Secondary Cities as Catalysts for Nutritious Diets in Low- and Middle-Income Countries

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1 Introduction

The world is facing a global malnutrition crisis. One in nine people go to bed hungry, more than 2 billion people suffer from micronutrient deficiencies, while one-third of the global population is overweight or obese (Global Nutrition Report 2020). Unhealthy diets are the leading risk factor for deaths from non-communicable diseases (NCDs). Although laudable progress has been made in maternal, infant and young child nutrition, malnutrition persists at unacceptably high levels in every country in the world, and we are not on track to achieve the targets of Zero Hunger (Goal 2) of the Sustainable Development Goals (SDGs). To date, despite growing political attention, such as through the Scaling Up Nutrition (SUN) movement, no

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country has managed to reverse the rapid rise in malnutrition in all its forms, and this was even before the disruption caused by the COVID-19 pandemic (Global Nutrition Report 2020). The coexistence of undernutrition, micronutrient deficiencies and overnutrition in countries, households and even within individuals, referred to as the triple burden of malnutrition, signals a major shift in the global burden of malnutrition, with great variations and inequalities at different levels i.e., age, gender, geographical location (urban-rural) and other sociodemographic factors.

As urbanization rates across the globe are rising and there is a continued push to decentralize decision-making power to levels that are closer to the people served, cities are gaining an increasingly important role in the global malnutrition crisis and offer entry points for food system transformation. Besides the role of cities in ensuring adequate diets and managing the rising burden of NCDs, cities could also play a key role in enhancing resilience to food security shocks. This chapter discusses the challenge of the growing triple burden of malnutrition in urban contexts and advocates for the role of secondary cities as game changers in transforming city region food systems. Secondary cities are introduced as emerging players in pioneering nutrition-centered food systems interventions, and in monitoring and evaluating their impacts for later improvements and out-scaling.

2 The Challenge: A Growing Triple Burden of Malnutrition in Urban Contexts

The triple burden of malnutrition has moved to the cities as the world's population becomes more urbanized. For the first time in history, more than half of the world's population lives in urban areas (United Nations, Department of Economic and Social Affairs, Population Division 2014). By 2050, two-thirds of the global population is expected to reside in urban areas, consuming 80% of the world's food and producing 85% of global economic output (United Nations, Department of Economic and Social Affairs, Population Division 2018). Infants and young children of parents with low socio-economic status are extremely vulnerable to poor nutrition, and the first 1000 days are considered critical for a strong foundation in life. It is estimated that one in three children affected by stunting currently resides in urban areas, with the most disadvantaged urban children having stunting rates, on average, only slightly lower than those of the most disadvantaged rural children (Ruel et al. 2017). Poor urban children are up to ten times more likely to be stunted than urban children of a high socio-economic status (Ruel et al. 2017). In parallel, child undernutrition rates are rivaling the levels found among the rural poor, while the prevalence of overweight children is often higher among urban areas (Ruel et al. 2017). Among adults, the accelerated increase of overweight over the past decade and a half was more concentrated in urban areas. Overall, the data point to a shift towards a greater overall burden of malnutrition in all its forms in urban, compared to rural, areas. By 2035, half of individuals in extreme poverty (i.e., daily income

less than USD 1.25) will live in urban areas, thereby increasing the number of people who cannot afford a healthy diet (Ravallion 2002). An additional and growing concern relates to food safety issues associated with eating out, particularly regarding street foods. Economic development, population growth and increasing rates of urbanization are creating an urgency to specifically understand the role of food systems in sustainable food production, consumption, diets and nutrition in urban contexts (also referred to as city region food systems).

Poor diets among city inhabitants are the consequence of a combination of forces. These include changes in types of occupation, particularly for women, that increase the demand for convenience and for ready-to-eat meals and foods; food-environment factors such as the persistent marketing and availability of nutrient-poor and energy-dense foods; shifts in norms and attitudes regarding food that are correlated with urban living, such as pressures to move away from traditional diets and changes in food habits and demand for (ultra)processed foods (Ruel et al. 2017). The recognition and consumption of traditional diets are also hampered due to the increasing globalization of the food sector and dependence on imported foods, a development that might exclude opportunities to enhance local food production. Another key element relates to the affordability of healthy diets, in the light of 3 billion people not being able to afford a healthy diet due to food prices and income constraints (FAO et al. 2020). Although incomes are generally higher in urban contexts, cities struggle to provide affordable and healthy diets to the urban poor. Poor road conditions and long distances between rural agricultural areas and cities cause food losses and food safety concerns regarding the transport of food to markets. This is especially critical for perishable nutritious foods, including animal products, vegetables and fruit (FAO et al. 2020). In sub-Saharan Africa, 35% of fruit and vegetables are lost and wasted at the retail level (FAO et al. 2020). Post-harvest preservation and conservation techniques are still poorly developed, meaning that a lot of nutritious food does not make it to the urban table.

