

influence participation at the neighbourhood scale. Such factors may include the effects of forces like gentrification on the number of eligible residents in a neighbourhood, or demographic changes like an increased population of immigrants that can influence whether residents of a community choose to participate in SNAP even if their low income enables them to qualify.

Currently an estimated 220,000 New York City residents who are not citizens but who are here legally are receiving SNAP benefits, cash assistance, or both, yet a survey of 50 frontline staff of community-based organizations that serve food-insecure people found significant deterrents to SNAP participation among some immigrant communities. One potential obstacle was the language barriers faced by some of the approximately 17 per cent of New Yorkers who speak languages other than the nine the city translates for informational material and application forms (Vignola et al., 2018). A more complex upstream barrier to SNAP participation is fear of deportation due to recent federal immigration policies. Survey respondents reported that current and proposed federal policies, along with political rhetoric from elected officials, have stoked fears of deportation and have had a chilling effect, not only on applications for federal programmes like SNAP, but also on inquiries about food benefits among immigrants with whom they have interacted (Vignola et al., 2018). Some immigrants seeking US residency believe, incorrectly for now, that participation in SNAP will designate them a ‘public charge’, which could be used as a basis for deportation. A recently proposed rule that would broaden the definition of a public charge to include those receiving SNAP and other benefits has only intensified fears of participating in the programme, even among eligible immigrants (Health Affairs Blog, 2018).

Data on upstream determinants of participation in food benefit programmes such as language barriers (e.g., the percentage of those eligible for SNAP who speak languages other than those on government forms) and deportation fears (e.g., the percentage of eligible immigrants who fear that SNAP participation will put them at risk) would help cities isolate the causes of changing rates of participation within specific neighbourhoods and suggest methods to increase participation. While quantitative data on the prevalence and effects of the factors identified above may not affect anti-immigrant political positions, metrics tracking the experiences of immigrants applying for and participating in SNAP, including qualitative data on their perceptions of and responses to federal policies, could enhance arguments for political change and also facilitate the design of more effective interventions targeting specific immigrant populations. Metrics would also enable planners to anticipate the effects of future shifts in immigration policy on SNAP participation and develop alternatives to prevent hunger and malnourishment in immigrant communities. Surveying recent immigrants in the current anti-immigrant climate is a significant challenge for public agencies, even with supportive local governments, but it may be easier if agencies partner with non-profits who have the trust of immigrant communities.

Table 11.1 Marginal effects of federal food benefits on NYC poverty rate, in % change, 2012–2016

<i>Program</i>	<i>2012</i>	<i>2013</i>	<i>2014</i>	<i>2015</i>	<i>2016</i>
SNAP	-3.7	-4.0	-3.6	-3.2	-3.3
School Meals	-0.5	-0.6	-0.5	-0.7	-0.6
WIC	-0.3	-0.2	-0.2	-0.2	-0.3

Source: NYC Mayor's Office of Operations, 2018.

In addition to measuring the effects of upstream factors on SNAP participation and resulting downstream effects like reduced malnourishment and diet-related diseases, food planners can also track the upstream impacts to strengthen the case for the programme. For example, the New York City Mayor's Office of Operations analyses the effects of SNAP and two other federal food programmes (school meals and the Women, Infants, and Children programme), on the New York City poverty rate (NYC Mayor's Office of Operations, 2018). The most recent study shows that SNAP benefits reduce the poverty rate by more than 3 per cent, as Table 11.1 illustrates (NYC Mayor's Office of Operations, 2018). Tracking participation in SNAP not only as a way to address malnourishment but also as a tool for poverty alleviation provides evidence of the broader value of SNAP and illustrates the value of collaboration between advocates for health and food justice and anti-poverty advocacy groups.

Development and local food environments

A neighbourhood's spatial configuration, such as the availability of transit, neighbourhood services, and civic spaces for social interaction have long been viewed as important upstream determinants of health (Braveman et al., 2011). In recent years, researchers have focused on the local food environment, defined as the prevalence and configuration of food establishments, as factors in population nutrition and health (Malambo et al., 2016). Typically, food environments are measured based on the mix and location of food retailers, with the availability of convenience stores, corner stores, bodegas, and fast food restaurants proxies for unhealthy food environments and supermarkets as indicators of healthy food access (Lytle & Sokol, 2017; Rosenberg & Cohen, 2018). Researchers have also measured access to food in adjacent neighbourhoods and travel patterns to understand how food environments shape decisions about shopping, diets, and malnourishment (Lytle & Sokol, 2017). Upstream determinants of these patterns, such as development pressures and zoning decisions, are not typically measured as food metrics.

New York City's Food Metrics Reports track results of several policies to increase physical access to healthier food: the number of retailers participating in a programme called *Shop Healthy*, which helps bodegas and independent grocers sell healthier food; the number of Green Carts (mobile produce vendors selling in neighbourhoods underserved by supermarkets); and the number of new and expanded supermarkets supported by the Food Retail Expansion to Support Health (FRESH) policy, which offers incentives to increase grocery square footage in underserved neighbourhoods (New York City Mayor's Office of Food Policy, 2018). The metrics show that 36 FRESH supermarkets have received incentives to open or expand, but since 2011, 273 additional supermarkets opened without FRESH subsidies (New York City Mayor's Office of Food Policy, 2018). The number of Green Cart permits has declined to 286 (New York City Mayor's Office of Food Policy, 2018), though there has been no analysis of why there are so few Green Carts when 1,000 permits are available.

Incorporating upstream factors that determine the mix of food retailers in a community can more thoroughly explain changes in local food environments. Many variables determine retail development, from the health of the economy to the structure of retail sectors. At the community scale, zoning is an important determinant of real estate development potential. Zoning can restrict or induce commercial and residential development by changing the allowable uses, size, density, or configuration of buildings. Zoning changes determine food retailer locations and can spur displacement of existing food businesses by making other land uses more profitable (Cohen, 2018). Rezoning can also have secondary effects on food environments by stimulating overall real estate development, increasing population density, and attracting new, more affluent residents to a neighbourhood, potentially reducing the ratio of food retail per capita and encouraging retailers to market to the new higher income residents (Cohen, 2018). When zoning attracts wealthier residents to a low-income neighbourhood it can also lead to gentrification and displacement of existing residents.

Despite these direct and indirect effects of zoning on local food environments, cities rarely treat zoning changes as food system interventions and seldom analyse their potential consequences when they conduct public reviews. Because these effects on food are rarely documented in land-use review processes, they are infrequently raised by local advocates in public hearings. In New York City's environmental review process, for example, secondary or induced displacement of food retailers as a result of new commercial activity is not typically analysed, based on the assumption that commercial food establishments will open to meet any increased market demand. If environmental impact statements do not measure the adverse impacts of proposals on food access, they will not be identified and public reviews will likely overlook them.

An analysis of the effects of rezoning on the food environment of East Harlem, a historically low-income community of colour in upper Manhattan facing gentrification pressure, shows that upstream determinants of food environments like zoning-induced development pressures have changed the types of food retailers in the community and thus have affected access to healthy, affordable food. East Harlem has been rezoned numerous times since the late 1990s to stimulate economic development and in response to pressure from the real estate industry. The rezoning and subsequent development has had three principal effects on East Harlem's food environment: supermarket displacement; the creation of new sites for big box food retailers; and the expansion of both healthy and unhealthy food retail as the neighbourhood has gentrified (Cohen, 2018).

Rezoning Harlem's historic 125th Street made higher-density mixed-use development feasible and increased real estate values along this major commercial corridor. The increased land value enabled a local community development corporation to sell property it had previously acquired from the city at a below market price, with the purpose of developing an affordable supermarket called Pathmark (Cohen & Freudenberg, 2016). The company that purchased the Pathmark site now plans to build two 32-story residential towers on the land, yet has not committed to replacing Pathmark with another supermarket, despite demands from local elected officials and community leaders (Cohen & Freudenberg, 2016). A second example is the rezoning of an abandoned industrial site in East Harlem into a regional shopping centre designed to house big box food retailers that currently include Costco, Target, and Aldi. The environmental assessment's analysis of alternatives considered but rejected a conventional neighbourhood-serving supermarket and smaller commercial spaces as unfeasible (Cohen, 2018). A third example is the extensive rezoning of East Harlem to increase the scale of development sites to boost land value and development potential. Such rezoning throughout East Harlem has attracted residential development occupied by higher-income residents, increasing the value of residential and commercial real estate (Cohen, 2018). The influx of higher-income people has led to residential and commercial gentrification, including displacement of low-cost food retailers (Busà, 2014).

Considering the effects of zoning and other aspects of land development on the spatial configuration of food retailers would help planners anticipate and address the potential for new development to spur food gentrification, the process by which higher-income residents contribute to the displacement of affordable food establishments by higher-priced grocers and restaurants, or induce changes in the products offered by existing retailers, effectively displacing existing residents from the neighbourhood food environment by making them feel that the remaining food retail establishments are not offering the foods they desire and can afford (Pearsall & Anguelovski, 2016; Cohen, 2018). Treating data on real estate development trends (e.g., changes in commercial rents and commercial vacancies) and zoning proposals (e.g.,

square feet of additional commercial space permitted in a community) as food metrics can enable planners to anticipate the effects of these upstream factors on food retail and suggest strategies to prevent food gentrification. Strategies might include city financial support for existing food businesses, policies to prevent property owners from warehousing vacant commercial spaces, or the use of zoning incentives to attract affordable grocers and restaurants. Discussions about the determinants of food retail could be extended to include other upstream factors such as poverty or housing affordability, which affect the kinds of commercial activities that a community can support. Modifying the public review procedures that produce data-rich analyses of proposed developments, like environmental assessments and land-use review documents, so that they estimate the direct and secondary displacement of food retailers, would provide advocates with data on potential impacts and thus empower them to support land-use changes that enhance food access.

Good jobs for food workers

The workplace and working conditions are important upstream determinants of health. However, much of the occupational health and safety field has focused on the physical effects of work and environmental hazards in the workplace, rather than on the nature of employment, from the wages paid to workplace rules, that significantly affect a worker's economic status and emotional and physical health. In addition to salaries, workplace benefits (e.g., health insurance and paid leave) determine whether workers can afford healthier living conditions, including healthy, adequate food, yet those in low-wage jobs often earn too little to cover basic household needs. Low-wage jobs also prevent workers from having much control over their work processes, leading to irregular work schedules, insecure employment, and limited decision-making capacity that can create stress and other psychosocial impacts associated with the increased likelihood of injury, morbidity, and mortality, including diet-related chronic diseases (Lowden et al., 2010).

The conditions of food workers are particularly important to measure. The food sector has grown significantly over the past decade (Freudenberg et al., 2016). However, most of the food jobs that have been created in the United States since the Great Recession of 2007–2008 have been non-union, insecure, hourly labour in food services and food retail. In New York City, for example, the food sector is one of the largest and fastest growing job sectors, with 63,000 grocery store workers and 320,000 food service and drinking establishment employees, yet these jobs pay among the lowest wages of any employment sector (Freudenberg et al., 2016).

Over the past decade, New York City has adopted policies to address two important upstream determinants of nutritional health. One set of policies has increased wages for workers, and by doing so has increased incomes for low-wage food workers. A second set of policies has improved

working conditions for the lowest-wage workers, which in New York City are concentrated in the food sector.

Higher wages

In 2012, the city enacted the Fair Wages for New Yorkers Act (Local Law 37 of 2012), which increased the living wage that businesses getting financial benefits from New York City have to pay their workers. Two years later, Mayor de Blasio signed an executive order expanding the coverage of this law to additional categories of workers and indexed the amount of the required living wage to the Consumer Price Index, raising the amount that the jobs covered by this law pay to approximately \$15 per hour by 2019. The executive order covers an estimated 18,000 additional workers, 4,100 of which are in minimum wage jobs in the retail and fast-food sectors.

Over the past few years there has been a growing movement to raise the minimum wage, particularly for fast-food workers, buoyed by the national *Fight for Fifteen* movement, which calls for fast-food employers to provide at least a \$15 hourly wage. Support by the Mayor and Governor led the New York State Wage Board on 20 May 2015 to raise the fast-food minimum wage to \$15. The mayor also approved an increase to a \$15 minimum wage, by the end of 2018 for all city employees and non-profit human services contractors. Raising the city's minimum wage means higher incomes for approximately 25 per cent of minimum wage earners and their families, affecting approximately 1.46 million workers throughout New York State.

Improved working conditions

In 2014, the city enacted legislation to expand mandatory paid sick leave to smaller businesses and added categories of family members (e.g., sibling, grandchild, and grandparent) for whom sick leave can be taken. These expansions in the new law extended sick leave coverage to an estimated 350,000 additional workers. Sick leave is particularly beneficial for low-wage workers, many of whom lack savings and thus face extreme hardships if they lose pay from being sick. This is particularly true of food service workers, a low-wage sector in which fewer than half of all workers had sick leave benefits before the law took effect (Rankin, 2012). Guaranteeing paid sick leave not only ensures that food workers and other low-wage employees are able to attend to their health without losing wages, but it also enables workers not to report to their workplaces ill, reducing health risks to co-workers and customers, especially important for people who handle food.

Another issue unique to restaurant workers is tipped wage theft. In November 2015 the city enacted Local Law 104 of 2015, which created an Office of Labor Standards to address this and other labour laws. The Office is required to educate employers; create public education campaigns

regarding worker rights; collect and analyse statistics on violations; research and promote programmes about worker protections, education and safety; and conduct investigations, serve subpoenas, and impose civil penalties on businesses that do not comply with NYC's labour standards.

In 2017, New York City enacted several local laws to improve the work life of shift workers, a category that includes many fast food workers, by regulating the way their work schedules are set. Fast-food employers must provide work schedules two weeks in advance, pay premiums for changes made to work schedules, and offer open shifts to existing fast food employees. The laws also ban schedules that require workers to both close the business at night and reopen it first thing in the morning, and require employers to provide their employees with 72 hours advance notice of their work schedules.

To prevent prospective employers from discriminating against those who have a criminal record, Local Law 63 of 2015 prohibits any employer from inquiring about a job applicant's criminal history until after the employer makes the applicant a conditional offer of employment. This law is particularly important to address discrimination in arrests and sentencing, which has resulted in a disproportionate level of incarceration among African-American men, limiting their economic opportunity (Martin et al., 2015).

Transitions within the food retail sector prompted New York City to adopt Local Law 11 of 2016, which is designed to protect workers when a supermarket is sold to another company. The law requires grocery store owners that purchase existing grocery stores to retain the previous owner's employees for a period of 90 days after the business is purchased. After the 90-day transition period, the new employer must evaluate these employees and consider continuing their employment.

Metrics documenting compliance with some of these labour policies tracked by the Department of Consumer Affairs illustrate the challenges faced by low-wage workers. Food or drink service employees report being paid below the minimum wage at nearly three times the rate of retail employees (17.5 per cent vs. 6.7 per cent) (New York City Department of Consumer Affairs, 2017). A large percentage of low-wage workers in New York City report that they have experienced workplace violations in the previous week, including: 54 per cent with at least one pay-related violation; 69 per cent who were asked to do 'off-the-clock' work; 77 per cent with violations of overtime pay; and 21 per cent with minimum wage violations (New York City Department of Consumer Affairs, 2017). Low-wage immigrant workers in New York City, a particularly vulnerable group, experience minimum wage violations at more than twice the rate of non-immigrant low-wage workers (25 per cent vs. 12 per cent) (New York City Department of Consumer Affairs, 2017).

Treating labour data, particularly metrics on labour violations among low-wage workers, as relevant to the large food labour force, and integrating these data with metrics on malnourishment and diet-related health outcomes, could help to design interventions in the workplace that would

improve compliance with labour laws and improve the health of low-income workers. Integrating labour and food metrics would also help to re-focus economic development policies from those that attract undifferentiated food sector jobs to those that aim to create food jobs that pay living wages and engage workers in businesses that produce and distribute healthier food (Freudenberg et al., 2016). It would also encourage needed research on the diet-related health impacts of stressful, unstable working conditions, an emerging area of public health scholarship (Laraia et al., 2017).

Strategies for integrating upstream and downstream food metrics

As the previous examples illustrate, it is difficult to transform the food system without connecting upstream variables that have substantial effects on downstream food system outcomes like food security and diet-related health. The notion that social determinants, like income, affect diets and health has become part of the common discourse on food policy, as public testimony from New York City Human Resources Administration Commissioner Steven Banks (2014) illustrates: ‘The long-term solutions are clear. When New Yorkers can earn a living wage and find affordable housing, they will have the ability to obtain the food they need to prevent hunger...’. Given the complexity of measuring upstream variables, however, a key question is how food policymakers, planners, and advocates, can integrate them into the more commonly measured metrics of food policy outcomes. The examples above suggest three strategies: (1) aggregating, organizing, and analysing seemingly disparate data collected by different agencies as food metrics; (2) using innovative methods to collect relevant upstream data efficiently and cost-effectively, including using big data and crowd-sourcing techniques; and (3) including social, economic, and spatial indicators in food planning processes. Each of these is addressed below.

Using diverse datasets

Cities create troves of metrics prepared by the public and private sectors. Within city government, municipal agencies track the progress of their own programmes, monitoring public health, economic development, environmental characteristics, and many other dimensions of city life. Agencies record performance data on their activities, from inspections to licensing, that often involve the food system. Many existing public metrics like those on poverty, discrimination, educational attainment, housing affordability, or access to parks and active transportation are important upstream determinants of food and nutrition outcomes. These data can be used to answer important food systems questions, like how policies making the

city more or less affordable for low-wage workers affects food security and hunger, the degree to which workplace or environmental stressors related to unhealthy diets disproportionately affect particular racial or socio-economic groups, and whether processes like gentrification and displacement affect neighbourhood food access.

Some of these data are published on agency websites, some are made available through data portals that an increasing number of cities have created (e.g., Open Data New York City), while others are collected for internal agency use and are not as easily accessed. Creating an inventory of food system-related metrics already available across agencies and other branches of city government, as well as relevant data collected by state and federal agencies, is the first step towards identifying relevant metrics and demonstrating ways to use them in food planning. In addition to aggregating available data, cities can change the requirements of existing assessment processes to require food system data to be collected and included in those analyses. Environmental impact assessments are one opportunity to collect relevant data on the relationship between zoning and development proposals and food environments, but cities are also required to collect and report social, economic, and infrastructure data to various federal agencies, from Housing and Urban Development to the Department of Transportation, that could be aggregated and analysed to better understand downstream food system outcomes. Ensuring that an expanded collection of food-related metrics is used requires alliances between food system advocates and groups that work on upstream issues like poverty, racial discrimination, immigrants' rights, affordable housing, and other social justice concerns. Academic institutions can support this collaborative work by showing how seemingly disparate data can be organized, analysed, and used for advocacy.

Big food data

A second strategy is to use innovative methods to collect relevant upstream data efficiently and cost-effectively. This includes using big data to measure behaviours at the population scale. For example, anonymized GPS data from mobile phone apps can be analysed to better understand how populations make choices about shopping and dining, and how daily activity patterns vary by demographic group, helping planners target programmes, like supermarket incentives, more effectively (see Athey et al., 2018). Aggregated purchasing data can be used to better understand how various social and economic characteristics influence what people buy and eat. Geospatial data like Google Street View can be analysed to better understand the environmental factors that influence activities like shopping in communities and can track commercial and residential changes over time that affect local food environments (Bader et al., 2017).

Food planning

A third strategy is to adopt a more expansive notion of food system planning that addresses the root causes of food system inequities: siting food production and distribution infrastructure to reduce poverty as well as improve efficiency; focusing economic development plans on sectors of the food industry that offer pathways to higher-wage jobs; protecting food businesses that cater to low-income residents as neighbourhoods are rezoned; and changing planning processes to more effectively involve community stakeholders with knowledge of social determinants and hard-to-reach demographic groups, like recent immigrants. Integrating upstream determinants of health into the types of issues that food planners address requires interdisciplinarity, and successful planning processes can break down barriers among administrative agencies and advocacy groups and foster interdisciplinary approaches to problem-solving (Corburn, 2009).

Moving beyond the food metrics typically tracked to monitor progress in addressing the health, social, economic, and environmental impacts of the food system requires identifying the root causes of downstream outcomes and figuring out ways to aggregate, organize, and analyse this information so it is useful to various stakeholders and city government. This can seem daunting to food planners with neither the resources nor the power to aggregate, organize, and analyse such data. Fortunately, integrating upstream and downstream metrics can be carried out iteratively, by starting with existing relevant data, using lessons from other big data projects, and engaging in a food system planning process that brings multiple stakeholders together to track a broader range of food metrics, spanning issues from poverty to social wages (housing, healthcare, education) to economic and environmental trends.

Notes

- 1 City of New York. Local Law 48 of 2011.
- 2 City of New York. Local Law 50 of 2011.
- 3 City of New York. Local Law 52 of 2011.

References

- Athey, S., Blei, D., Donnelly, R., Ruiz, F., & Schmidt, T. (2018) Estimating heterogeneous consumer preferences for restaurants and travel time using mobile location data. *arXiv*. preprint. doi:1801.07826.
- Bader, M.D., Mooney, S.J., Bennett, B., & Rundle, A.G. (2017) The promise, practicalities, and perils of virtually auditing neighborhoods using Google Street View. *The ANNALS of the American Academy of Political and Social Science*. 669(1), pp. 18–40.
- Banks, S. (2014) *Testimony to the New York City Council General Welfare Committee hearing on hunger in New York*. New York, New York City Human Resources Administration. Available at: https://www1.nyc.gov/assets/hra/downloads/pdf/news/testimonies/2014/nov_2014/HungerHearing_2014.pdf

- Barrett, C.B. (2010) Measuring food insecurity. *Science*. 327(5967), pp. 825–828.
- Braveman, P., Egerter, S., & Williams, D.R. (2011) The social determinants of health: Coming of age. *Annual Review of Public Health*. 32, pp. 381–398.
- Busà, A. (2014) After the 125th street rezoning: The gentrification of Harlem's Main Street in the Bloomberg Years. *Urbanities*. 4(2), pp. 51–68.
- Campbell, L.K. (2016) Getting farming on the agenda: Planning, policymaking, and governance practices of urban agriculture in New York City. *Urban Forestry & Urban Greening*. 19, pp. 295–305.
- Cohen, N. (2011) *FoodWorks legislative package scheduled for vote*. Urban Food Policy blog. Available at: <https://urbanfoodpolicy.com/2011/07/27/foodworks-legislative-package-scheduled-for-vote/>.
- Cohen, N. (2018) Unintentional food zoning: A case study of east Harlem, New York. In: Cabannes, Y. & Marocchino, C. (Eds.) *Integrating food into urban planning*. London, UCL Press.
- Cohen, N. & Freudenberg, N. (2016) *Creating healthy food access in a changing food retail sector: Invitation to a dialogue*. New York, CUNY Urban Food Policy Institute.
- Coppo, G., Stempfle, S., & Reho, M. (2017) Urban food strategies and plans: Considerations on the assessment construction. *City, Territory and Architecture*. 4(1), p. 8.
- Corburn, J. (2009) *Toward the healthy city: people, places, and the politics of urban planning*. Cambridge, MA, MIT Press.
- Freudenberg, N., Cohen, N., Poppendieck, J., & Willingham, C. (2018) *Food policy in New York City since 2008: Lessons for the next decade*. New York, CUNY Urban Food Policy Institute.
- Freudenberg, N., Franzosa, E., Chisholm, J., & Libman, K. (2015) New approaches for moving upstream: How state and local health departments can transform practice to reduce health inequalities. *Health Education & Behavior*. 42(1 Suppl.), pp. 46S–56S.
- Freudenberg, N., Silver, M., Hirsch, L., & Cohen, N. (2016) The good food jobs nexus: A strategy for promoting health, employment, and economic development. *Journal of Agriculture, Food Systems, and Community Development*. 6(2), pp. 283–301.
- Freudenberg, N., Willingham, C., & Cohen, N. (2018a) The role of metrics in food policy: Lessons from a decade of experience in New York City. *Journal of Agriculture, Food Systems, and Community Development*. 8(2 Suppl.), pp. 191–209.
- Health Affairs Blog (2018) The health impact of the proposed public charge rules. 27 September. doi:10.1377/hblog20180927.100295.
- Hezri, A.A. & Dovers, S.R. (2006) Sustainability indicators, policy and governance: Issues for ecological economics. *Ecological Economics*. 60(1), pp. 86–99.
- Hunger Free America & CUNY Urban Food Policy Institute (2018) *SNAP declines yet hunger persists: NYC caseloads 2012–2016 and the need to ease access to benefits*. Available at: <https://www.hungerfreeamerica.org/sites/default/files/atoms/files/Declining%20SNAP%20Participation%20Report%20June%202018.pdf>.
- Ilieva, R.T. (2017) Urban food systems strategies: A promising tool for implementing the SDGs in practice. *Sustainability*. 9(10), p. 1707.
- Innes, J.E. (1990) *Knowledge and public policy: The search for meaningful indicators*. Piscataway, NJ, Transaction Publishers.

- Laraia, B.A., Leak, T.M., Tester, J.M., & Leung, C.W. (2017) Biobehavioral factors that shape nutrition in low-income populations: A narrative review. *American journal of preventive medicine*. 52(2S2), p. S118.
- Libman, K. (2015) Has New York City fallen into the local trap? *Public Health*. 129(4), pp. 310–317.
- Lowden, A., Moreno, C., Holmbäck, U., Lennernäs, M., & Tucker, P. (2010) Eating and shift work: Effects on habits, metabolism, and performance. *Scandinavian Journal of Work, Environment & Health*. 36(2), pp. 150–162.
- Lytle, L.A. & Sokol, R.L. (2017) Measures of the food environment: A systematic review of the field, 2007–2015. *Health & Place*. 44, pp. 18–34.
- Malambo, P., Kengne, A.P., De Villiers, A., Lambert, E.V., & Puoane, T. (2016) Built environment, selected risk factors and major cardiovascular disease outcomes: A systematic review. *PloS One*. 11(11), e0166846.
- Martin, S.A., Harris, K., & Jack, B.W. (2015) The health of young African American men. *Jama*. 313(14), pp. 1415–1416.
- Meter, K. (2010) Metrics from the field: Letting food systems emerge. *Journal of Agriculture, Food Systems, and Community Development*. 1(1), pp. 23–26.
- Milan Urban Food Policy Pact (2017) *Building opportunities for local food policies: Urban monitoring framework*. Gathering and Mayor's Summit. Available at: http://www.milanurbanfoodpolicypact.org/wp-content/uploads/2017/12/FAO_MUFPP-monitoring-framework-Valencia.pdf.
- New York City Council (2011) *Report of the governmental affairs division*. Committee on governmental operations. 27 July.
- New York City Council (2013) *Local Law to amend the New York city charter and the administrative code of the city of New York, in relation to assessing food security*. Available at: <http://legistar.council.nyc.gov/LegislationDetail.aspx?ID=1520864&GUID=953D129F-2808-48E0-9E9D-D3C577E7DCFF>.
- New York City Department of Consumer Affairs (2017) *The state of workers' rights in New York City*. Available at: <https://www1.nyc.gov/assets/dca/downloads/pdf/workers/StateofWorkersRights-Report-2017.pdf>.
- New York City Mayor's Office of Food Policy (2018) *Food Metrics Report 2018*.
- New York City Mayor's Office of Operations (2018) *New York City government Poverty Measure 2005–2016*.
- Pearsall, H. & Anguelovski, I. (2016). Contesting and resisting environmental gentrification: Responses to new paradoxes and challenges for urban environmental justice. *Sociological Research Online*. 21(3), pp. 1–7.
- Prosperi, P., Moragues, A., Sonnino, R., & Devereux, C. (2015) *Measuring progress towards sustainable food cities: Sustainability and food security indicators*. Report of the ESRC financed Project 'Enhancing the Impact of Sustainable Urban Food Strategies'. Available at: <http://sustainablefoodcities.org/getstarted/developingindicators>.
- Rankin, N. (2012) *Still sick in the city: What the lack of paid leave means for working New Yorkers*. New York City, Community Service Society.
- Reynolds, K. & Cohen, N. (2016) *Beyond the kale: Urban agriculture and social justice activism in NYC*. Athens, GA, The University of Georgia Press.
- Rittel, H.W. & Webber, M.M. (1973) Dilemmas in a general theory of planning. *Policy Sciences*. 4(2), pp. 155–169.
- Rosenberg, N.A. & Cohen, N. (2017) Let them eat kale: The misplaced narrative of food access. *Fordham Urban Law Journal*. 45, p. 1091.

- Sébastien, L. & Bauler, T. (2013) Use and influence of composite indicators for sustainable development at the EU-level. *Ecological Indicators*. 35, pp. 3–12.
- Vignola, E., Ruiz-Navarro, P., & Freudenberg, N. (2018) *Expanding immigrant access to food benefits in New York City: Defining roles for city and state government*. New York, CUNY Urban Food Policy Institute.
- Vitiello, D. & Brinkley, C. (2014) The hidden history of food system planning. *Journal of Planning History*. 13(2), pp. 91–112.

12 The view from here

A critical consideration of sustainable food system assessments

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Introduction

This final chapter pulls together the perspectives that framed this book by considering the academic literature in light of the three overarching themes from the Toronto workshop. As elaborated in Chapter 1, the three themes are:

1. Conceptual foundations;
2. Operationalizing metrics;
3. Outcomes and goals for assessment projects.

These dimensions and their interconnections are captured in Figure 12.1, which provides a summary framework for *Sustainable Food Systems Assessment: Global Approaches to Practice*. As is expanded in the conclusion of this chapter, several key points emerge. First, the imperative to give voice to and/or reinforce socio-political processes founded in social movements and the evolving relationship between policymakers, practitioners, civil society, and academics. We also discuss what defines ‘assessment’, including the importance of stories, trust, and the social (including the social economy) as we link and identify indicators as nested, linked, *and* relational. The opportunity to render the invisible visible is a part of how assessment can bring challenges to the surface and transform solutions through understanding, transparency, and building on food system complexity.

The research reported in this book points to assessments as not only providing information but also about how the process, when done right, can help build capacity within communities, provoke food systems thinking, connect people across scales, and even lead to policy coherence. The authors also highlight how assessment processes make successes and areas for improvement more apparent. Finally, the insights from *Sustainable Food Systems Assessments: Lessons from Global Practice* add more heft to important questions about whose voices are raised through assessment processes and what discourses are reinforced, foregrounded, overlooked, or ignored. In the following sections, we tease apart the challenges and opportunities in

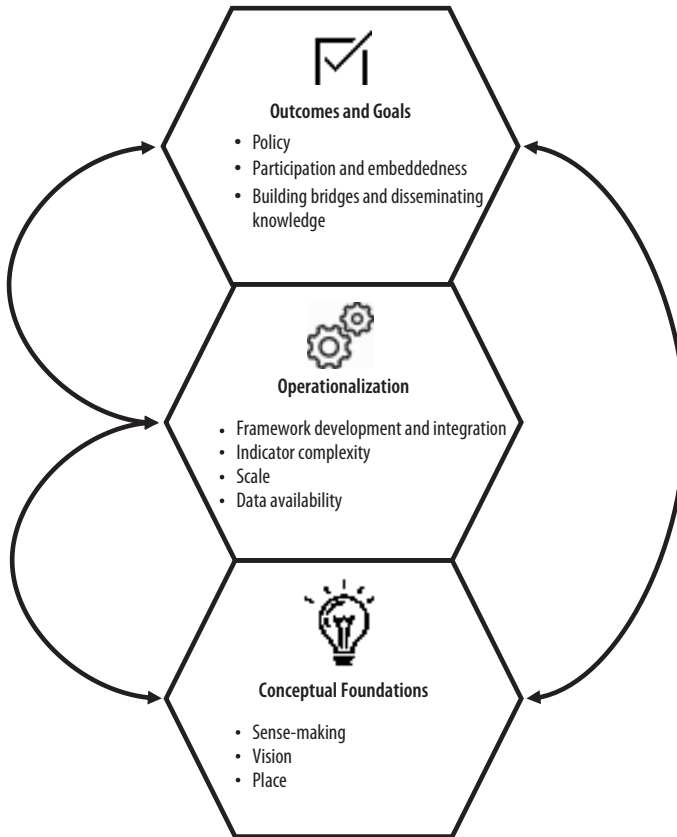


Figure 12.1 Iterative Sustainable Food System Assessment dimensions.
Note: Interaction occurs between and within: Outcomes and Goals, Operationalization, and Conceptual Foundations.

applying these dimensions to sustainable food system assessment (SFSA), drawing heavily from the research in the previous chapters.

Conceptual considerations: sense-making, vision, and place

The conceptual considerations identified during the workshop focused on the process and outcomes of sense-making and vision as well as the need to recognize place-based dimensions (Sonnino et al., 2016). The sense-making used to develop indicators and the lenses used to frame them determine what is included or left out of an analysis. In selecting metrics, Maye and Duncan (2017, p. 268) ask us to broaden ‘visibility fields’ to question what is visible and why and how this decision-making process unfolds. This also

allows us to capture multiple dimensions of performance. It is important to consider ‘visibility’ as,

we must be particularly sensitive to aspects which are hidden from our view by the focus on the process of embedding sustainability in the supply chain, and conversely seek to understand how and why our attention is being directed to other areas by the actors concerned and the field of visibility associated with the embedding sustainability in decision-making tool.

(Spence & Rinaldi, 2014, p. 438)

The idea of visibility points to the importance of considering what an indicator represents. As Garnett (2014) points out, using one-dimensional indicators alone, such as efficiency and demand restraint, can be one-sided and oversimplify the context, missing key components that need to be included in sustainability assessment. Frequently, the efficiency perspective promotes the use of technology to meet increasing demand through more production, more efficient chemical use, and waste reduction – reinforcing the technocratic fix and often contributing to a top-down approach. This line of thinking is problematic as it overlooks issues related to food access and quality, including the current reality that there is enough food produced to feed everyone in the world a healthy diet, yet more than 800 million people are food insecure and more than 1 billion people are overweight or obese (FAO, 2017). The second perspective – the demand-driven focus – views solutions as being consumer-led and tackles food challenges from the influence eaters have over the supply chain. In many cases, the focus is on reducing meat-based diets or decreasing food miles to improve both environmental conditions and health. However, this is also too simplistic since indicators that support reduced meat consumption may overlook local sustainable meat production practices that can help sequester GHG and provide a regionally appropriate protein source (D’Silva & Webster, 2017). Alternatively, using a food system transformation lens draws upon the interdependence of production and consumption networks to recognize that sustainable food systems require integrated structural change and that these changes are interrelated and complex (see Chapter 4, this volume). A focus on transformation includes social justice and equity issues and offers a more robust and complete picture of challenges and possible solutions (Garnett, 2014). This integrated vision for fostering a sustainable food system is applied throughout this book. Chapters by Prosperi et al. (Chapter 7), Battersby (Chapter 5), Valette et al. (Chapter 2), Palmer and Santo (Chapter 8), Paredes et al. (Chapter 10), and Cohen (Chapter 11) all make the case for integrating social justice indicators into SFSA analyses. The Spring et al. (Chapter 3) and Meter (Chapter 4) chapters weave social justice into the assessment process itself by elevating the insights of those who had been marginalized as indicators are framed.

As the sustainable food system movement works to transform the industrial food system, it is important to direct the focus away from bottom line, high technology-centred solutions, as well as industry- and export-driven policy to practices focused on social justice, food and nutrition security for all, agroecology, and local circular economies (Anderson, 2019). Food sovereignty is one way to do this as it explicitly values culture, food democracy, the sacredness of food, and the Right to Food (FIAN, 2016; Levkoe & Blay-Palmer, 2018). FIAN's (Food First Information and Access Network) project, People's Monitoring of the Right to Food and Nutrition (RTFN) has the vision that

Food Sovereignty and RTFN monitoring is consistently used by actors at all levels to result in positive changes in the realization of the RTFN and for the identification of strategic paths to a new society where all human rights are fully realized.

(FIAN, 2016, n.p.)

This project emerged from a desire to collect and report data that includes input from front-line people in civil society organizations (CSOs) and reflects resistance to a technocratic approach. Through this process, food sovereignty and RTFN monitoring information is not only used and reclaimed, but also produced, interpreted, and transformed into action by people and their representatives through different approaches to food, including agroecology, community-based co-operatives, and direct farmer to consumer sales. Food sovereignty and RTFN approaches have been used in a number of contexts, including in recent writing and policy focused on sustainable food system assessment (Levkoe & Blay-Palmer, 2018). While none of the chapters in this volume adopt an explicitly rights-based approach, many contributors to this book advocate for more inclusive processes that work to give agency to marginalized communities (in particular Chapters 3, 4, 5, 6, 8, 10, and 11).

At their best, place-based considerations account for local needs and ground the SFSA process to capture relevant information and point the way to impactful sustainable food system change (Sonnino et al., 2016). For example, by applying an ecosystem-assessment perspective, positing specific foodsheds helps us understand food systems as embedded in broader ecosystems instead of existing exclusively within political boundaries. Such an approach brings an ecosystem viewpoint to the analysis of SFSA based on place through the lens of food (e.g. Kloppenberg, 1996; Mullinix et al., 2016). Place-specific indicators, as well as inclusive and participatory indicator identification and development, are necessary for transformative SFSA processes. Noting the disconnect between indicators at the global and national scale with community initiatives, in particular with needs and goals across scales, Prosperi et al. (2015, drawing from Cassar et al., 2013) observe the importance of developing indicators that include place-based considerations such as the geographical, socio-economic, and cultural context where these tools are implemented. As a result, they stress

that, ‘a strong and active involvement of the local/community stakeholders is key to design a set of metrics that will be useful to measure real progress and gaps towards the sustainability of the urban food systems’ (2015, p. 30). Prosperi’s work applying a Delphi method to capture expert insights for the Mediterranean region reported in this book shows that consensus can be used to develop shared indicators (Chapter 7). Meter (Chapter 4) brings this work to a community level, engaging residents in defining linked indicators that cut across issue areas, and express systems levers that can be moved in each context (also City Region Food Systems, Chapter 9).

Place-based assessment can be pivotal for rural and urban authorities who have a chance to facilitate the institutionalization of innovative food system approaches. Research in Marin County, California, makes it clear that using a place-based approach is important. In that case, the analysis focused primarily on food access and food security challenges for low-income households as these factors were identified as having the most relevance in their jurisdiction and were seen as the best levers for change at that time in that place (Marin County, 2012). The URBAL project described in Chapter 2 recognizes the need for both place-based flexibility and robust widespread usability of research tools as it develops an impact-pathway mapping tool to capture sustainable urban food system innovation. Testing this tool in eight cities through 12 innovation labs will help to meet project goals of reach and relevance and enable the maps to capture the place-based vision for each innovation. The Sustainable Cities project in the UK is another excellent example of the importance of considering place throughout the development and implementation of indicators (Chapter 6). The overall goals of this project were: (1) To work with grassroots organizations and local practitioners to define success in cities; and (2) To develop an indicator toolbox to support municipal governments and communities as they work to change the food system. Following a literature review on sustainability and food security indicators, the researchers held four workshops to co-develop a vision with associated metrics across health, economics, and the environment. This information was assembled into an indicator toolbox that was tested in pilot communities. Crossing boundaries, this data is relevant for agencies with respect to the environment, climate change, and economic development. As the project was driven by the needs of the people in each place, there are no standardized objectives or pathways to change since each city is different and so all had different entry points. The Delphi survey used by Prosperi et al. in Chapter 7 developed indicators focused specifically on the Mediterranean region, while Battersby’s chapter points to data gaps based on decisions specific to Cape Town.

As part of the work of imagining a sustainable food system, a shared sense of why indicators are being developed, and related goals is important at all steps from analysis and interpretation, through to policy development so that an indicator framework realizes its potential to become a sense-making process. These examples from our book and elsewhere point to ways visions

and sense-making as well as place-based considerations enhance the relevance of SFSA. With these visions to guide indicator selection, a related consideration is how to then operationalize indicators. Engaging stakeholders in assessments also transforms the process from place-based sense-making to place-making.

Operationalizing assessment tools

Operationalizing assessment tools relies on several resources including how frameworks are developed and feed into the assessment process, the relative complexity or simplicity of indicators, considerations about scale, and the availability of data.

Frameworks

As discussed in the previous section on conceptual foundations including visioning, a shared framework can capture common goals and lead to a consistent analysis over a broader context by including considerations outside of the narrow project scope (Riley et al., 1999). In addition, the process of sharing/developing common framework(s) can connect and facilitate work towards aspirational goals, such as a common framework with multiple, varied indicators. When selecting metrics, Maye and Duncan (2017) ask us to pay attention to the frameworks we use so that we engage meaningfully with key sustainability challenges (Lakoff, 2010). Morin (2008) recommends a paradigm of complexity that frames more self-reflective assessment work. While Lakoff (2010) refers specifically to the environment, this idea applies equally to enacting sustainable food systems and the crossover with other areas that are, ‘... intimately tied up with other issue areas: economics, energy, food, health, trade, and security. In these overlap areas, our citizens as well as our leaders, policymakers, and journalists simply lack frames that capture the reality of the situation’ (p. 76). At the same time, trends can be identified in the use of assessment tools for more inclusive places. Freedgood et al. (2011) identified several types of community assessments used particularly in the US and Canadian contexts: foodsheds, comprehensive food systems, community food security, food asset mapping, food deserts, land inventories, and food industries. These point to the multi-scale nature of ‘place’ and how place can be a layered consideration. Frameworks such as the Sustainable Livelihoods Framework (SLF) have been used to ground the work in household and community needs. In Chapter 3, Spring et al. use this framework in a wide range of circumstances including in First Nation communities in the Northwest Territories, Canada, where links were made between climate change, food security, and traditional systems. In particular, political capital was identified as a key community resource. Applying a common framework can enable comparisons across research and community initiatives (Blay-Palmer et al., 2015).

Complexity

There are several challenges that can be considered under the heading of complexity. On the one hand, there is the tension between the need to capture all facets of sustainable food systems dimensions and, at the same time, be simple enough so that indicators are functional. Indicators that are static can misrepresent the bigger picture. The FAO State of Food Insecurity report and the Prevalence of Undernourishment (PoU) indicator referred to in Chapter 1 are cases in point (FAO, 2017). The City Region Food Systems (CRFS) project described in Chapter 9 grappled with these challenges. In that case, researchers looked to develop an approach that was complex and applicable everywhere despite different place-specific issues, capacities, and missions in the pilot cities. The URBAL project (Chapter 2) is aiming to develop a mapping methodology that can be applied across sustainable food system innovations. In these cases, flexibility and multiple options is key so that the approach is relevant across a range of cases. Meter's Chapter 4 also reflects on these SFS challenges, proposing a complex adaptive systems approach as valuable based on its capacity to reflect actual community needs and levers for systemic change. Complex indicators that address multiple co-benefits are also important in order to reflect complexity through, for example, agro-ecological approaches, so that indicators capture change in more than one dimension and can help to connect knowledge silos.

Scale considerations

It is important to consider how frameworks and indicators can or cannot be translated across scales, ranging from the individual and household to the municipal, regional, and sub-global. Considerations include the way indicators are nested, connected, and/or contradictory. Chapter 1 provides a discussion of the Millennium Development Goals (MDGs), the Sustainable Development Goals (SDGs), and related challenges, including the lack of engagement with community voices, the privileging of scientific knowledge, the disregard for traditional knowledge, and the technocratization of sustainability assessment (Death & Gabay, 2015; Fukuda-Parr & McNeill, 2019). Several authors in this book address these and other challenges related to scale issues. Battersby (Chapter 5) illustrates how data expectations at one scale miss data needs at another scale. The analysis of the food system and food security study commissioned by the City of Cape Town illustrates these disconnects through either the lack of appropriately disaggregated data and/or no data or data requirements by international projects that miss the mark locally. The chapter by Prosperi et al. on the Mediterranean region provides an example of how to address assessment challenges and opportunities at the sub-national level. The chapter describes the consensus-building process developed based on the Delphi survey method to identify and agree on a suite of indicators for food and nutrition security in the context of SFS. The

CRFS project presented in Chapter 9 documents place-specific sustainability dimensions of food flows in the Global South and North. This work relied on either existing or creating multi-scaled, multi-actor networks. These networks were used to enhance urban–rural linkages and improve various dimensions of the food system including food access for low-income families, waste management, improving incomes for rural and urban producers, and by creating food policy (Forster et al., 2015; Dubbeling et al., 2017). As Forster and colleagues explain, '[s]trengthening urban-rural linkages by focusing on improving the holistic performance of food systems at a city region level can contribute to the broader sustainable urbanization agenda. The improvement of city region food systems has significant implications for spatial planning' (Forster et al., 2015, pp. 3–4). Toolkits include indicators that support SFS capacity building and food policy advocacy (Chapters 8 and 9). Paredes et al.'s chapter (Chapter 10) tests indicators at the intersection of sustainable food production and access in three regions in Ecuador. This project emerged from a desire to collect and report data that included and reflected input from front-line people in civil society organizations and demonstrates their resistance to a technocratic approach that would not have represented community priorities. Cohen's chapter (Chapter 11) assesses downstream outcomes around food access in New York City and links them with upstream federal policies around immigration and food, and makes the existing and potential iterative relationships between the two scales clear. Chapter 2 by Valette et al. explores mapping methodologies to support urban and surrounding regional sustainable food system analysis and offers new tools for data analysis. Meter (Chapter 4) discusses the merits of using an adaptive complexity approach within regions as the basis for indicators that are integrative across sectors and scales through both qualitative and quantitative data to highlight core system dynamics. His chapter also informs the city region food-planning approach by identifying the extractive economic structures that place cities in a more powerful position than rural areas. Research focused on assessment at these regional scales can enable more comprehensive and coherent pathways to address food system challenges.

At the city scale, SFSAs typically link food assessment with a range of city goals. As previously discussed, the Milan Urban Food Policy Pact, with its six sustainability categories (production, health and well-being, governance, waste, biodiversity, and social inclusion), provides the basis for urban sustainability assessment and potentially for comparative work across the more than 200 signatory cities. In these cases, comparisons, network, and capacity building can be indirect outcomes of the data collection process. This work is consistent with the chapter by Moragues-Faus (Chapter 6) who assesses the co-production and reflexive processes that occur as indicators are developed during Action Research sustainable food futures projects in the UK.

All of the chapters in this book point to the challenges of interpreting national data at smaller scales as solutions are overly generalized. This points

to the relevance of community-based research that leads to the creation of relevant indicators. Based on the work in this book, regional and smaller scales appear to provide the most useful information for policymaking and action, while national and global approaches may add important comparative overarching perspectives through a broader context.

Data availability

Collecting data is expensive and time-consuming and the extent data is or is not available limits and constrains the capacity to support visions. As Battersby (Chapter 5) points out in her chapter, available data is gathered in the context of existing politics. In the case of Cape Town, this has led to data gaps for food system assessment stemming from a misarticulation of data boundaries and the kind of data that was (or was not) available. Pointing to the disconnect between food and landscapes, Spring et al. (Chapter 3) discuss the lack of data covering remote northern communities and the gaps that need to be filled to link traditional food systems with the health of the land as a key source of regional food and boreal ecosystem health. The question of data availability is critical in communities closely tied to the land for their food as the climate continues to change. Paredes et al. (Chapter 10), Moragues-Faus (Chapter 6), Valette et al. (Chapter 2), and Palmer and Santo (Chapter 8) also address the question of data availability, in these cases through participatory processes as part of the development for SFSA.

When data is available or is being collected for the first time, it is important to be able to compare indicators over time and build on that work to keep it relevant, identify trends, and share it out as well as identifying data gaps. The Food Counts report card for Canada is a good example of this challenge. As a key part of the analysis, Levkoe & Blay-Palmer (2018) identified the need for new metrics. For example, there was no existing way to measure ‘food is sacred’ as one facet of the Canadian SFSA. Identifying data needs emerged as an important contribution of that work. In Maryland, an intuitive, accessible metric was developed to capture the siltation of a river (Flora, 2018). The goal was to make the water quality problem visible to local residents who lived upstream so they would be motivated to make a difference. To make the problem clear, the mayor put on white tennis shoes and walked out into the bay to see where he lost sight of his feet, recalling that people used to be up to their necks and still see their feet. Every year at the same time he would walk to the point where he could still see his feet and this measure would be posted on a bulletin board. As the siltation decreased over time, in part though work with farmers up and down the watershed, people celebrated enthusiastically as results were reported widely throughout the state. This was a very simple, inexpensive but visible indicator of turbidity that could be linked directly to soil run-off, making the remediation challenge and the progress clear for local communities.

Outcomes and goals

Outcomes and goals for sustainable food system assessment are clearly context dependent. In many cases they include policy generation, which is fostered by, and helps to enhance, the engagement and inclusion of participants and communities, builds connections between initiatives, embeds change in communities and allows for widespread knowledge dissemination.

Policy generation

Several questions emerged from the Toronto workshop around policy as an outcome of data gathering based on research projects. These questions focused on: (1) The conditions needed for policy to emerge from SFSA work; and (2) Whether there is a common process or trajectory that all/most places follow as they work towards SFS. Key informants at the workshops also identified power dynamics on how/whether policy is implemented as an important consideration. The extent to which subsidiarity applies is also key as it reflects the extent of empowerment of local actors and the extent to which power and agency are devolved as close to the community scale as possible. The IPES-Food 2017 report provides insights into necessary conditions for policy formulation at the city scale. Drawing on in-depth interviews and literature scans, the report identifies the policies and conditions needed to create and maintain sustainable food systems in cities including: (1) The need for robust inter-sector actor networks as channels for policy influence and the basis for partnerships; (2) The importance of partnerships between municipal departments and external organizations to allow for co-governance. This requires supportive resources and capacity for implementation; (3) The determination of formal governance and terms of reference so all actors know what is expected and are accountable; (4) Conducting research and monitoring impacts to demonstrate efficacy, and to identify and remedy unexpected impacts; and (5) Focusing on areas of local government control and influence seeking synergies with the national level where possible (IPES-Food, 2017).

The SFSA processes described in *Sustainable Food Systems Assessment: Global Approaches to Practice* support and build from the insights captured in the IPES findings to help address food systems challenges. In some of the research reported in this book, conflicts emerge between different levels of government (Chapter 11). In other cases, data is mis/realigned across departments, sectors, or scales, as in the findings reported by Battersby (Chapter 5) and Moragues-Faus (Chapter 6). As reported, indicators can help deal with these tensions as they can enable the identification of which policy levels should be addressed – in some cases national policies are needed to provide an overarching context, in other cases local zoning may need to be changed (Chapter 8). This type of policy alignment is ongoing as circumstances evolve. A related set of questions revolves around whether the

assessment uses universal indicators or not. And, whether researchers want to identify indicators that will help decide which policy level is the best for intervention. To help answer these questions, there is an ongoing exploration about whether international initiatives can be leveraged to shift from technical to more policy approaches. For example, in their policy-directed assessment, Perez-Escamilla et al. (2017) evaluate the usefulness of national and global food security indicators to make the case for indicators that facilitate evidence-based policymaking. Using SMART (specific, measurable, achievable/attainable, relevant, and time-bound) criteria they assess the usefulness of commonly used indicators (Dietary Diversity Measures; Measures Based on Participatory Adaptation; Prevalence of Undernourishment; Global Hunger Index; Global Food Security Index; Dietary Record; 24-hour recall; Food Frequency Questionnaires; Food Consumption Score; Household Dietary Diversity Score; Coping Strategies Index; Experience-based food insecurity scales; Anthropometry) for policymakers and classify indicators for usability. Battersby's chapter raises these important points from a community and local perspective providing insights into how indicators are shaped by the existing hegemony and where there may be entry points for change (Chapter 5). In Chapter 8, Palmer and Santo offer insights into the advocacy process through their work on food policy councils. Their extensive survey of existing food policy initiatives points to ways that advocacy may be improved. And, as Prosperi et al. reiterate, the ways in which assessment results get translated, packaged, and mobilized are important factors in how change occurs (or does not occur) in food systems at all levels (Chapter 7). If policymakers do not understand interactions and dynamics that are inherent to SFS then assessment results can be misinterpreted and policy and programmes will be ineffective or even counter-productive to the goals policymakers and communities establish (Chapter 11).

Participatory approaches and embeddedness

When working in communities, comparing and talking about developing or replicating a process can help to identify relevant indicators, build networks, and embed learnings. All of the chapters in this book support the importance of communities as they need to determine their own values and related visions and what they want to work towards based on their goals, needs, and resources. As discussed, international project goals can be set at the global scale with indicators identified for specific national or local concerns. The SDGs are an interesting example of this approach; while there was consultation with member states, intergovernmental organizations, non-governmental organizations, business sector, and other major groups, there was very little public consultation. Some of these concerns include the need for continuity between the process that established the SDGs and their implementation (Palmer, 2015), issues around land rights (Wise, 2015), and the technocratization of the process to the exclusion of smallholder farmers and others (IPES-Food, 2015). Participatory research by Sanye-Mengual et al.

(2018) in Bologna, Italy, into the interconnections between local urban food production (UFP) and global sustainability initiatives, in particular the SDGs, identified the need to consider sustainability transversally and through a participatory approach. Enhancing the chance of success and uptake,

[t]his bottom-up approach unveiled a comprehensive vision of sustainable UFP, the relevance of certain sustainability elements and key aspects to take into consideration for the implementation of UFP, the design of effective policy-making and the development of research studies on the sustainability of UFP that built upon the presented conceptual framework. (Sanye-Mengual et al., 2018, p. 15)

This building process is important to embed indicator work so that it has staying power and is not lost with a shift in government or through other changes. One mechanism is to liaise with official data collection agencies as this can help to maintain and/or add indicators to the data-gathering process and embed food system sustainability. This is also important to ensure the continuation of functions needed to support food systems.

As explored earlier, creating coherence across scales for indicators is challenging – community participation in developing action-oriented assessment can help mitigate this problem. For example, in Montpellier, France, university researchers gathered municipally elected people together to ask them what they were doing in their political work to advocate for their own food systems. While food was not previously a focus, the elected officials involved in the project started to talk about school canteens, land use, environment, shops, and then the foodscape. Then suddenly everybody did work for food. It was the creation of the process that generated a sense of food, the potential of food, and suddenly people could feel that working on food could be of benefit. Then, when food was an issue and they were working on that, they realized that they need data to understand the situation, to know, for example, that people are hungry, to map the situation, then data becomes important. The data gathering also allows people in civil society and policymakers to think beyond the agenda they had already established. This was the case based on the research in South Africa as reported by Battersby in Chapter 5. Meter found in Chapter 4 that simple network maps changed economic development leaders' perspectives. Prosperi et al.'s chapter (Chapter 7) used a participatory research method throughout the indicator development process to ensure relevant co-production of knowledge and to facilitate, given the complexity, that everyone understood terms, concepts, and frameworks in the same way (see also Lehtonen et al., 2016). Palmer and Santo (Chapter 8) also demonstrate the importance of iteration as assessment tools are being developed as well as the need for as many face-to-face consultations as possible to enable this iteration. The URBAL project (Chapter 2) and the CRFS work (Chapter 9) demonstrate the possibility of engaging multiple stakeholders across disciplines, sectors, and scales and the benefits that can accrue, including increased capacity and coherence for communities.

Building bridges and disseminating knowledge

Part of thoughtful indicator creation is ensuring outcomes do not reinforce or seed more silos between disciplines, sectors, and government departments and institutions. Rather, indicators need to allow actors to talk to each other more frequently and more effectively. At the same time, it is important to work from a food systems perspective to provide the resources and data that communities need in order to address the issues they value within their own food systems. For example, at a meeting leading up to the 3rd UN Conference on Housing and Sustainable Urban Development (Habitat III, Quito, 2016), a panel whose diverse participants worked at multiple scales and from many institutions discussed the need to share instruments and knowledge among cities. While they identified the need for instruments to carry out assessments as well as evidence from focused studies, planning and regulatory instruments for cities were singled out as lacking. The co-creation of knowledge provides a more inclusive and relevant set of indicators as the basis for policy and policy tools.

In this context, a question becomes, how can indicators be used to create networks that link across sectors and institutions to foster system transformation? The indicator work needs to be embedded in potential policy delivery, which is not always easy. The cities of Toronto, Canada and Milan, Italy are pioneers in this regard having developed both depth and breadth in food policy. The Toronto Food Policy Council is a world leader having been established nearly 30 years ago, while Milan has become extremely active following the launch of the Milan Urban Food Policy Pact in 2015. To continue this work requires unpacking the ‘policy-governance’ box and looking at how food can become an issue that engages all communities. Questions to address include: (1) is policy integration taking place, for example between planning and land use (Forster et al., 2015)? And (2) if it is, is the balance right? The CRFS process reported in Chapter 10 and the idea of linking upstream policy with downstream impacts as proposed in Chapter 11 by Cohen are good examples of how this can work.

Sharing the results from indicator projects is key and should be considered part of the process from project inception. There is a need to actively share findings with other researchers, government, the private sector, and civil society. Using multiple platforms including clear plain language reports, online spaces, and social media is critical to keep forward momentum so projects are not time bound and the work is taken up and used by administrators and policymakers. Creative partnerships could help ensure findings are accepted and acted upon, and also employed as part of public education. Including key actors from the outset also helps with knowledge dissemination, as indicators are more likely to reflect key player needs and goals.

It is also valuable to look outside food systems to learn from other domains, such as the health sector where a lot of relevant work is already

being done, for example, the World Health Survey and the water–energy–food nexus. Sustainability movements are confronting similar problems as they challenge the neo-liberal hegemony, so it is helpful to share information about processes and the kinds of frameworks that are useful. The UN Convention on Biodiversity (CDB) was among the first, multi-lateral agreement to tackle a global challenge with the recognition of ‘traditional knowledge’ and provides an example of integration across multi-stakeholders.

The view from here

We conclude the book with some insights that pull out and weave together some common threads as well as raise questions to consider moving forward as we work to advance the relevance and breadth of sustainable food system assessments.

First, in addition to data gathering and tool development, an important part of the assessment work at the centre of this book is the development of, giving voice to, or reinforcing socio-political processes founded in social movements and the evolving relationship between policymakers, practitioners, civil society, and academics. Working on assessments can have the added benefit of capacity building through the participation enabled with this type of research (Chapter 9).

It also raises questions about what constitutes data. While indicators are important, stories are interesting and compelling; thus, a key question is, how do we capture the most useful insights? And, how do we link and talk about the indicators as nested, linked, *and* relational? It is important to talk about processes and purpose simultaneously. Chapter 3 by Spring et al. is an excellent example of how communities with traditional food systems need to connect their community food system assessments to the health of the land. In this case, the well-being of the boreal forest, including caribou and fish health, is part of understanding the sustainability of Kakisa’s food system. The EKOMER project (Chapter 10) focuses attention on the household as part of a city region while chapter authors Paredes et al. (Chapter 10) explain the power of the,

efforts of consumers to self-organize around ethical values and morals of consumption and to exert political influence at any stage of the process. Such is the notion of ‘co-producer’, ‘a consumer who knows and understands problems of food production’ (Petrini, n.d.)

(p. XX)

Colombo used a city region focus as part of the FAO-RUAF CRFS project (Chapter 9). In that case, stakeholders attended primarily to indicators using their locally determined project foci of waste, food security, or food safety. The food policy work by Palmer and Santo (Chapter 8) demonstrates

how assessment can be used as a vehicle for building tools for activism. It is anticipated that the URBAL project (Chapter 2) will build communities of food around the process of mapping sustainable urban food system innovations so that knowledge is co-created and agency is enhanced as networks grow. As part of these processes, it is important to combine and point out how the indicators are linked and improve the connections as learning opportunities to understand more about food systems as a whole. In considering scale of assessments, questions include how/whether to move from local or regional indicators to more national or international indicators, or the reverse, and what links and connections exist between scales? Battersby's, Meter's and Cohen's work (Chapters 4, 5 and 11) helps us to understand the challenges in shifting between scales and the need to work within complex frameworks. All of the projects in this book point to the centrality of iteration and the value of cross-verifying data as it is gathered.

Second, while the initiatives reported in this book help to broaden the conversation about assessment and policy, more is needed. In addition to understanding local food systems, it is also important to understand how international laws affect local laws, for example the World Trade Organization, the European Union, or through the multi- or bi-lateral accords such as the SDGs. The common list of indicators used by international organizations applies a global lens that can be difficult to apply at the local level (Chapter 5). It is important to have standard indicators but, from a governance point of view, if people do not understand the value of food then it is a challenge to integrate food into policies. Moving to standard indicators coupled with a participatory approach for interpretation and implementation can be effective. Related questions to address include, does future work compare processes, frameworks, and/or specific indicators? It seems there is an interesting nexus between indicators and unknowns in the realm of governance that needs to be further unpacked to try to identify ways to make new pathways between different interests. A related question is what are the indicators we can use to create and signal transformative food systems? One way to know the indicators are successful, is that we would see change in the values of indicators over time, or pertinent, new indicators may be initiated. But what combination of indicators would signal that food system sustainability is being achieved? The authors of this book certainly suggest that indicators of social capital and relationships of trust play a central role, in concert with other measures (for example, the role of communities as discussed in Chapters 2, 3, 4, 9, & 10, this volume).

A third consideration is capturing the invisible dimensions of SFSA. The social economy, particularly as it is articulated in informal economies, is a good example of the largely invisible and often poorly measured dimensions of SFSA, a situation that is captured in the work of Joubert et al. (2018) on the ways in which informal food systems in South Africa, Kenya, Zimbabwe, and Zambia are overshadowed. Case studies or other qualitative processes that capture these important stories can complement metrics

and other assessment tools by providing the depth needed to connect the data in a meaningful way. To develop relevant policy, it is critical to capture the practices that are out of the scope, or beyond the ‘official’ framework, or simply invisible and the associated contributions that are very difficult to measure. There are many data challenges including, as reported by Paredes et al. (Chapter 10), with people being reluctant to be ‘data-ed’.

The book also raises questions about complexity and using an adaptive systems approach. Meter (Chapter 4) is the most clear about this opportunity but others, for example the chapters by Valette et al. (Chapter 2), Cohen (Chapter 11), and Santini et al. (Chapter 9), draw on these assumptions. As Kate Clancy (2014) states, complex adaptive systems integrate and rely on, ‘many diverse and autonomous components or parts ... which are interrelated, interdependent, linked through many (dense) interconnections, and behave as a unified whole in learning from experience and in adjusting (not just reacting) to changes in the environment’ (p. 10). The multi-directional, iterative co-creation of knowledge demonstrated in the development of the advocacy toolkit developed by Palmer and Santo (Chapter 8) is an excellent example where multiple individuals in the same organization completed the assessment as they worked towards enriched, varied convergence. The heterogeneity that comes from multi-stakeholder, multi-sector, and multidisciplinary assessment opens up space for verification and buy-in.

Finally, we need to consider enacting assessment processes and tools to help address the pressing issues the world now faces. Climate change, migration shifts, and growing inequality can all be addressed through more sustainable food systems. To do this, we need assessment processes and tools that reflect the realities of those most disadvantaged in households, communities, regions, and countries. By providing relevant assessment support, we can make decisions based on evidence that raises the voices of the people who need to be heard the most. At its best, a sustainable food system assessment process, as demonstrated by all the chapters in this volume, offers the potential to build capacity and bring transparency and clarity, in turn enabling a better use of resources and learning over time and across scales (Anderson, 2015). They can also provide the basis for seeing how participation may need to change, measure change over time, enable strategy development, knowledge transfer, and inform transformative, coherent policy.

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References

- Anderson, M.D. (2015) The role of knowledge in building food security resilience across food system domains. *Journal of Environmental Studies and Sciences*. 5(4), pp. 543–559.
- Anderson, M.D. (2019) Comparing the effectiveness of structures for addressing hunger and food insecurity. In: Andrée, P., Clark, J.K., Levkoe, C.Z., & Lowitt, K. (Eds.) *Civil society and social movements in food systems governance*. London, Routledge, pp. 124–144. doi:<https://doi.org/10.4324/9780429503597>.
- Blay-Palmer, A., Renting, H., & Dubbeling, M. (2015) City region food systems: A literature review. *Carasso Foundation*. Report available at: <https://www.ruaf.org/sites/default/files/City%20Region%20Food%20Systems%20literature%20review.pdf>.
- Clancy, K. (2014) A different way to approach policy change. *Journal of Agriculture, Food Systems, and Community Development*. 4(4), pp. 9–11.
- Death, C. & Gabay, C. (2015) Doing biopolitics differently? Radical potential in the post-2015 MDG and SDG debates. *Globalizations*. 12(4), pp. 597–612.
- D’Silva, J. & Webster, J. (Eds.) (2017) *The meat crisis: Developing more sustainable and ethical production and consumption*. London, Routledge.
- Dubbeling, M., Santini, G., Renting, H., Taguchi, M., Lançon, L., Zuluaga, J., De Paoli, L., Rodriguez, A., & Andino, V. (2017) Assessing and planning sustainable city region food systems: Insights from two Latin American cities. *Sustainability*. 9(1455). doi:10.3390/su9081455.
- FAO (2017) *State of food security and nutrition in the world*. Rome, FAO. Available at: <http://www.fao.org/3/a-i7695e.pdf>.
- FIAN (2016) *FIAN International Annual Report 2016*. Available at: https://www.fian.org/fileadmin/media/Publications/Annual_Report/FIAN_International_Annual_Report_2016_english_march.pdf.
- Flora, C.B. (2018) *Rural communities: Legacy + change*. London, Routledge.
- Forster, T., Santini, G., Edwards, D., Flanagan, K., & Taguchi, M. (2015) *Strengthening urban rural linkages through city region food systems*. UNCRD/UN Habitat issue of Regional Development Dialogue.
- Freedgood, J., Pierce-Quiñonez, M., & Meter, K. (2011) Emerging assessment tools to inform food system planning. *Journal of Agriculture, Food Systems, and Community Development*. 2(1), pp. 83–104.
- Fukuda-Parr, S., & McNeill, D. (2019) Knowledge and politics in setting and measuring the SDGs: Introduction to special issue. *Global Policy*. 10, pp. 5–15.
- Garnett, T. (2014) Three perspectives on sustainable food security: Efficiency, demand restraint, food system transformation. What role for life cycle assessment? *Journal of Cleaner Production*. 73, pp. 10–18.
- IPES-Food (2015) *The new science of sustainable food systems: Overcoming barriers to food systems reform*. First Report of the International Panel of Experts on Sustainable Food Systems.
- IPES-Food (2017) *Too big to feed: Exploring the impacts of mega-mergers, consolidation and concentration of power in the agri-food sector*. Available at: http://www.ipes-food.org/_img/upload/files/Concentration_FullReport.pdf.
- Joubert, L., Battersby, J., & Watson, V. 2018. *Tomatoes and taxi ranks: Running our cities to fill the food gap*. Cape Town, South Africa, African Centre for Cities, University of Cape Town.

- Kloppenbergh, J., Hendrickson, J., & Stevenson, J. W. (1996) Coming into the foodshed. *Agriculture and Human Values*. 13(3), pp. 33–41.
- Lakoff, G. (2010) Why it matters how we frame the environment. *Environmental Communication*. 4(1), pp. 70–81.
- Lehtonen, M., Sébastien, L., & Bauler, T. (2016) The multiple roles of sustainability indicators in informational governance: Between intended use and unanticipated influence. *Current Opinion in Environmental Sustainability*. 18, pp. 1–9.
- Levkoe, C.Z., & Blay-Palmer, A. (2018) Food counts: Food systems report cards, food sovereignty and the politics of indicators. *Canadian Food Studies/La Revue canadienne des études sur l'alimentation*. 5(3), pp. 49–75.
- Marin County (2012) *Marin community food systems assessment project report: Fixing food together*. Available at: <https://marinfoodsystem.files.wordpress.com/2012/02/marin-county-food-system-assement-project-report.pdf>.
- Maye, D. & Duncan, J. (2017) Understanding sustainable food system transitions: Practice, assessment and governance. *Sociologia Ruralis*. 57(3), pp. 267–273.
- Morin, E. (2008) *On complexity*. Cresskill, NJ, Hampton Press.
- Mullinix, K., Dorward, C., Sussmann, C., Polasub, W., Smukler, S., Chiu, C., Rallings, A., Feeney, C., & Kissinger, M. (2016) *The future of our food system: Report on the southwest BC bioregion food system design project*. Richmond, British Columbia, Institute for Sustainable Food Systems, Kwantlen Polytechnic University.
- Palmer, E. (2015) Introduction: The 2030 agenda. *Journal of Global Ethics*. 11(3), pp. 262–269.
- Perez-Escamilla, R., Gubert, M.B., Rogers, B., & Hromi-Fiedler, A. (2017) Food security measurement and governance: Assessment of the usefulness of diverse food insecurity indicators for policy makers. *Global Food Security*. 14, pp. 96–104.
- Prosperi, P., Moragues-Faus, A., Sonnino, R., & Devereux, C. (2015) *Measuring progress towards sustainable food cities: Sustainability and food security indicators*. Report of the ESRC Financed Project ‘Enhancing the Impact of Sustainable Urban Food Strategies’. Swindon, ESRC.
- Riley, F., Mock, N., Cogill, B., Bailey, L., & Kenefick, E. (1999) *Food security indicators and framework for use in the monitoring and evaluation of food aid programs*. Washington, DC, Nutrition Technical Assistance Project (FANTA).
- Sanyé-Mengual, E., Orsini, F., & Gianquinto, G. (2018) Revisiting the sustainability concept of urban food production from a stakeholders’ perspective. *Sustainability*. 10(7), p. 2175.
- Sonnino, R., Marsden, T., & Moragues-Faus, A. (2016) Relationalities and convergences in food security narratives: Towards a place-based approach. *Transactions of the Institute of British Geographers*. 41(4), pp. 477–489.
- Spence, L.J. & Rinaldi, L. (2014) Governmentality in accounting and accountability: A case study of embedding sustainability in a supply chain. *Accounting, Organizations and Society*. 39(6), pp. 433–452.
- Wise, T.A. (2015) *The great land giveaway in Mozambique*. Dollars & Sense. Online. March/April. Available at: <http://dollarsandsense.org/archives/2015/0315wise.html>.

Index

Note: page numbers in *italic* type refer to Figures; those in **bold** type refer to Tables.

- 3rd UN Conference on Housing and Sustainable Urban Development (Habitat III, Quito, 2016) 246
100 Resilient Cities 10, 94, 107
2030 Agenda for Sustainable Development, United Nations 2
- ACT (Advocacy Capacity Tool), Bolder Advocacy Project, AFJ (Alliance for Justice) 164
action research *see* AR (action research)
administrative advocacy 166; *see also* advocacy
advocacy: definition of 159; theoretical foundation 161–163
advocacy capacity measurement *see* FPN (Food Policy Networks, Johns Hopkins Center for a Livable Future)
advocacy capacity measurement toolkit
Advocacy Capacity Tool (ACT), Bolder Advocacy Project, AFJ (Alliance for Justice) 164
affordability of food (food and nutrition security issue) 138, 139, 141, 142, 144, 147
AFJ (Alliance for Justice) 164
African Americans, employment discrimination against 227
Agricultural Census of Commercial Agriculture, South Africa 100
Agricultural Land Review, Cape Town, South Africa 101, 103
Agricultural Marketing Service (AMS), US 75
Agricultural Resource Management Survey (ARMS), US 75
agroecology 55–56, 112; Ecuador responsible consumption study 196, 198, 199–200, 201, 202, 202, 203, 204, 205, 209
Agropolis Foundation 20
‘Alianza por el Buen Vivir’ (‘Alliance for Good Living’) 188–189
Allen, T. 2, 10–11, 130–155, 236, 238, 240, 244, 245
Alliance for Justice (AFJ) 164
Altieri, M. 56
amaranth (*Amaranthus caudatus*) 200; *see also* Andean grains, consumption of
AMS (Agricultural Marketing Service), US 75
Andean grains, consumption of (Ecuador responsible consumption study) 200, 202, 202, 203, 204, 205, 209
April-Lalonde, G. 12, 195–215, 236, 241, 242, 246, 247, 249
AR (action research): definition 114; SCFN (Sustainable Food Cities Network) project 5, 8, 10, 111, 115–118, 118, 119, 120–125, 238, 241, 242, 243
ARMS (Agricultural Resource Management Survey), US 75
attractors 73
Aubin, J. 22, 67, 68, 72
- Badal, M. 8
Baltimore: UFIL (Urban Food Innovation Lab) 33, 33
Baltzer, J. 9, 42–65, 239, 242, 247
Banks, S. 228

- Battersby, J. 10, 93–100, 236, 238, 240, 242, 243, 244, 245, 248
- Bauler, T. 7, 149
- Baum, F. 74
- BEA (US Bureau of Economic Analysis) data 75–76
- Berlin: UFIL (Urban Food Innovation Lab) 33, 33
- Berti, P.R. 12, 195–215, 236, 241, 242, 246, 247, 249
- big food data 229
- Binimelis, R. 7–8
- biodiversity: and agroecology 55–56; biodiversity loss (food system vulnerability/resilience driver) 138, 139, 141, 143, 147
- Bioversity International *see* ‘Metrics of Sustainable Diets and Food Systems Project’ (Bioversity International/ CIHEAM-IAMM)
- Blay-Palmer, A. 1–16, 19–41, 178–194, 234–251
- Boada, L. 12, 195–215, 236, 241, 242, 246, 247, 249
- Bolder Advocacy Project, AFJ (Alliance for Justice) 164
- Bologna, Italy 245
- Bonomelli, V. 8–9, 19–41, 236, 238, 240, 242, 245, 248
- boreal forest ecosystem, Canada 42–43, 54; ecosystem health 47–51; *see also* Kakisa, Northwest Territories, Canada
- Brasilia: UFIL (Urban Food Innovation Lab) 33, 33
- Bricas, N. 8–9, 19–41, 27, 236, 238, 240, 242, 245, 248
- Brighton, UK: SFCN (Sustainable Food Cities Network) project 115
- Bristol, UK: SFCN (Sustainable Food Cities Network) project 115, 117–119, 121, 123
- Brundtland Report (*Our Common Future*), World Commission on Environment and Development 2, 22, 131
- Bureau of Labor Statistics Consumer Expenditure Survey, US 75
- Calancie, L. 164
- Calgary Food Action Plan - Calgary Eats!* 5
- Canada: food systems in North 9, 42–45; *see also* Kakisa, Northwest Territories, Canada; Toronto, Canada
- Cape Town, South Africa: food security mandates 96–98; Food System and Food Security Study 5, 10, 93, 94–108, 236, 238, 240, 242, 243, 244, 245, 248; UFIL (Urban Food Innovation Lab) 33, 33; *see also* data challenges in South Africa
- Cardiff, UK: SFCN (Sustainable Food Cities Network) project 117–119, 121, 123
- Cardiff University: SFCN (Sustainable Food Cities Network) project 111
- Carlsson, L. 23
- CAS (complex adaptive systems) 9–10, 23, 66–67, 131–132, 217, 238, 240, 241, 245, 248, 249; definitions 67–68; four stages of adaptive cycle 68–69; impact of CAS assessments 84–85; implementation of plans 84; interactions between order and disorder 69; limitations of approach 85–86; methodological frameworks 72–73; methodological tools 75–80, 77; participative research processes 73–75; setting up food system assessment 80–82; success measurement using linked indicators 83–84; uniqueness of settings 71–72; “wicked problems” or “problem situations” 70–71; workplans 83
- Catalan food sovereignty assessment 8
- CBA (cost-benefit analysis) 22
- CBD (UN Convention on Biodiversity) 247
- CBFS (‘community-based food systems’) 80–81
- Census of Agriculture (US National Agricultural Statistical Service) 75; 2012 68
- Centers for Disease Control and Prevention, US 75
- CFS (Committee on World Food Security), United Nations 4
- CGIAR Water Land and Ecosystems Programme 178; *see also* CRFS (City Region Food Systems) project
- changes in food consumption patterns (food system vulnerability/resilience driver) 138, 139, 141, 144–145, 147
- chemical pollution, in Canada’s north 51
- Chimborazo, Ecuador *see* Riobamba, Ecuador

- chocho (*Lupinus mutabilis*)
200; *see also* Andean grains,
consumption of
- chronic diseases, Ecuador 196, 197
- Churchman, C.W. 71
- CIHEAM-IAMM (International
Center for Advanced Mediterranean
Agronomic Studies-Mediterranean
Agronomic Institute of Montpellier)
see 'Metrics of Sustainable Diets and
Food Systems Project' (Bioversity
International/CIHEAM-IAMM)
- CIRAD 20
- City of Toronto Food and Beverage
Sector 189
- City Region Food Systems project *see*
CRFS (City Region Food Systems)
project
- Civil Society Organization (CSO)
Forum 4
- Clancy, K. 249
- climate change, and Canada's north
46, 47–51
- CMC (Colombo Municipal
Council) 186
- Cogill, B. 2, 10–11, 130–155, 236, 238,
240, 244, 245
- Cohen, N. 12–13, 216–233, 236, 243,
246, 249
- Cole, D.C. 12, 195–215, 236, 241, 242,
246, 247, 249
- Colombo Municipal Council
(CMC) 186
- Colombo, Sri Lanka: CRFS (City
Region Food Systems) project
179–180, 185–187
- Committee on World Food Security
(CFS), United Nations 4
- community capitals framework 82
- community development: and CRFS
(City Region Food Systems) 190
- 'community-based food systems'
(CBFS) 80–81
- complex adaptive systems *see* CAS
(complex adaptive systems)
- complexity paradigm 67, 83, 86, 239
- Conaré, D. 1–16, 19–41, 234–251
- conceptual foundations 234, 235,
235–239
- consumer price index (CPI), US Federal
Reserve Bank 76
- consumption: definition 198; *see also*
responsible consumption
- contamination, in Canada's north 51
- Conway, G.R. 131
- co-production 114, 115, 124–125;
SFCN (Sustainable Food Cities
Network) project 111, 116–117,
120; *see also* participative research
processes
- Cornwall, A. 73–74
- cost-benefit analysis (CBA) 22
- county boundaries, as units of
analysis 81–82
- Cousins, J.B. 26
- CPI (consumer price index), US Federal
Reserve Bank 76
- CRFS (City Region Food Systems)
project 5, 12, 178–180, 190–192,
240, 241, 245, 247, 249; challenges
and obstacles 190–191; outcomes
of assessment and planning process
182–190; toolkit and approach
180–182
- CSO (Civil Society Organization)
Forum 4
- Cuba 55
- cultural food preferences (food and
nutrition security issue) 138, 139,
141, 143, 147
- data 23, 242, 247; big food data 229;
Cape Town, South Africa, food
system and food security study
94–96, 98–108; CRFS (City Region
Food Systems) project 190–191;
global scale 6–7; and governance
93, 94–96; local-level 75; time-series
data, US 75–78, 77
- data challenges in South Africa 94–96,
106–108; absent data 104–105; local
government data sets 102–105; poor
disaggregation 98–101; private sector
data control 105–106; weak proxies
101–102
- De Haan, J. 73
- De Schutter, O. 125
- Delphi Inquiry Process 23
- Delphi surveys: 'Metrics of Sustainable
Diets and Food Systems Project'
(Bioversity International/CIHEAM-
IAMM) 11, 136, 137, 138,
140–141, 141, 142–145, 146, 147,
149–151, 236, 238, 240, 244, 245
- Department of Agriculture, South
Africa 97

- Department of Health and Mental Hygiene (DOHMH), New York City 219
- Dhondt, S. 21
- Di Battista, A. 1–16, 234–251
- dietary energy balance (food and nutrition security issue) 138, 139, 141, 145, 147
- DOHMH (Department of Health and Mental Hygiene), New York City 219
- drought, in Canada's north 48
- Dubbeling, M. 12, 178–194, 240, 241, 245, 247, 249
- Dueñas Ocampo, S. 197
- Duncan, J. 235, 239
- Earl, L.M. 26
- East Harlem, New York City 224
- economic dimensions of sustainable food systems 2; URBAL (Urban-Driven Innovation for Sustainable Food Systems) 28, 28
- Economic Research Service (ERS), USDA 75, 76
- Ecuador 12; Quito CRFS (City Region Food Systems) project 179, 180, 189–190; responsible consumption 12, 196–197, 198–199, 200–203, 202, 204, 205, 205–206, 206, 207–208, 209–210, 236, 241, 242, 246, 247, 249
- Edinburgh, UK: SFCN (Sustainable Food Cities Network) project 122
- education, and CRFS (City Region Food Systems) 190
- EKOMER project team: Ecuador responsible consumption study 12, 196–197, 198–199, 200–203, 202, 204, 205, 205–206, 206, 207–208, 209–210, 236, 241, 242, 246, 247, 249
- employment: and CRFS (City Region Food Systems) 190; employment discrimination against African Americans 227
- environmental dimensions of sustainable food systems 2; URBAL (Urban-Driven Innovation for Sustainable Food Systems) 28, 28
- environmental footprint calculations 55
- environmental impact assessments 229
- Ericksen, P. 133
- ERS (Economic Research Service), USDA 75, 76
- European Action Plan for Food and Nutrition Policy 2007–2012, World Health Organization 139
- European Union 149, 248
- Fair Wages for New Yorkers Act (Local Law 37 of 2012), New York 226
- FAO (Food and Agriculture Organization), United Nations 12, 21, 113, 178, 240; SAFA (Guidelines for Sustainable Assessment of Food and Agriculture Systems) 23; *see also* CRFS (City Region Food Systems) project
- farmers, direct purchase from (Ecuador responsible consumption project) 199, 202, 202, 203, 204, 205, 209
- farmer-to-farmer learning 56
- farm-level sustainability 5–6
- fast food outlets, Cape Town, South Africa 105
- Federal Census, US 75
- Federal Ministry of Food and Agriculture, Germany 178; *see also* CRFS (City Region Food Systems) project
- Feenstra, G. 132
- FIAN (Right to Adequate Food and Nutrition) 4, 237
- FIES (Food Insecurity Experience Scale), UN 5
- Fight for Fifteen* movement 226
- fish pollution, in Canada's north 50–51
- fishing *see* traditional food systems, Canada
- FLEdGE (Food: Locally Embedded, Globally Exchanged) Partnership 1
- Flood, R.L. 71, 73, 78
- Flora, C. 82
- Flora, J. 82
- focus groups: 'Metrics of Sustainable Diets and Food Systems Project' (Bioversity International/CIHEAM-IAMM) 136, 137
- Folke, C. 67, 72, 78, 81, 82
- Fondation Daniel & Nina Carasso/ Daniel and Nina Carasso Foundation 20, 130, 178; *see also* CRFS (City Region Food Systems) project
- Food Act, Sri Lanka 187

- Food and Agriculture Organization, United Nations *see* FAO (Food and Agriculture Organization), United Nations
- Food and Nutrition Security unit, Medellín, Colombia 187
- Food Counts: the pan-Canadian Sustainable Food Systems Report Card* 6, 8, 242
- food crisis, 2008–2009 4
- food insecurity 236; Canada's north 42, 45; New York City 218, 220–222, 222; *see also* food security
- Food Insecurity Experience Scale (FIES), UN 5
- Food: Locally Embedded, Globally Exchanged (FLEDGE) Partnership 1
- Food Matters 115, 120
- food miles 236
- food planning 230
- food policy councils *see* FPCs (food policy councils)
- Food Policy Networks *see* FPN (Food Policy Networks, Johns Hopkins Center for a Livable Future) advocacy capacity measurement toolkit
- food price volatility (food system vulnerability/resilience driver) 138, 139, 141, 143–144, 147
- food processing, Cape Town, South Africa 105
- Food Retail Expansion to Support Health (FRESH) policy, New York City 223
- food retailers, New York City 222–223
- Food Secure Canada 8
- food security 133, 134; food security data, Cape Town, South Africa 98–99, 112; issues in 138, 139–140, 141, 142–145; URBAL (Urban-Driven Innovation for Sustainable Food Systems) 28, 28; *see also* food insecurity
- food sharing: Canada 45
- food sovereignty 7–8, 237; Ecuador 196
- food system data, Cape Town, South Africa 99–100
- food systems: integration of upstream determinants and downstream metrics 216–230; as social-ecological systems 133–134; vulnerability and resilience in 134–135, 135
- food systems assessments: challenges of 111; literature review 112–115
- food waste: Colombo, Sri Lanka 186; Medellín, Colombia 188; New York City 219
- foodsheds 27, 81
- FoodWorks (New York City Council) 218, 219
- Foran, T. 133
- Forster, T. 241
- FPCs (food policy councils): diverse membership of 162–163; organisation of 162; *see also* FPN (Food Policy Networks, Johns Hopkins Center for a Livable Future) advocacy capacity measurement toolkit
- FPN (Food Policy Networks, Johns Hopkins Center for a Livable Future) advocacy capacity measurement toolkit 172–174, 236, 242, 243, 244, 247–248, 249; background and context 159–161; development process 164–165; equity and inclusion 166, 167–168, 169; goals of 11, 163–174; LAFC (Lynchburg Area Food Council) experiences 11, 169, 171–172, 173; systems-thinking metrics 169, 170; theoretical foundation 161–163; toolkit contents 165–166
- Framework for Strategic Sustainable Development (FSSD) 23
- frameworks 239
- Francis, C. 55
- Freedgood, J. 239
- FRESH (Food Retail Expansion to Support Health) policy, New York City 223
- fruit and vegetables, consumption of (Ecuador responsible consumption study) 203, 205, 207, 209
- FSSD (Framework for Strategic Sustainable Development) 23
- Fundazione Cariplo 20
- Gallopin, G.C. 132
- Garnett, T. 236
- gathering *see* traditional food systems, Canada
- geographic boundaries, as units of analysis 81–82

- 'Get It Toolgether: Assessing your Food Council's Ability to Do Policy' *see* FPN (Food Policy Networks, Johns Hopkins Center for a Livable Future) advocacy capacity measurement toolkit
- Giordano, T. 95–96, 107
- GIS data 75
- global food system, resilience of 112
- Golden Horseshoe Food and Farming Alliance, Toronto, Canada 189
- governance 2, 243; CRFS (City Region Food Systems) project 181, 191–192; data availability and reliability issues 93, 95–96; FPN (Food Policy Networks, Johns Hopkins Center for a Livable Future) advocacy capacity measurement toolkit 173; Quito, Ecuador 189–190; URBAL (Urban-Driven Innovation for Sustainable Food Systems) 28, 28
- Greater Cincinnati Food Policy Council 164
- Green Cart vendors, New York City 219, 223
- Guardian programme, Kakisa, Northwest Territories, Canada 53
- Guidelines for Sustainable Assessment of Food and Agriculture Systems (SAFA) 23
- Habitat III, Quito, 2016 (3rd UN Conference on Housing and Sustainable Urban Development) 246
- Hanoi: UFIL (Urban Food Innovation Lab) 33, 33
- harvester surveys, traditional food systems 44–45
- Health Canada 44
- Heinisch, C. 198
- HLPE (High Level Panel of Experts on Food and Nutrition Security) 133
- Holland, J. 67–68, 69
- Holling, C.S. 67, 68, 69, 82, 84
- Hope, A. 74
- Hummelbrunner, R. 26
- hunting *see* traditional food systems, Canada
- IAASTD (International Assessment of Agricultural Knowledge, Science and Technology for Development) 3–4, 7
- Ibarra, Ecuador: responsible consumption study 197, 201, 204, 206, 207–208, 209
- Imbabura, Ecuador *see* Ibarra, Ecuador
- immigrants: food insecurity in New York City 218, 220–222, 222
- impact pathways: URBAL (Urban-Driven Innovation for Sustainable Food Systems) 24–25, 30
- Impact Pathways Analysis (IPA) 25
- Indiana food system assessment 84–85
- indicators 4–5; integration of upstream determinants and downstream metrics of food system 13, 216–230; need for integrated set of 132; SMART 7, 117, 244; *see also* 'Metrics of Sustainable Diets and Food Systems Project' (Bioversity International/CIHEAM-IAMM)
- Indigenous and Northern Affairs Canada 43, 44
- indigenous communities: Canada 43, 44, 45; *see also* Kakisa, Northwest Territories, Canada
- informal food retail, Cape Town, South Africa 105
- information gathering and diffusion 6–7
- input-output analysis 22
- institutional advocacy 166; *see also* advocacy
- Integrated Food Security Strategy, South Africa (2002) 97, 98, 99
- International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) 3–4, 7
- International Covenant on Economic, Social, and Cultural Rights 42
- International Institute for Environment and Development 107
- international Panel of Experts on Sustainable Food Systems (IPES-Food) 4
- International Resource Centre on Food Security Foundation *see* RUAF (International Resource Centre on Food Security) Foundation
- invasive species, in Canada's north 50–51
- IPA (Impact Pathways Analysis) 25
- IPES-Food (international Panel of Experts on Sustainable Food Systems) 4
- Irwin, S. 74–75

- IWMI: CGIAR Water Land and Ecosystems Programme 178
- Jefferson County (Colorado) Food Policy Council 164
- Jewkes, R. 73–74
- Johns Hopkins Center for a Livable Future *see* FPN (Food Policy Networks, Johns Hopkins Center for a Livable Future) advocacy capacity measurement toolkit
- Joubert, L. 248
- Ka'a'gee Tu First Nation (KTFN) 46–47, 49, 50–51, 52–53; *see also* Kakisa, Northwest Territories, Canada
- Kakisa, Northwest Territories, Canada 9, 56–57, 239, 242, 247; community-driven food system metrics 46–47; ecosystem health 47–51; local food production 54–56; supporting community participation in food system evaluation 52–53
- Kania, J. 72
- Kenya 107, 248
- Kingdon, J. 160, 161–162
- Kitwe, Zambia: CRFS (City Region Food Systems) project 179, 180, 182–185
- Kloppenber, J. 81
- knowledge: culturally embedded 78; differing types of 113; dissemination of 246–247; *see also* traditional knowledge
- Koopmans, M. 67
- Kramer, M. 72
- KTFN (Ka'a'gee Tu First Nation) 46–47, 49, 50–51, 52–53; *see also* Kakisa, Northwest Territories, Canada
- La Via Campesina 4, 8
- LAFC (Lynchburg Area Food Council) 11, 169, 171–172, 173
- Lahlou, S. 210
- Lakoff, G. 239
- Landert, J. 23
- language barriers, and food benefit programmes 221
- Latin America, food consumption practices 195; *see also* Ecuador
- Laurier Centre for Sustainable Food Systems *see* LCSFS (Laurier Centre for Sustainable Food Systems)
- LCA (Life Cycle Assessment) 22, 55
- LCS (legitimacy-credibility-saliency) 7
- LCSFS (Laurier Centre for Sustainable Food Systems) 1, 12, 20, 21, 178; *see also* CRFS (City Region Food Systems) project; Wilfrid Laurier University, Canada
- legislative advocacy 166; *see also* advocacy
- legitimacy-credibility-saliency (LCS) 7
- Lehigh Valley Food Policy Council 164
- Lenoble, J. 125
- Levkoe, C.Z. 242
- Levy, Á. 55
- Libman, K. 217
- Life Cycle Assessment (LCA) 22, 55
- listeria outbreak, South Africa 106
- lobbying 159
- 'local food network' 85
- local food production: Cape Town, South Africa 99–100, 101–102, 103; Kakisa, Northwest Territories, Canada 54–56
- local food systems: environmental and social justice issues 20
- London, UK: SFCN (Sustainable Food Cities Network) project 115
- Loorbach, D. 73
- Lores, A. 55
- Luederitz, C. 21
- Lusaka, Zambia: CRFS (City Region Food Systems) project 179, 180, 182–185
- Lynchburg Area Food Council (LAFC) 11, 169, 171–172, 173
- maize 183, 184
- Manchester, UK: SFCN (Sustainable Food Cities Network) project 115
- Maricopa County (Arizona) Food Systems Council 85
- Marin County, California 238
- market food systems, Canada 43, 45, 46
- Maye, D. 235, 239
- MDGs (Millennium Development Goals), United Nations 6, 240
- Meadows, D.H. 2–3
- meat consumption, reduction of 236
- Medellin, Colombia: CRFS (City Region Food Systems) project 179, 180, 181, 187–198, 190
- Mediterranean area: 'Metrics of Sustainable Diets and Food Systems Project' (Bioversity International/ CIHEAM-IAMM) 11, 136, 137, 138,

- 140–141, 141, 142–145, 146, 147, 149–151
- Megapolis, Sri Lanka 185, 186
- Memphis Tilth 164
- mercury pollution, in Canada's north 51
- Meter, K. 1–16, 66–90, 217, 234–251
- metrics 4–5, 12–13; integration with upstream determinants 13, 216–230, 236, 243, 246, 249
- 'Metrics of Sustainable Diets and Food Systems Project' (Bioversity International/CIHEAM-IAMM) 10–11, 130–131, 150–151, 236, 238, 240, 244, 245; concept of sustainable food systems 131–132; framing working hypotheses 133–136; identification of indicators 140–141, 141, 142–145, 146, 147; lessons learned 148–150; methodology 136, 137, 138; vulnerability and resilience models 138–140
- Midgley, G. 71–72
- Milan, Italy: Milan Urban Food Policy Pact (MUFPP) 5, 21, 34, 113, 241, 246; UFIL (Urban Food Innovation Lab) 33, 33
- Millennium Development Goals (MDGs), United Nations 6, 240
- minimum wage, New York City 228
- Ministry of Agriculture Food and Rural Affairs, Toronto, Canada 189
- Ministry of Agriculture, Zambia 184, 185
- Ministry of Health, Zambia 185
- Ministry of Local Government, Zambia 184
- MoMWD (Ministry of Megapolis and Western Development), Sri Lanka 185, 186
- mono-diet practice, Zambia 183
- Montpellier, France 245; UFIL (Urban Food Innovation Lab) 33, 33
- Moragues-Faus, Ana 10, 111–129, 238, 241, 242, 243
- Morin, E. 67, 71, 72, 81, 85, 86, 239
- MOTIFS 6
- MUFPP (Milan Urban Food Policy Pact) 5, 21, 34, 113, 241, 246
- multi-stakeholder planning 26
- Muñoz, F. 12, 195–215, 236, 241, 242, 246, 247, 249
- National Agricultural Policy, Sri Lanka 187
- National Food and Nutrition Commission (NFNC), Zambia 183
- National Nutritious Food Basket (NNFB), Canada 43–44
- National Nutrition Policy, Sri Lanka 187
- National Policy on Food and Nutrition Survey 2014, South Africa 98
- National Urbanization Policy (NUP), Zambia 180, 184
- Naudet, J. 22
- Nelson, C.H. 69, 70, 71
- Nelson, E. 9, 42–65, 239, 242, 247
- New York City: big food data 229; diverse datasets 228–229; emergence of food metrics 218–219; food insecurity among immigrants 218, 220–222, 222; food workers' labour conditions 218, 225–228; integration of upstream determinants and downstream metrics of food system 13, 218–230, 236, 243, 246, 249; neighbourhood food environments 218, 222–225
- NFNC (National Food and Nutrition Commission), Zambia 183
- NNFB (National Nutritious Food Basket), Canada 43–44
- NUP (National Urbanization Policy), Zambia 180, 184
- nutrition dimensions of sustainable food systems: URBAL (Urban-Driven Innovation for Sustainable Food Systems) 28, 28
- nutrition security issues 138, 139–140, 141, 142–145
- nutritional quality of food supply (food and nutrition security issue) 138, 139, 141, 142, 143, 144, 147
- obesity 236; Ecuador 196, 197; Latin America 195
- Office of Food Policy, New York City 219
- Omaha Food Policy Council 164
- Ontario, Canada 69
- on-the-land learning, Kakisa, Northwest Territories, Canada 53
- operationalizing assessment tools 234, 235, 239–242
- organic production: Ecuador 196; *see also* agroecology
- Our Common Future* (Brundtland Report), World Commission on

- Environment and Development 2, 22, 131
- Outcome Logic Model 30, 31
- outcomes and goals 234, 235, 243–247
- Pal, S. 44
- Palmer, A. 11, 159–177, 236, 242, 243, 244, 247–248, 249
- PAR (Participatory Action Research) 73; Kakisa, Northwest Territories, Canada 46
- paradigm of complexity 67, 83, 86, 239
- Paredes, M. 12, 195–215, 236, 241, 242, 246, 247, 249
- participative research processes 114, 124–125, 244–245; CAS (complex adaptive systems) 73–75; ‘Metrics of Sustainable Diets and Food Systems Project’ (Bioversity International/CIHEAM-IAMM) 136, 151; SFCN (Sustainable Food Cities Network) project 116–117, 120–121, 122–123; *see also* co-production; PAR (Participatory Action Research)
- participatory evaluation: URBAL (Urban-Driven Innovation for Sustainable Food Systems) 25–27
- Participatory Rural Appraisal 56
- Pathmark 224
- Pawson, R. 24–25
- ‘Paying for Nutrition’ project, Canada 44–45
- People’s Food Policy 8
- People’s Food Sovereignty Now!* (CSO Forum) 4
- Perez-Escamilla, R. 7, 244
- permafrost thaw, in Canada’s north 48–49, 51
- PHA (Philippi Horticultural Area), Cape Town, South Africa 94, 100, 101–102, 104
- Pichincha, Ecuador *see* Quito, Ecuador
- place 1, 8, 9, 13, 42, 54–55, 57, 67, 71, 82, 111, 112, 114, 116, 118, 121, 122, 123–124, 190, 235, 235, 237–238, 239
- Plymouth, UK: SFCN (Sustainable Food Cities Network) project 115
- policy: definition 159–160
- policy generation 243–244
- policy windows theory 160, 161–162
- political dimension of urban food systems sustainability assessment 23–24
- pollution, in Canada’s north 51
- Popov, E.V. 21
- PoU (Prevalence of Undernourishment) indicator 7, 240
- Prado Beltrán, P. 12, 195–215, 236, 241, 242, 246, 247, 249
- Prince George’s Food Equity Council 164
- private sector data control in Cape Town, South Africa 105–106
- “problem situations” 70–71
- producers, direct food purchase from (Ecuador responsible consumption study) 199, 202, 202, 203, 204, 205, 209
- Prosperi, P. 2, 10–11, 130–155, 236, 238, 240, 244, 245
- Public Health Law Center 164
- quinoa (*Chenopodium quinoa*) 200; *see also* Andean grains, consumption of
- Quito, Ecuador: CRFS (City Region Food Systems) project 179, 180, 189–190; responsible consumption study 197, 199, 200, 201, 203, 204, 206, 207–208, 209
- Rabat: UFIL (Urban Food Innovation Lab) 33, 33
- Randolph College 171
- RCI (Responsible Consumption Index), Ecuador responsible consumption study 12, 196, 201–203, 202, 204, 205, 205–206, 206, 207–208, 209, 210
- reflective practices 114–115, 124–125; SFCN (Sustainable Food Cities Network) project 111, 121–122
- resilience in food systems 112, 134–135, 135; ‘Metrics of Sustainable Diets and Food Systems Project’ (Bioversity International/CIHEAM-IAMM) 138–140, 140–141, 141, 142–145, 146, 147, 148, 149
- Response Inducing Sustainability Evaluation (RISE) 5–6
- responsible consumption 195–196; definition 197; dimensions of 197–200; Ecuador 196–197, 198–199, 200–203, 202, 204, 205, 205–206, 206, 207–208, 209–210
- Revised Northern Food Basket (RNFB), