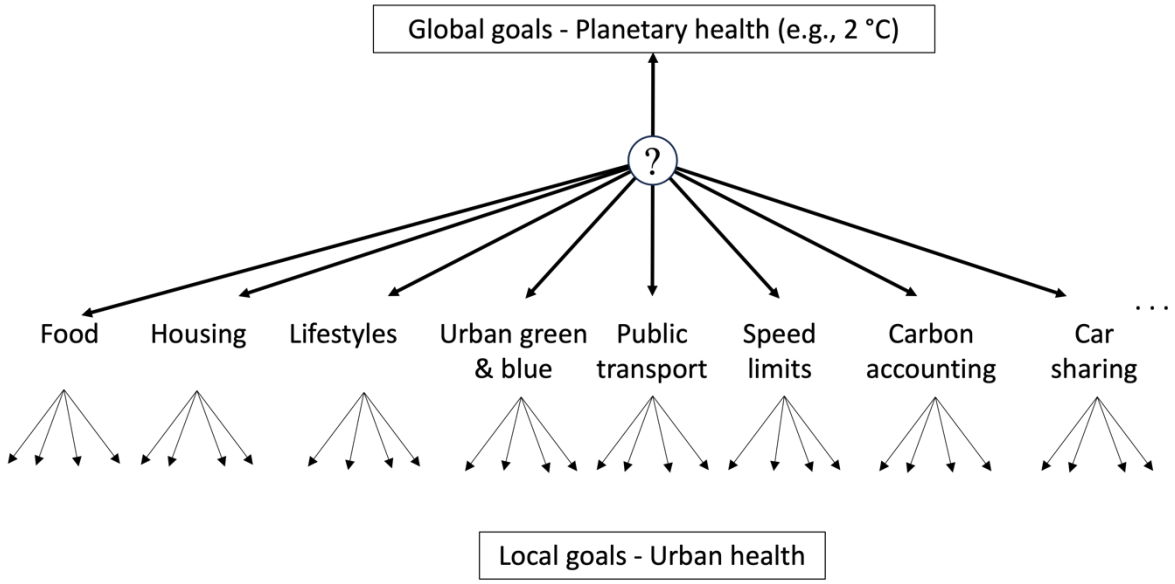

Figure 2: Which data are required for local, urban and global planetary health goals?

Secondly, the issue is about knowledge co-creation and governance. Before cities can act on urban health knowledge, they need teams to create it, by identifying the systemic role of the social and environmental determinants and how their interactions potentially play out in future scenarios. These knowledge co-creation capabilities of teams are also required to identify the data which is needed. Despite incomplete data, value plurality and high levels of uncertainty, decisions need to be made, often urgently.

Those are typical situations in which decision making improves by being approximately right instead of being precisely wrong; not necessarily by generating larger amounts of big data, but by better governing the knowledge creation process and connecting data, knowledge and action (decision-making) (Figure 3).

Recommendations

Our proposal is to systemically connect data, knowledge, and action/decision-making for solving complex urban and planetary health challenges and creating economic wealth. That enhances urban systems intelligence for solving complex problems characterized by an urgency of decision making, value plurality and irreducible uncertainty. DAKAS can be established as units or hubs at municipal, district, or neighborhood level, are run by diverse teams of specialized experts, politicians, citizens, professionals, or private sector representatives – stakeholders who literally have a stake in making better decisions for urban health. They have been developed and tested in science and business management projects[6] and have become of age to be implemented at scale.

Our recommendation overlaps with the International Science Council's[7] call to establish missions for sustainability. Such missions are solutions-focused and emphasize the need for science to directly engage with society: policymakers, civil society, funders, the private sector, and other relevant stakeholders. Their aim is to design and implement interventions that lead to action, together. "'Mission science for sustainability' refers to science that engages substantially with society to co-produce actionable knowledge to promote long-term sustainability, locally and globally."[8]

Urban DAKAS create economic value by responding to complex problem-solving demands. They create collective know-how, which is knowledge of *what* and *how to*. This local knowledge demand has not been addressed by conventional evidence-based science because evidence-based approaches often ignore complexity and treats it as risk. According to complexity economics,[9] even natural resource poor societies can prosper and progress by creating an enabling environment for knowledge to become productive and by recombining a high diversity of know-how in teams to come up with solutions. Not the quantity of highly educated people drives progress; it is the ability to (re-)combine diverse types of knowledge in teams that co-create knowledge products (solutions) which respond to a problem-solving demand. That is what drives progress and makes cities thrive.

Cities with complex economies, that have achieved higher accumulation and combination of productive knowledge (know-how) have higher qualities of life standards than others. In order to combine know-how and put it into productive use, it needs to be embedded into an enabling knowledge infrastructure which combines data, knowledge and decision-making. That facilitates the flow, communication, transfer, and re-combination of know-how.