3 The Solution: Secondary Cities as Game Changers for Sustainable Food Systems

3.1 Secondary Cities' Unique Characteristics

Contrary to popular belief, urbanization is not causing existing cities to develop into so-called 'mega-cities,' but is rather creating a patchwork of smaller urban areas (Satterthwaite 2007; Swilling and Annecke 2012). In 2018, close to half of the world's urban residents lived in settlements or towns with less than 500,000 inhabitants (United Nations, Department of Economic and Social Affairs, Population Division 2018). These settlements are classified as secondary cities and are, in terms of population, the fastest growing urban areas. Besides secondary cities, urban areas also consist of primary cities. These are generally defined as "the leading

city in its country or region, disproportionately larger than any others in the urban hierarchy." Secondary cities are known as the 'second tier' in this urban hierarchy. There is no universally agreed-upon definition of a 'secondary city' (Goodall 1987). The term is contextual and can relate to population size, an administrative area, or a system of cities/towns with a particular significance within a country or geographical region (Roberts 2014a). Importantly, secondary cities within countries and regions are not uniform and can be classified into three broad categories generally described as "(1) the extractive city, whose economy and sole reason for existence was informed by and is now reliant on an extractive resource (often a single resource); (2) the trunk or trade city, located on a transport route or at a transport intersection; and (3) a satellite city, whose existence is informed by and deeply reliant on another city or country" (Roberts 2014b).

Secondary cities are characterized by a relatively smaller spatial scale and a physical proximity to rural areas when compared to primary or mega-cities. In contexts where power is decentralized to lower administrative levels, this characteristic offers unique opportunities to transform the city region food system for improved human and planetary health. In fact, in low- and middle-income countries (LMICs) specifically, linking urban areas with agricultural hinterlands could increase food security resilience through, for instance, a reduced dependence on international trade and a reduced vulnerability to natural disasters and climate change, which may result in food shortages (Blay-Palmer et al. 2018; Dubbeling et al. 2017). Additionally, localized food production in city region food systems creates the possibility of shortening food supply chains and reconnecting consumption and production. This has been found to enhance local and rural development and promotes information-sharing between producers and consumers (Belletti and Marescotti 2020). Short supply chains could provide ecological, health and socio-economic benefits. They have been linked to reduced food loss and are generally associated with decreased carbon emissions (resulting from, e.g., reduced transportation) (Blay-Palmer et al. 2015). Moreover, they have been described as an effective strategy when aiming to develop urban agriculture for enhanced food security. However, short value chains could also face challenges related to possible inefficient small-scale production processes or logistics (small freights/empty trucks). Inefficient production processes, logistics and use of resources could negatively affect pricing and even compromise the generally low emission of greenhouse gasses associated with short value chains (Borsellino et al. 2020). The potential of short value chains to benefit human and planetary health should therefore always be subject to context-specific assessments.

In short, when compared to primary cities, the city region food systems in secondary cities are largely characterized by strong urban-rural linkages and the opportunity for localized food production and consumption. In high-income countries, secondary cities are increasingly seen as important drivers to sustainably advance economic and social developments. In 2015, Parkinson et al. recommended that the European Commission increase their investments in secondary cities when "(i) the gap with capitals is large and growing, (ii) the business infrastructure of second-tier cities is weak because of national underinvestment and (iii) there is clear

evidence about the negative externalities of capital city growth" to realize the economic potential of these cities (Parkinson et al. 2015). While primary cities have received the highest attention, the growing importance of secondary cities for urbanizing populations makes them uniquely positioned to serve as critical entry points for city region food system transformations.

