FOOD SYSTEMS PLANNING FOR CITIES YET TO BE BUILT

ESSENTIAL BUT OFTEN FORGOTTEN

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SUMMARY

Food systems are essential to food and nutrition security. They are also major drivers of economic, environmental, and social development and can be positive forces for urban development. This is critical, as increasing urbanisation of the global population is shifting the relative burden of poverty, food insecurity, and malnutrition to cities. To keep up with this growth, greater urban infrastructure, including entirely new cities, is required.

Developing an entirely new city provides an opportunity through urban planning and design to address a range of development challenges. This paper will focus on how integrating food systems planning into design of new cities can improve access to nutritious and safe food (and therefore contribute to reducing levels of malnutrition). As food systems are impacted by, and contribute to, climate change, there is also an opportunity for well-designed cities to promote resilient urban food systems through considering options for climate change mitigation and adaptation. However, as this paper demonstrates, new cities being designed and built are not seizing the opportunities to address these development challenges. Further there is limited technical guidance available for doing such planning in practice.

A global call to action on new city development, by UN agencies and other key stakeholders outlined in the paper, is required to discuss how such development could be used to further the Sustainable Development Goals and Paris Agreement requirements whilst supporting healthy diets to improve nutrition.

KEY MESSAGES

- Malnutrition, climate change, urbanisation, and unsustainable use of natural resources are key challenges of our time. Due to the fundamental role of cities in each of these issues, sustainable urban development is essential to addressing them.
- Hundreds of new cities are being planned or developed; most are not applying principles of sustainable urban development. The essential role of food systems planning for new cities is also not widely recognised.
- Integrating food systems into urban planning of new cities can reduce malnutrition and positively contribute to other Sustainable Development Goals.
- Work is required to develop 'best practice' urban planning that addresses and mitigates the significant challenges to future development, rather than relies on the *status quo*, which is unsustainable, socially divisive, and economically short-sighted.
- Sustainable urban development, integrating food systems planning, needs to become the norm; this entails a focus beyond just economic objectives. National governments, supported by key actors, need to drive this change.

BACKGROUND AND OBJECTIVE

Food systems (all processes from food production, distribution, and retailing to consumption, and through to waste management (1)) are major drivers of economic, environmental, and social development (2). Depending on how each of the processes, from production to waste, are implemented, they can positively or negatively influence nutrition and health outcomes, the sustainability of resource use, climate change mitigation and adaptation (2), and the interactions between rural and urban development (3). For example, six of the top 11 risk factors driving the global burden of disease relate to diet (4); to improve population health, it is thus necessary to improve diets—and for food systems to provide the nutritious and safe food needed to enable those changes.

In urban areas there are both opportunities for and challenges to consuming nutritious and safe food. There is often year-round access to fresh foods and commercially fortified foods, with a greater diversity of food available (5, p74). However, urban dwellers are more reliant on purchasing food than growing it themselves, so diet quality depends on the food that is available and affordable (6,7), as well as consumer incomes. As a result, some of the drivers of malnutrition in urban environments include a lack of time and facilities for home cooking, greater exposure to marketing of unhealthy foods, more sedentary lifestyles, and inadequate water, sanitation, and hygiene (8,9). This can entail a greater consumption of ultra-processed[1] convenience, or street foods; where these are energy-dense, nutrient-poor foods, high in fat, sugar and salt, this can increase the risk of non-communicable diseases. Therefore while research tends to support that living in urban areas correlates to lower levels of undernutrition and higher levels of overweight and obesity, there are challenges for policymakers to strengthen the opportunities for urbanisation to improve diet quality, while continuing to reduce undernutrition (5).

Facilitating food systems that provide nutritious and safe food in urban areas is becoming increasingly important. By 2050, 68% of the world's population is predicted to be urban, with almost 90% of this growth expected to be in low- and middle-income countries (LMICs) in Asia and Africa (10). Africa has the highest rate of urban population growth, whereas Asia has the highest rate of urbanisation and the highest net rate of rural–urban migration (11). For some countries, rising sea levels and flooding of coastal cities will also influence urbanisation, forcing people to migrate and causing loss of urban infrastructure (12–14).

[1] One of the four NOVA classifications for foods, ultra-processed foods include snacks, drinks, ready meals and many other product types formulated using many types of additives. While the processes and the ingredients used in the manufacture of ultra-processed foods make them highly convenient (ready-to-consume, almost imperishable) and highly attractive (hyperpalatable) for consumers, and highly profitable (low cost ingredients, long shelf-life) for their manufacturers, they are also typically nutritionally unbalanced and liable to be over-consumed (103).

Additional housing and infrastructure are required to address these rates of urbanisation and, for coastal areas, to replace urban areas lost through sea-level rise. Much of this infrastructure has not yet been built. For example, it was estimated that at a global level between 50-60% of the places that will be urbanised by 2030 had not yet been built in 2000 (15). Many new cities are thus in the process of being built (see Box 1).
Urban planning provides a *practical* platform to integrate the Sustainable Development Goals

BOX 1. WHAT ARE 'NEW CITIES'?