Urban Data-Knowledge-Action systems (DAKAS) can be perceived as a city's engine for driving the data metabolism – they are the process of how cities think.[10] They generate the right type and amount of data and information, transform it into knowledge and knowledge into action. The centerpiece of a DAKAS is a participatory, reiterative, and computer supported systems modelling process (Figure 3). Apart from an improved problem-solving capacity, co-benefits of DAKAS are progress in economy and democracy.

The general dilemma cities are confronted with, is that they need to simultaneously achieve local and global health goals, which are interconnected and involve trade-offs. The data and knowledge needed to achieve them, however, are absent or not FAIR. Data do not inform about the goals, are insufficiently disaggregated, or simply lacking; knowledge is insufficiently, non-transparently, and non-participatorily created, fragmented and, as a result, action is sporadic, ad-hoc, uncoordinated and ineffective. In other words, urban Data-Knowledge-Action Systems are fragmented and dysfunctional. As a result, economic values are not turned into benefits for the city and investments into creating a better knowledge governance system are merely regarded as costs to be avoided.

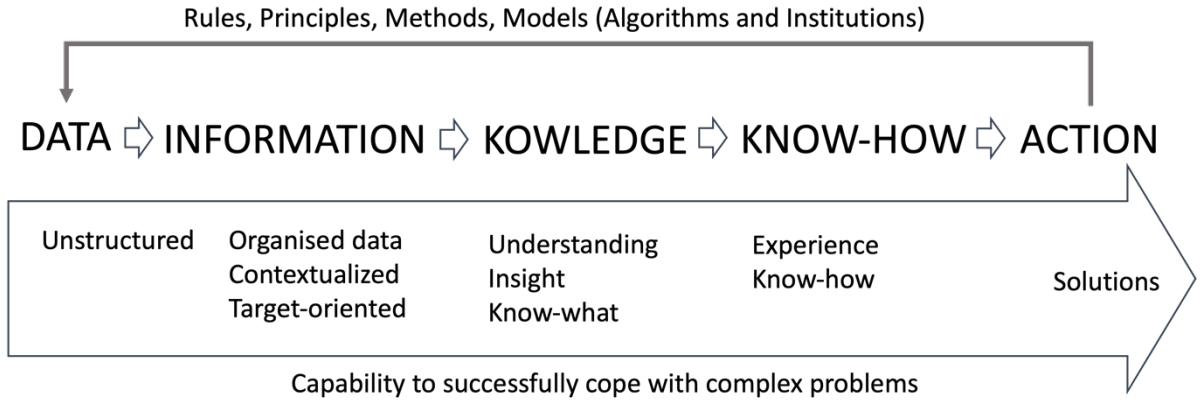

Figure 3: Circular structure and function of a Data-Knowledge-Action System

Therefore, cities need teams which serve the data and knowledge demands of people and cities, not only of science. Data not only needs to be disaggregated but also specific to the ecological, social, economic context of each project. For example, solving noise pollution in a district of a city or solving traffic congestion problems for the entire city, are very different urban health problems which each require specific sets of data, information, and know-how to understand the determinants of the specific problem situation. It requires data to generate know-how and know-how to identify the right data, and people's values help decide what matters most.

Currently, data are often available from universities or other research organizations and have been collected for research purposes. A science-driven Data-Knowledge-Action System usually stops at the *K*: the knowledge that has been generated is

published and then archived. Little, if any effort is made to put that knowledge into use. Applied science organizations may take the process further, to develop policy recommendation, patents, or products, however, they also have a different purpose and no long-term commitment to solving a city's local urban health and well-being problems. In these cases, the city is merely a research object. Knowledge (of why and what) is extracted and used in the science domain, instead of putting it to productive use. Research teams usually dissolve after a project has been finalized. Even if FAIR data principles are applied, knowledge and its potential economic values is lost.

Scenario of outcomes

The capabilities of cities to address complex problems of urban and planetary health efficiently and effectively, are still lagging behind the expectations articulated in global goals such as the New Urban Agenda or the Sustainable Development Goals. How cities think, impacts a global majority of people and the planet. To improve the quality of urban governance within tighter planetary boundaries, urban governments should routinely base their decisions on knowledge co-creation processes which are integrated into the fabric of urban governance.

Lessons learnt, show that the amount of data and knowledge produced does not necessarily lead to improving a city's problem-solving capability. What matters for economic prosperity is the diversity and ubiquity of knowledge and the knowledge creating 'system' that allows knowledge and knowhow to be recombined and move to where it is needed most.[11]

To improve city's prosperity by enhancing its urban health problem solving capability, we have proposed Data-Knowledge-Action systems (DAKAS) which are the systems and teams at work to generate knowhow for urban communities to solve complex urban health problems within planetary boundaries. They are the enabling systems for creating knowledge in situations where values are in dispute, facts are uncertain, decisions are urgent, and stakes are high. They can be considered as the core operating units of what has been referred to as science missions for sustainability by the Technical Advisory Group of the International Science Council.

Complexity economics provides the theoretical basis for Data-Knowledge-Action systems. Economic complexity indicators are about knowhow and deviate from conventional GDP based indicators for progress and wealth. The diversity of know-how a city has and the variety of complex knowledge products (solutions) it is able to produce, are important economic progress indicators. Knowledge diversity and ubiquity are rough approximations of the variety of capabilities available in a city for solving problems. Accordingly, cities' productive knowledge governance type and their capacity for establishing DAKAS can be mapped as shown in Figure 4.

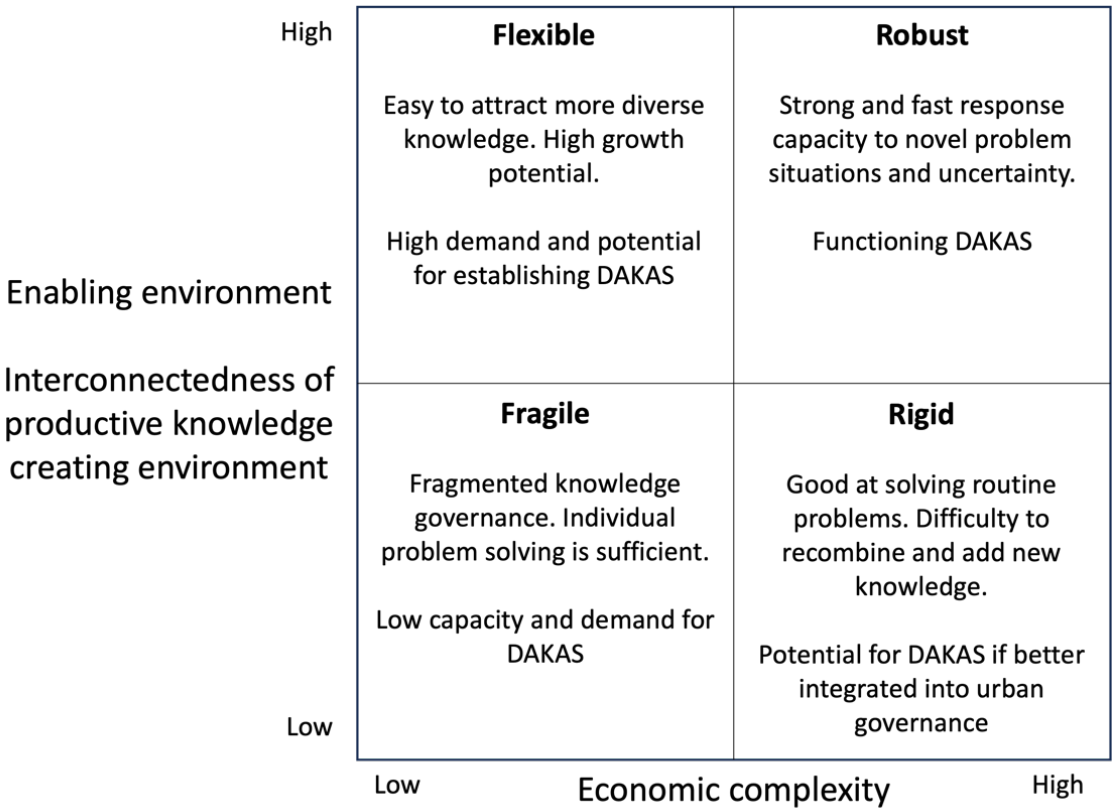

Figure 4: Urban productive knowledge governance types and potential for Data-Knowledge-Action Systems

The urban productive knowledge capacity is the capacity to put knowledge into use and create value. The productive knowledge capacity of a city depends on its economic complexity (x-axis) and the enabling environment (y-axis). Economic complexity is defined by knowledge: the number of diverse types of knowledge a city has for solving complex problems, and ubiquity, the ability of other cities to solve the same kind of problems. High economic complexity means a city can create (knowledge) products, i.e., solve urban health problems, which require many different specialized types of knowledge and which few other cities can solve.

Increasing a city's knowledge productivity for urban health, requires an enabling environment (y-axis) to move and recombine knowledge and to make knowledge co-creation part of decision-making, e.g., by good governance principles, regulations, or making public expenditures conditional on DAKAS-based decision-making. According to the framework (Figure 4) cities can map their opportunities for progress by putting knowledge into productive use. The key for responding to an increasing knowledge demand to solve complex problems of urban health is to improve knowledge governance at city and local levels. National governments can support cities by providing them sufficient data autonomy, avoiding a disproportionate amount of time collecting aggregated data which are not useful for solving local problems and supporting the knowledge co-creation process.

Cities have untapped data and knowledge resources which can be mined as additional revenue sources. Investing in the building of knowledge co-creation systems for urban health will not only solve health problems for people and the planet but also make cities prosper. Due to numerous co-benefits,[12] returns from investing in such knowledge resources for urban health are likely to pay off faster than from conventional resources.

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