3.2 Secondary Cities Face Challenges That Can Be Turned into Opportunities

Secondary cities, however, also face persistent challenges and disadvantages. In Europe, they play a key economic and social role, but compared to primary cities, they lack economic, demographic and, especially, political importance (Cardoso and Meijers 2017). Disadvantages resulting from this lack of importance may, in turn, lead to several setbacks in terms of infrastructure, governance, autonomy, decision-making space and the power required to raise resources and galvanize meaningful action. The disadvantages faced by secondary cities in Europe are more pressing in less-developed economic regions. Although the available body of research on secondary cities in LMICs appears to be less extensive, it is important to acknowledge that the underlying processes that shape urbanization in Africa are very distinct from those in other regions, such as Europe. Urban expansion in Africa is largely characterized by unplanned and/or unregulated growth and the absence of strong urban planning institutions (Pieterse and Parnell 2014). Consequently, secondary cities in sub-Saharan Africa and other LMICs are faced with several key challenges, as witnessed in Europe, but in a generally more complex context (Haysom and Fuseini 2019). Indeed, secondary cities are rapidly growing and are challenged by the fact that this increasing urban population is starting to call municipal leadership to account when access to basic services is compromised. Furthermore, similarly to Europe, governance and accountability remains a key challenge, as budgets, skills and capacities are often limited when compared to primary cities and hinder the effective governing of pressing issues related to poverty, health and social safety. Finally, the rapid growth experienced by secondary cities may put basic infrastructures (road networks, housing, access to markets, health and education services) under pressure, which may cause social inequalities to increase, with women and young girls of low socio-economic status particularly at risk of being excluded and exploited. In fact, whereas the original structure of a city might have met the needs of the population, it might not be an adequate foundation for rapid and unregulated expansion. All of these hinder sustainable economic growth (Haysom and Fuseini 2019) and make it difficult to attract private sector investments, create jobs and retain capital (Roberts 2014a). Although opportunities to transform secondary city food systems are apparent, the combination of rapid population growth and lagging development may cause poverty, malnutrition and related issues to concentrate among vulnerable populations (women, youths and the poor) in these same cities.

Without significant investment, a real effort to become more integrated and improved governance to bring different sectors, local business and civil society to the table, these locations will become a force for deeper exclusion and inequalities. The generally limited governance capacities in secondary cities calls for an improved understanding as to how these cities are governed, attention to the question of the decentralization of power, and how this shapes poverty and the production, distribution and consumption of food. As suggested by Satterthwaite (2007), the rapid urban growth in itself is not the main issue in cities. In fact, the most pressing challenge is the inadequate governance and planning from national and local institutions that is vital to adapting to this urban growth (Satterthwaite 2007). Although some research on how city governance affects urban poverty is available, the relationship among governance, poverty and the related nutrition and health outcomes in smaller cities needs further investigation.

The coming two to three decades will be critical in defining urban development in Africa, Asia and Latin America. Time is of the essence when conceptualizing, planning, financing and implementing this development (Pieterse et al. 2018). The rapid growth and the above-mentioned characteristics of secondary cities position them to take the lead in innovative and urgently needed food system interventions to ensure human and planetary health. However, as these cities struggle with challenges, increased investment and research in LMICs are needed.

The initiatives described below are practical examples that, when applied to the secondary cities context, can be leveraged to transform urban food systems and combat malnutrition and poverty. The examples highlight secondary cities' unique opportunities, namely, their power to convene key stakeholders, to make decisions and to raise and channel resources. Another opportunity is their ability to strengthen the supply and demand of diverse, locally produced and nutritious foods with short chains benefiting both producers and consumers.

3.3 Secondary Cities Can Accelerate Food Systems Transformation – Three Case Studies from LMICs

3.3.1 Nutrient Profiling with OBAASIMA in Ghana

Nutrient profiling (NP) is a scientific method for assessing the nutritional quality of (processed) foods and beverages based on their energy content and nutrient composition. NP and, for instance, the translation to front-of-pack labeling is a useful approach to informing, educating and empowering consumers and shifting consumer demand towards more diverse and healthy foods while allowing the food supply chain to respond to this demand. Creating consumer demand for nutritious foods is especially relevant in urbanizing contexts in which populations are increasingly exposed to (ultra)processed foods. To date, different NP models have been applied in high-income countries. However, transferring these models to urbanizing LMIC contexts remains challenging, as the current models are not tailored to address the

triple burden of malnutrition, nor fortified foods and the affordability of diets. Also, LMIC contexts experience challenges related to access to basic education and nutrition literacy. In Ghana, the OBAASIMA project aims to stimulate the sustainable supply and the demand for high-quality, safe and affordable micronutrient-rich foods designed for women of reproductive age.

The OBAASIMA project builds on a demand-driven approach to increase the consumption of high-quality fortified food. It uses a front-of-package seal for foods that adhere to the minimum fortification content and nutrition criteria (18 vitamins and minerals), in combination with a social marketing campaign that provides information on nutrition and nutritious foods to women. The growing demand for products with the OBAASIMA seal offers entrepreneurial opportunities and encourages local small and medium-sized enterprises (SMEs) involved in food processing and fortification to adhere to fortification and quality standards. Ultimately, the project aims to improve food and nutrition security in Ghana, where women of reproductive age are severely affected by micronutrient deficiencies.

To date, the project has supported the development and nutritional optimization of three different products in Ghana. Since the launch of the products in 2017, they have been subject to marketing campaigns targeted towards women of reproductive age. The products are also included in the World Food Programme's cash and voucher strategy to improve the nutrition status of vulnerable women. Preliminary evidence is pointing towards increased consumer awareness of OBAASIMA and increased capacity of SMEs to produce nutritious and safe products.

Initially, the OBAASIMA products were launched in two secondary cities in Ghana (Sunyani and Tamale). Currently, the distribution of the products is expanding to three additional cities in Ghana, including the capital city Accra. OBAASIMA recognizes the presence of persistent challenges in secondary cities, such as poverty and limited access to roads, that reduce the availability and accessibility of nutritious foods for vulnerable populations when compared to primary cities. Consequently, the positive impact of the OBAASIMA products is expected to be greater in these secondary cities. This example shows secondary cities' potential in pioneering and scaling such NP models in LMICs. Developing suitable NP models could play a vital role in increasing both the supply and demand for nutritious products, as well as enhancing nutrition literacy in secondary cities.

3.3.2 Participative Urban Agriculture with the AGRUPAR Project in Quito, Ecuador

Urban agriculture can offer improved access to nutritious foods (e.g., fruit, vegetables, dairy) and provides a source of income and employment. As found in a study by Zezza and Tasciotti, urban farming improved dietary diversity in ten out of fifteen analyzed countries (Zezza and Tasciotti 2010). In Quito, Ecuador, the Participative Urban Agriculture Program AGRUPAR targets the most vulnerable population of the city through the production of organic food and by promoting urban agriculture as a livelihood and a powerful strategy for improved food security and nutrition.

Throughout the project, both the production and consumption of locally grown food is promoted. The project stimulates subsistence farming and facilitates selling surplus products through organic produce markets (bioferias). The project also facilitates the provision of technical assistance, microcredit and capacity-building to the urban growers and uses applied research to stimulate the use of agroecology. The bioferias play an important role in the stimulation of the consumption of fresh and local foods. In fact, the local markets include an educational component and are located next to health centers to promote the use of free health assessments for citizens and provide information on healthy diets. Ultimately, the project aims to improve food security for the most vulnerable groups, and therefore actively involves female-headed households, the elderly, children, youths, migrants, and the disabled.

The AGRUPAR project received the badge of Special Mention 2016 from the Milan Urban Food Policy Pact under the Food Production category. The program demonstrates the strong potential of urban agriculture in terms of improving food producers' livelihoods, job creation, food and nutrition security and democratization of the food system in secondary cities. The project could serve as a model for other (secondary) cities. However, despite its demonstrated benefits, urban policies and regulations often do not favor urban agriculture. Challenges related to access to inputs and waste management could arise and should be carefully considered. As described earlier, the urban areas of secondary cities are generally well embedded in the surrounding rural areas and the urban-rural connections are strong. As shown in the AGRUPAR project, urban farming has the potential to support short supply chains by actively connecting the supply and demand sides of the food system. Although secondary cities generally experience challenges related to governance, their rapid growth and development could be leveraged and shaped towards an urban agriculture-friendly environment. When this is combined with the provision of technical assistance and capacity-building (as described in the AGRUPAR project), secondary cities become a strategic entry point to further explore possibilities for urban and peri-urban farming.

3.3.3 KUMWE HARVEST – A New Post-Harvest Model for Combating Aflatoxin Contamination in Rwanda

Africa Improved Foods (AIF) is a Kigali-based social enterprise. In collaboration with the Government of Rwanda, AIF's objective is to address malnutrition and stunting by manufacturing high-quality nutritious supplementary foods. These foods are targeted towards vulnerable populations, including children and pregnant women. One of the main challenges AIF has faced is the quality of the local maize supply (a main component of the supplementary foods), particularly with respect to aflatoxin contamination (Nishimwe et al. 2017; Grosshagauer et al. 2019). Kumwe Harvest, a local start-up, developed a logistics model to address the high quantities of rejected maize.

The model in question limits the vulnerability of maize to contamination by enabling AIF to purchase maize from cooperatives, farmer groups and individual farmers in cob form, as opposed to already shelled grains. Improved harvest and post-harvest practices reduce the predominant aflatoxin production on the crops. Aflatoxin contamination has severe implications for food safety, and when vulnerable commodities (such as maize) are dietary staples, exposure to aflatoxins becomes chronic and can lead to long-lasting detrimental health effects (cancer, weakened immune function, stunting). Mycotoxin control is therefore key to ensuring food security. Besides improving food safety, the Kumwe Harvest model has increased the farmers' incomes and saved them time and labor. Additionally, food losses among the maize value chain have been reduced and AIF has benefited from a more reliable supply of high-quality and locally sourced maize. This, in turn, results in the continued production of safe and nutritious supplementary foods that contribute to the nutrition and health outcomes of vulnerable populations.

The Kumwe Harvest model is an example of the beneficial effects of short supply chains on the supply of nutritious foods for consumers, farmers' income and livelihood and food losses. Adapting this model to secondary city contexts could help to overcome the challenges related to infrastructure and logistics and ensure the efficiency of local and short supply chains. Post-harvest logistics models could be applied to nutrient-dense and perishable supply chains (such as fruits, vegetables and dairy) in which significant losses and reductions in quality occur. Consequently, these models could increase the availability and quality of local and nutrient-dense foods in secondary cities.

Sharing experiences and best practices on interventions targeting different dimensions of food systems (such as supply, demand and food security) in secondary cities or comparable contexts is key when aiming to acquire new knowledge on what works (and what does not) in the transformation of city region food systems (De la Peña et al. 2018). When compared to primary or mega-cities, the characteristics of secondary cities appear to provide a favorable environment for implementing and scaling ideas that could convert city region food systems to benefit nutrition and health. However, impact assessments from such projects, interventions and ideas are required to assess if and how these projects could be implemented in secondary cities. Collecting high-quality data and mainstreaming promising models, as described above, offer opportunities for secondary cities to become global game changers in city region food system transformation and improve nutrition and health outcomes for their populations.

4 Conclusion and Call to Action

The world is facing a global malnutrition crisis, and the drivers of co-existing problems such as undernutrition, micronutrient deficiencies and overweight are diverse and complex. To tackle these challenges, multisectoral and context-specific

municipal leadership that connects the different sectors is essential to facilitate progress towards global nutrition targets.

While current urban development efforts are mostly targeted towards capital cities, we consider secondary cities in LMICs as a vast untapped potential for altering urban food systems due to their unique embeddedness in rural-urban linkages and the identified challenges related to functioning governance structures and infrastructure. The huge potential for secondary cities is embedded in the opportunity to strengthen and couple the supply and demand of diverse, locally produced and nutritious foods with short chains that benefit both producers and consumers. The identification of secondary cities in LMICs as gamechangers for global food system transformation is in alignment with several initiatives aimed at strengthening food systems and nutrition in urban contexts. As the Milan Urban Pact, FAO Food-for-cities network, CITYFOOD Network, WHO Healthy Cities and other city networks testify, there is no better time than now to focus on secondary cities to ensure that they are fully integrated into the global food system and set the best foundations for their own transformation into more sustainable local food systems. Despite a seeming lack of attention towards secondary cities in Africa and other continents, their physical proximity to rural areas and their smaller spatial scale can no longer be ignored and must be leveraged.

Against the context of many of the challenges raised in this chapter, the Swiss Agency for Development and Cooperation has initiated and provides funding for a project starting in 2021, that aims to improve nutrition in secondary cities in three countries. The Nutrition in City Ecosystems (NICE) project works with selected secondary cities in Bangladesh (Dinajpur and Rangpur), Kenya (Bungoma and Busia) and Rwanda (Rubavu and Rusizi), and places a particular focus on women, youths and vulnerable groups in city regions. Key elements of NICE are to strengthen the supply of and demand for agroecologically produced, local and nutritious foods, foster multisectoral governance, and stimulate greater public and private sector engagement in resilient food systems and improved nutrition outcomes. NICE is co-financed and implemented by a Swiss consortium comprised of the Swiss Tropical and Public Health Institute, the Swiss Federal Institute of Technology of Zurich (Sustainable Agroecosystems & Food Processing Groups and World Food System Centre), Sight and Life, and the Syngenta Foundation for Sustainable Agriculture.

NICE aims to achieve its goals by focusing on four outcome areas: (1) participatory governance and systems, (2) the production and availability of agroecological and locally produced foods, (3) knowledge and demand generation for nutritious and agroecologically produced food and (4) policy and advocacy. Consultations with the six selected cities draw attention to several of the challenges outlined above, such as unemployment, social inequality, lack of decentralized governance and financial and human capital and overall difficulties in accessing finance and technology. Moreover, low levels of nutrition literacy and inefficient chains for local supply were identified as bottlenecks to reducing poverty and improving nutrition and health outcomes. The consultations indicated a high level of support from relevant stakeholders within the cities for working collaboratively towards solutions. The cities

and consortium look forward to sharing evidence and experiences from the NICE project in the forthcoming years, as well as creating linkages with the International Mayor Summit for peer-learning among cities and making the case to include a secondary cities' food system angle in the summit.

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