New cities are planned, designed and built as a complete entity, 'largely independent from existing cities and have their own industries'(68). Although some may be satellite cities adjacent to a major city, new cities are standalone metropolitan entities (68). The scale of the development of new cities is immense. Since the early 2000s, hundreds of new cities have been planned or built across over 40 countries in Asia and Africa, with Indonesia alone constructing 27 new cities (68). In South East Asia by 2030, more than 50 new cities are expected to be developed (114).

(SDGs) and sustainable urban development[2]: furthering a range of overall planning objectives including health, equity, sustainability and resilience, livelihoods and economic opportunity, social cohesion, and amenity (16). The way a city, including a new city, is designed and developed influences not only how it looks physically (the built environment) but also how it functions and impacts both individual and planetary health (17). Therefore, how and where food system actors (i.e., producers, distributors, and formal and informal retailers) operate within urban areas, how they interact with surrounding regional areas, and the accessibility of different types of food all are influenced by urban planning (18). As sustainable food systems providing nutritious and safe food are an essential component of functioning cities, they should be a mandatory objective of urban planning (18).

Globally, the role of sustainable urban development has been recognised through the New Urban Agenda (see Box 2) (19). In October 2016, United Nations (UN) Human Settlements Programme (UN Habitat) and partners hosted an event focussing on *Achieving Sustainable New Town Development in Developing Countries.* There was recognition that there was a gap in global guidance for sustainable 'New Town' (new city) development and therefore development of an international policy guide was required. To date, this policy guide is unpublished. However, a review of the current draft suggests that while there is mention of

[2] 'The goal of sustainable urban development is to create an equal balance between the economic, environmental, social, and governance aspects, in order to create more liveable and productive cities, towns, and villages' (104, p153).

the importance of food security, there is limited guidance on including food systems planning as a part of an integrated approach to sustainable urban development (20).

BOX 2. THE NEW URBAN AGENA: A FRAMEWORK FOR SUSTAINABLE URBAN DEVELOPMENT

The New Urban Agenda, adopted at the Habitat III conference in 2016 (19), recognises the fundamental role of cities and human settlements as drivers of sustainable development (19). It recognises that the way cities are planned, designed, financed, developed, governed, and managed can reduce poverty and malnutrition in all its forms[1], along with a range of other development objectives (19). The importance of linking the New Urban Agenda and the SDGs is also recognised (19).

This paper will outline some of the challenges relating to urban malnutrition and food systems that have implications for urban design and planning of new cities, especially in LMICs. It will then assess whether the development of new cities is addressing these challenges and will propose how urban food systems planning could be applied to new cities. This includes consideration of who needs to be involved, what actions need to be taken, and the guiding principles that should underpin such a planning process.

METHODOLOGY

This paper is based on interviews with eight urban and food systems experts including those at the African Centre for Cities; Development Planning Unit, University College London; Food and Agriculture Organization of the United Nations (FAO); Food Studies Program, New School for Public Engagement; Milan Urban Food Policy Pact; World Health Organization (WHO); and Guangzhou Institute for Urban Innovation. Respondents were proposed by the author or by interviewees. A total of eight formal interviews were carried out between June and August 2019, and further information and input was received from three people.

The aim of the interviews was to understand whether food systems are being routinely integrated into the urban planning of new cities. Interview data was collected using a semi-structured interview template, with variations in questions depending on the role of the person interviewed, and detailed notes were taken throughout the interview.

To support the information from the interviews, a scoping literature review was undertaken of relevant English-language scientific literature. To supplement this, grey literature (e.g., project reports, websites, and newspaper articles) was also reviewed on the topics of new cities, sustainable urban development, food systems planning, urban malnutrition, and climate change. This was done using internet search engines (e.g., Google Scholar). Approximately 120 documents were reviewed. All information collected from interviews and the literature review was then collated and inserted into a standardised template capturing information on new city development; challenges relating to urban food systems planning,

including impacts of urban food systems on climate change and vice versa; and recommended actions required to address current gaps in urban planning for new cities.

URBAN CHALLENGES TO BE CONSIDERED THROUGH FOOD SYSTEMS PLANNING

It is costly and complex to retrospectively modify urban areas to improve their efficiency, adaptability, and ability to meet the needs of residents. Planning and development of new cities provide an opportunity to circumvent such costs by establishing urban food systems and urban environments better suited to current and future stressors and designed to reduce negative environmental and social impact generated by the city. Some of the challenges that need to be considered in the planning of new cities are outlined below.

DIETARY TRANSITIONS AND MALNUTRITION

It is difficult to make overarching statements on urban nutrition, as nutrition data is not consistently disaggregated between rural and urban areas for every country and definitions of urban areas differ across countries. Moreover, other differences, such as between socioeconomic groups and geographic regions, may be more or equally important in different contexts.

Malnutrition, including stunting, micronutrient deficiencies, and overweight and obesity, is prevalent in both urban and rural areas in many countries (21).[3] However, relative burdens of poverty, food and nutrition insecurity, and malnutrition are shifting to cities with increasing urbanisation (22). For example, a systematic review of child nutrition in 141 LMICs between 1985 and 2011 suggested that while the rates of underweight (low weight for age) and stunting (low height for age) in urban areas were relatively lower, they were also largely unchanged over the time period, whereas rates in rural areas had fallen. Therefore, the relative proportion of underweight and stunting in urban areas had increased (23). Furthermore, with urbanisation and rising incomes, dietary changes (generally to more sugar, fats, and highly processed foods) in LMICs are happening fastest among urban dwellers, causing a rise in overweight and obesity and diet-related diseases, such as diabetes (8).

Nutritional status is partly the result of diets. What people eat is driven by physical, economic, policy, and socio-cultural factors, which are influenced by the food industry, government, and society as well as individual factors (24). More than 97% of low-income urban households rely on purchased foods (25), and food accounts for a main area of expenditure, especially for those on low or irregular incomes. For example, a review of LMICs found that food accounted for a significant proportion of expenditure for urban households living on less than USD 1/day—over 50% in 12 of the 14 countries studied, with Tajikistan at 7% and Rwanda at 68% (26). Affordability is about not just the price of food but also overall household income, how the purchase of food is prioritised over other household expenses, and which food types are prioritised. As healthier diets tend to cost more (27), people on low

[3] Stunting: a child is defined to be stunted when its height-for-age is too low. This generally indicates a longer period of suboptimal health or nutritional conditions (105).
Micronutrient deficiencies indicate a shortage of micronutrients that are not produced by the body and must be derived from food, such as iodine, vitamin A and zinc (106).
Overweight and obesity: a person is said to be overweight or obese when body mass index (BMI) is respectively above 25 kg/m^2 or 30 kg/m^2 (107).

incomes may need to restrict food choices to low-cost, low-quality diets, in contrast to those on higher incomes, who have greater food choice (27,28); they may also be hit harder by food price shocks (25).

As nutritional status depends on not only food but also health, hygiene, and care, basic living standards, including access to water, sanitation infrastructure, and healthcare are also important (25). Urban planning for food systems in new cities needs to ensure that people can access nutritious and safe food within the urban environment and that all are able to access housing, water, sanitation, and healthcare; this may need to be supported by government policies, particularly for the lowest-income populations.

The human and economic costs of malnutrition are also significant (29,30), so planning and developing effective food systems that support the availability and accessibility of nutritious food would likely have a high return on investment.

THE IMPORTANCE OF INFORMAL MARKETS IN LMICS

Informal markets and street food vendors are a main source of affordable, fresh produce and cheap prepared food in LMICs; they also offer an option for local employment (31). More formal retail outlets (e.g., supermarkets) are often not an affordable option for those on low incomes. For example, Wertheim-Heck *et al.* (32) report that in Hanoi, food safety perceptions are driving the existing 67 permanent traditional markets to be replaced by 1,000 supermarkets by 2025. The authors raise concerns that this shift may promote less healthy diets through fresh food being less accessible for low-income consumers, who are dependent on traditional markets; this could stimulate a shift to increasing consumption of ultra-processed foods (32). Similarly, in Africa there are concerns that 'supermarkets deepen their reach into our cities, often speeding up our dietary switch to packaged, nutritionally poor foods, [but] the value of informal food traders goes largely unseen and often unsupported' as a source of food and employment (33, p57). Making planning and policy decisions without taking account of these informal sources can reduce access of low-income consumers to nutritious foods.

The importance of the informal sector must thus be recognised in the planning of new cities in LMICs. Properly integrating the informal sector into urban areas requires adequate zoning, transport planning for consumers and vendors, access to water and sanitation services, and improved access to nutritious food supply chains.

INTEGRATING FOOD SYSTEMS WITH OTHER SECTORS

Food systems are intrinsically linked with other sectors, such as waste, water, infrastructure, energy, and transport. However, further research is required to integrate these dependencies into planning in practice (18). For example, creating connectivity between planning transport systems and food retailers can help ensure that people have easy access to nutritious foods on commonly used routes.

Urban areas are also inextricably linked to rural agricultural sectors, and the two play fundamental roles in one another's development (34,35). Rural areas are a supplier of raw materials, food, and labour to urban areas, and rural areas depend on inputs and consumer goods sourced from urban areas. Planning and infrastructure must support these linkages.

For example, local and regional food producers need sufficient transport infrastructure to reach markets; improved infrastructure could shorten supply chains and improve the quality of fresh produce.

MANAGING THE IMPACTS OF URBANISATION ON FOOD PRODUCTION

An example of the urban-rural connection is how urbanisation can result in the loss of arable land, therefore harming food production (36). For example, as China urbanises it has been losing premium arable land at the rate of 0.04 ha per new urban resident, and the displacement of farmers is predicted to severely compromise China's future self-sufficiency in food (37). If urban sprawl of existing cities and the land area designated for new cities are not regulated and managed, further food producing areas and their communities could be lost. The impact of urbanisation on food production must thus be mitigated in planning new cities.

CLIMATE CHANGE IMPACTS ON FOOD SYSTEMS AND URBAN POPULATIONS

Cities will experience increasing environmental and social pressures in the coming years (38,39). Climate change is projected to have a significant impact on urban infrastructure and the health and wellbeing of those living in cities, especially those on low incomes, through extreme heat, increasing food and nutrition insecurity, sea-level rise for coastal cities, and scarcity of water resources (40–44). Food production—and therefore food supplies for urban areas—will be impacted. In LMICs, where the cost of refrigeration can be prohibitive, it may also make food storage and safety increasingly challenging for distributors, retailers, and households (45,46). Therefore, any new cities being built should account for these stressors through sustainable urban planning and design.

If new cities do not recognise the importance of providing for those on lower incomes, informal settlements may arise on the fringes as people migrate from rural areas. Those living in slums[4] and informal settlements are especially vulnerable to climate change due to poor disaster resistance caused by inadequate housing, inadequate resources to adapt to changes in costs (including food), and limited access to healthcare or ability to respond to environmental change (47).

MANAGING THE IMPACTS OF CITIES AS A CONTRIBUTOR TO CLIMATE CHANGE

Cities play a fundamental role in achieving sustainable development. Some 3% of the Earth's land surface is occupied by urban areas, yet cities represent almost two-thirds of global primary energy demand and account for 70% of carbon emissions from energy (48,49). Urban dwellers consume more food per capita than rural residents.[5] By 2050, it is estimated that 80% of food will be consumed in cities (50). Developing cities and urban food systems that consume less resources and generate less emissions can also result in economic savings.[6]

[4] Slum households are those where a group of people are living under the same roof lacking one or more of the following conditions: access to improved water, access to improved sanitation, sufficient living area, and durability of housing (108).
[5] For example, an average from four African countries showed urban consumption at 48% of food produced and sold (but only 25% of the population) and an average across four Asian countries showed urban food consumption was 53% of food purchased, even though urban consumers are only 38% of the population (109,110)
[6] It has been estimated that applying such an approach in China would cut public spending by 2.5% of GDP, reduce sulphur dioxide and nitrous oxide emissions by approximately 35%, halve water pollution, and deliver savings for the private-sector of 1.7% of GDP in 2025, largely from reduced consumption of natural resources (37).

Food systems generate emissions along every part of the supply chain, and cities create demand for food. A review of nearly 100 global cities shows food is one of the biggest sources of consumption-based emissions, representing 13% of the total in 2017, with the potential to increase by 38% by 2050 (51). The increased demand for both refrigeration and air conditioning will further increase emissions (52). To reduce the environmental impact of cities, improving the sustainability of the entire food system is critical. Integrating food-related issues into city climate action plans and considering environmental issues in food systems planning will be critical for urban planners developing new cities (53).

Construction of infrastructure, including that relating to food systems, for new cities also needs to be considered, given that cement production is the third-largest human-made source of emissions (54). If LMICs were to achieve infrastructure levels, using current technologies, of high-income countries, this could generate a further 350 Gt CO_2 from materials production or 35–60% of the remaining carbon budget available until 2050 (to limit the average global temperature increase to 2 °C) (55). Therefore, low-carbon design and engineering standards and building codes for infrastructure need to be developed and initiatives need to test such technologies and approaches. For example, C40's Climate-Positive Development Program is being trialled in 18 cities to demonstrate how urban communities can reduce emissions (56).

GUIDING PRINCIPLES FOR FOOD SYSTEMS PLANNING IN NEW CITIES

While food systems planning is being implemented in different cities, further research and development of approaches are required (18), and its application to new cities is relatively new. However, based on some of the challenges described above that need to be considered in food systems planning for new cities, we propose a set of guiding principles as a starting point to how it could be implemented.[7]

Using the food environment as an entry point for planning to promote nutrition. the food environment is where urban dwellers interact with the food system, the 'physical, economic, policy and sociocultural surroundings, opportunities and conditions' that influence their food and beverage choice and nutritional status (24). The food environment influences people's food choices, and governments have a role in shaping food environments (57). This entails that new cities have a unique opportunity to design food environments that promote accessibility of nutritious and safe food. To do this requires a people-centred approach, considering the range of issues driving different food choices for different socioeconomic groups. In a new city where there are no residents, data and information from similar, local cities could be used as an initial surrogate to understand how they engage with their food environments.

Planning instruments such as zoning and land use requirements and regulations can be used to determine the how land can be used, including promoting access to nutritious and safe food. For example, land zoning and supporting regulations can be used to promote healthy food retail (58), allocating space and access to services for informal vendors, or ensuring that

[7] These principles are also relevant to promote food systems planning in urban development in existing cities.

prime agricultural land is zoned for urban agriculture, while a wetland may be reserved for water treatment (and food production, like the example in Box 3).

Using a multi-sectoral approach. Across the food system, from production to waste management, there is a diversity of food and non-food sectors, which need to input into the planning process (19 s26 p11, 59). Establishing a multi-sectoral platform made up of these stakeholders can help inform the design and planning phase; this group could form the basis of food system and nutrition governance once the city is developed. As a new city does not have stakeholders to be consulted, the initial consultations could involve those with an interest in the new city, such as a potential to live or work there.

Being rights-based and socially inclusive and using the needs of low-income residents as the basis for food systems planning. Governments have a responsibility in realising the right to adequate food (60). As described, those on low-incomes can be more vulnerable to malnutrition, including nutritious and safe food being unaffordable or inaccessible, therefore their needs should be used as a basis for the planning, design, and decision-making for new cities (19 s14(a) p7, 61), and their communities need to be represented in any multi-stakeholder platforms involved in the consultation process (19 s14(a) p7). Promoting a diversity of informal and formal retail and ensuring access (e.g., through linked transport to food hubs and decentralisation of fresh food markets or vendors) are examples of the range of actions that can be applied. Once the city is developed, supportive policies for those on low incomes, such as social safety nets and ensuring affordability of nutritious and safe food and adequate housing, can reduce the impact of shocks and reduce the likelihood of slum development.

Ensuring urban-rural linkages. To promote urban-rural linkages, considering regional plans and including rural stakeholders in the consultation process will be important. Although not developed for new cities, some key guidance documents that could be adapted include the cities region food systems approach (62) and UN Habitat's Guidelines of Urban and Territorial Planning (63) and guiding principles for urban-rural linkages (3). An important component of urban-rural linkages is ensuring zoning protections to reduce the loss of arable land in peri-urban areas from growth of the new city area.

Promoting sustainable use of resources and low emissions in food systems. Designing new cities provides an enormous opportunity to rethink urban landscapes and the sustainability of food systems, including consideration of market access for local producers and improving food distribution through ensuring adequate infrastructure and distribution networks are established, reducing food loss and waste through the supply chain, and recycling food waste, managing water and wastewater within the city, and supporting urban agriculture for local food production. This requires consideration of best practice urban food system actions and sustainable urban design in new city development.

Using the right metrics to inform decision-making. When comparing different options for food systems planning for new cities, it is important to use the right metrics to ensure planning will be sustainable over time. This includes using different scenarios related to climate change, population growth, and food demand in urban planning decision-making to

account for stressors that will one day impact food systems and the health and wellbeing of those living in cities.

Applying 'best practice' solutions to design and management of urban food systems. For new cities, there is an opportunity to promote sustainable urban systems, including food systems, by applying technical and management solutions through the planning phase and once established. Many such solutions are available but not yet widely implemented or adapted for food systems.[8] Development of food systems in new cities should be based on a combination of applying the latest technology (where practical)[9] and using proven, low-technology solutions (see Box 3) to improve access to safe and nutritious food.

BOX 3: LOW-TECH URBAN DESIGN IN KOLKATA (INDIA)

With around 15 million inhabitants, Kolkata is considered a megacity. Its inhabitants produce 750 million litres of wastewater and sewage per day. The city's wastewater is cleaned by natural filtration in the East Kolkata Wetlands, covering over 12,500 ha (64). Filtration of wastewater in the wetlands saves the city about USD 22 million per year compared to running a wastewater treatment plant. The wetlands are also a source of locally produced food (65). About 10,000 tonnes of fish are produced each year, and 40-50% of the green leafy vegetables available in Kolkata's markets are grown in the wetlands. As the wetlands are located next to the city, transportation is cheap and quick; food prices thus remain low, and the produce is fresh upon arrival at the markets (66).

Ongoing Processes to Support Healthy Diets in Cities. Urban planning can establish systems that improve the availability of nutritious and safe foods, but once the city is established, residents still need to be able to afford nutritious food and to make informed choices about the food they purchase. Therefore, the approaches established through planning need to be supported by food policies, public awareness campaigns, and projects to promote healthy diets, as outlined in Halliday et al. (57). Ongoing monitoring and evaluation of the impact of urban food policies and interventions are also critical to optimise outcomes and apply lessons learned to other cities and new city development (67).

ARE 'NEW CITIES' APPLYING THE PRINCIPLES OF SUSTAINABLE URBAN DEVELOPMENT?

As highlighted, the scale of development of new cities is immense. In Africa, for example, there are many new city development initiatives (see Figure 1). However, there are concerns raised, both in publications and by experts interviewed, that such initiatives are not based on sustainable urban development. Further, the experts commented that they are not aware of

[8] For example, by applying principles of resource conservation and circular economy (e.g., the reduction and recycling of food and other 'wastes', ensuring water is captured and used within urban areas for food growing rather than wasted or polluted) and through urban design (and building codes) that promote energy conservation and efficiency and the use of renewable energy.
[9] Although this requires access to basic technological building blocks such as electricity, phones and internet connections (111). One example is the dashboard that has been developed by the City of Surabaya, with the support of GAIN to track food distribution in the supply chain (112).

any examples of new cities where food systems are being incorporated as part of the planning. Rather, there seems to be a discrepancy between the promise to solve issues of unsustainable urbanisation and population growth and the reality of new cities focussed on consumption and residential areas for middle- and high-income households or aiming for high-tech innovation (68–73). Some examples of new cities that have recently been or are being built are outlined in Annex 1. These demonstrate the diversity of reasons for establishing such cities, but again, little evidence could be found of food systems being integrated into planning.

Therefore, there is a mismatch between the type of new cities that are generally being constructed and best practice sustainable urban development in accordance with the New Urban Agenda. Unless there is a shift in the approach to developing new cities, the nutrition needs of urban communities, especially those on low incomes will not be addressed, nor will the resilience of urban food systems to climate change be supported.

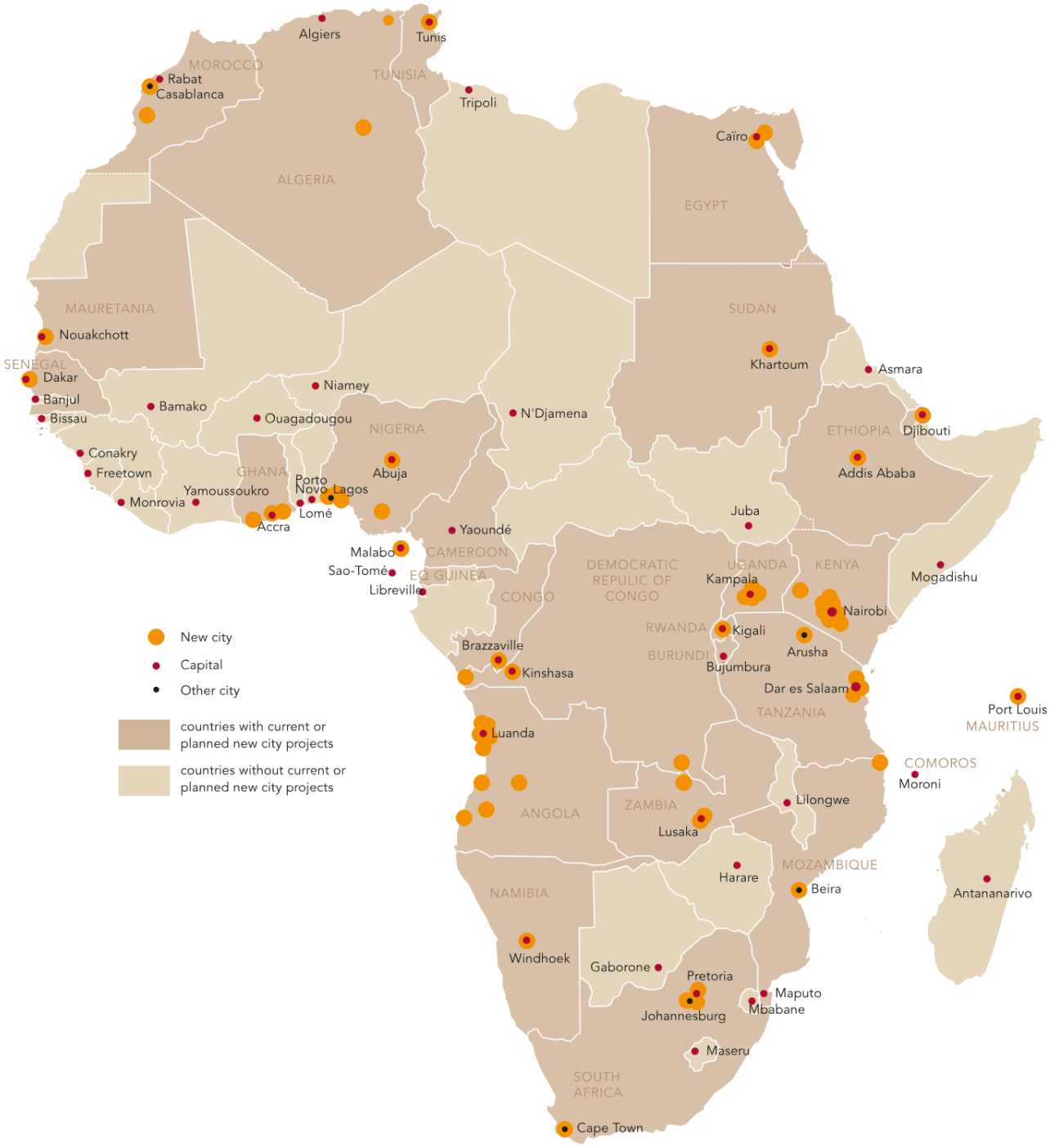

Figure 1: New cities in Africa: Geographical distribution of current and planned projects. Modified from (69).

ACTORS THAT HAVE A ROLE TO PLAY IN THE DEVELOPMENT OF NEW CITIES

It is widely recognised that sustainable development in urban areas is key to achieving the SDG agenda (67) and that national and subnational governments should be considering development in the context of all SDGs. However new cities that are developed through investment schemes are driven by economic objectives and market demand, often at odds with sustainable urban development (e.g., generally not providing for those on low incomes or considering design to reduce the climate change impact and resilience of the city).

Governments, either at national or sub-national level, decide on new city construction. They often provide funding for and assess potential large-scale planning and construction contracts. Through this process, they can establish assessment criteria to ensure that the environmental, social, and economic objectives of sustainable urban development are met. Government actors thus must be guided on priority actions and fundamental assessment criteria to be used when developing and assessing urban development tenders or contracts, and they must be supported in ensuring such criteria are adhered to throughout development. This means we need to build on what we know regarding integrating food systems into sustainable urban planning, with specific attention to the role of climate change. It also means that government staff, especially at the local level, need to be given the mandate, skills, and resourcing to be able to develop food systems planning and coordinate with other departments and stakeholders as required.

The work of governments can be supported by a range of different actors, including:

UN Agencies: UN Habitat supports countries to implement the sustainable urban development agenda. Inclusion of food systems planning in their agenda for new city development will be important. Food systems planning needs to be considered a component of urban planning (alongside transport, energy, and infrastructure development) and therefore included in guidelines and resources. However, it is currently largely absent from key guidelines (63). Moreover, the issue of food systems planning and new cities development cuts across the SDGs, necessitating collaboration with other UN agencies (e.g., FAO, WHO, United Nations Industrial Development Organization (UNIDO), and UN Climate Change).[10]

City networks and NGOs: City networks focus on specific agendas and initiatives, such as C40 (working with cities to further climate action), the MUFPP to further urban food policy, and the Global Resilient Cities Network (focussing on improving adaptation to physical, social, and economic shocks and stresses) (74–76). However, integrating food systems and sustainable urban development principles into urban planning of new cities furthers most of these specific agendas. Therefore, uniting with a common voice and pooling capacity and resources can help ensure the issues outlined in this paper are given the high profile and addressed with the urgency they require. Such alliances are also important for bringing together diverse stakeholders with a common goal and will need to develop novel solutions to improve food systems in new cities.

Advocacy work is required to raise awareness in the global development community about the importance of integrating food systems for new cities into development agendas. Advocacy must also further understanding of best practices for food systems planning, such as criteria that governments can use in planning and issuing development contracts for new cities. A network of city governments of new cities (perhaps under an existing city network) could be useful for advocacy on issues relating to new cities and for sharing knowledge.

Donors and the financing community: It is estimated that USD 4.5–5.4 trillion is needed globally to fill the urban infrastructure finance gap, but only 3% of this amount is available

[10] The New Urban Agenda supports the need for system-wide coordination and coordination in sustainable urban development (19 s83 p22).

through official development assistance (77). For food systems and nutrition, there are differing estimates of the funding gap but a definite need for innovative funding methods for scaling up interventions. One example of these is the Power of Nutrition initiative, which leverages financing and partnerships between the private sector, governments, donors, and implementing partners to support national nutrition programmes (78).

Where donors do play a role, they must apply criteria for sustainable urban development when allocating funding. As urban design, planning, and construction of new cities is a lengthy process, donor funding must support strategies that take a long-term perspective on new city development. There is also a need for funding the development of innovations to ensure sustainable cities have efficient and effective food systems. Given the complexity of the issues and the need to have a multi-sectoral approach, research grants need to support cross-disciplinary projects and comparative analysis between regions (79).

Researchers: Governments need data on, amongst other things, malnutrition issues and food consumptions trends for different socioeconomic groups in urban areas in their country. They also need realistic scenarios for how climate change will impact their food systems to inform the criteria they will apply in developing new cities. Such research will require intersectoral collaboration and consultation.[11] The IPCC Special Report on Cities and Climate Change (expected during its 7th assessment cycle, 2023-2028) is an opportunity to focus on the research needs of new cities, given their greater scope to implement 'best practices' in the design phase (80,81).

Architects and developers: As those responsible for design and development, it is important that architects and developers work within criteria for sustainable urban development and that the sector innovate and develop new ways to design new cities. Resources should be used efficiently to meet local environmental conditions and address needs of the residents, especially those on low incomes. Governments could mandate that companies bidding for large-scale projects also contribute some funds for relevant research that supports the development and monitoring of the new city and consider partnerships that facilitate testing and scale up of ideas and technologies (79).

There needs to be significant and urgent disruption of the current urban development trajectory for new cities to ensure that any further urban development addresses the full range of local and global social, environmental, and economic challenges. Transformative commitments for sustainable urban development are required. Food systems need to be integrated into the climate change and sustainability agenda, and sustainability issues need to be included in food system-specific debates. Every opportunity needs to be seized, and strong leadership by all key stakeholders (outlined above) is required to work across traditional silos.

[11] For example: The Future Resilience for African Cities and Lands (FRACTAL) project is a trans-disciplinary group of researchers from partner organisations around the world. FRACTAL aims to support resilient development pathways and enable decision-makers to better integrate pertinent climate knowledge into their resource management decisions and urban development planning (113).

CONCLUSIONS

This paper has highlighted some of the complex challenges relating to urban malnutrition and food systems, particularly in LMICs, and discussed how they could be taken into account in food systems planning for new cities. As food systems planning in new cities is a relatively new topic, there are few examples of the effectiveness of existing food systems planning in new cities. Therefore, a set of guiding principles were proposed for how existing approaches with food systems and urban planning could be applied to shape food environments and urban systems. Based on the literature reviewed and experts interviewed, the scale of new city development is immense, but it appears that food systems planning, and many sustainable urban development objectives, are not being addressed. This is wasting an enormous opportunity.

By leveraging the latest knowledge and technologies (low- or high-tech, as appropriate) via a multi-sectoral approach, such cities could drive development forward to address significant global challenges – malnutrition, climate change, and unsustainable use of resources. New cities could be built to avoid many of the negative impacts and costs of existing cities. Instead, they could promote health and nutrition by ensuring accessibility of safe and nutritious foods, facilitating sustainable use of natural resources, and generating low emissions whilst ensuring adaptation to future climate change impacts.

A range of actors were proposed that need to change the way new cities are being planned and developed. One of the first steps is for the issue to be more widely recognised and to facilitate discussions about a way to promote sustainable urban development of new cities at the international, national, and local levels. These conversations must include voices from the food systems and nutrition sector, given that food systems are fundamental to the economic, social, and environmental health of cities.

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ANNEX 1: EXAMPLES OF NEW CITIES

Khorgos (China), on the border with Kazakhstan

Population size: Currently around 100,000 inhabitants (82).

Purpose: The city is structured around the dry port that handles cargo for trains going from China to central and western Europe (83).

Background: Khorgos is part of the 'One Belt, One Road' major infrastructure initiative adopted by the Chinese government in 2013, which includes the development of new cities as well as transport and other infrastructure. This initiative aims to revive the ancient Silk Road and build up trade routes, both via land and water, between China and other regions (84). Around the dry port in Khorgos are new residential areas, a free-trade border zone between the two countries, and a special economic zone to attract large-scale manufacturing and warehousing operations (83).

Information on food systems planning: not available, to the author's knowledge.

Kilamba (Angola), 30km from the capital city of Luanda

Population size: population will soon surpass 200,000 inhabitants (85).

Purpose: Mixed residential development for the urban middle class in the area of Luanda, including schools and over 100 retail points (86).

Background: Construction started in 2008, as the result of an election promise. Initially apartments were too expensive for middle-class Angolans to afford, and it was difficult for them to obtain mortgages, turning the city into a 'ghost town' (86). With the introduction of a subsidised rent-to-purchase scheme and a drop in apartment prices, the units became affordable for the upper middle-class, and the city is becoming more populated (87).

Information on food systems planning: Retail points are included in Kilamba's planning, but it is unclear how food retail, production, and supply have been considered through the planning process (88).

Konza Technology (Kenya), 60km from the capital city of Nairobi

Population size: Aimed to create 20,000 jobs by 2015 and 200,000 by 2030, mainly in the information technology sector (89).

Purpose: It is being marketed as a smart city and area of innovation (90).

Background: Konza is one of the flagship projects of Kenya Vision 2030. The aim is to create a global technology and innovation hub, with space for a university and residential areas (91). However, construction has been stalled, as similar initiatives were launched in the region and there is a lack of financing (92).

Information on food systems planning: Not available to the author's knowledge.

Western Regional Megapolis (Sri Lanka)

Population size: In 2012, 5.8 million inhabitants; this is expected to grow to 8.7 million in 2030 (93).

Purpose: Being developed as a business, communication, and logistics hub (94).

Background: The aim is to resolve current issues in urban areas and match other economic hubs in the region through the Western Region Megapolis. The plan includes over 200 smaller projects, including improved transportation across the region, new business opportunities, and more tourism (94). It is expected to improve living conditions for 70,000 families currently living in shanty towns and slums (95).

Information on food systems planning: Based on a conversation about the Master Plan with the Project Manager, food security was being considered in the planning at the time (2016). One of the projects under the Master Plan included food composting, and rice paddies were being considered for integration within the city planning, along with environmental and climate change planning (96). Currently underway (June 2019-Feburary 2021) is a project to reduce the levels of food waste within the Western Regional Megapolis (97).

Kalimantan (Indonesia), on the island of Borneo

Population size: Expected number of inhabitants is around 1.5 million (98).

Purpose: To relocate the capital city and its administrative functions away from Jakarta (99).

Background: Jakarta, on the island of Java, is the current capital of Indonesia and its largest city, with a population of over 10 million (100). However, it is crowded, and the city is sinking from water extraction and sea-level rise (101). Therefore, the construction of the new capital, Kalimantan, is planned to begin in 2021, with move-in expected to start in 2024. There are concerns about the environmental impact, as the area where Kalimantan will be built is predominantly rainforest (99,102).

Information on food systems planning: Not available to the author's knowledge.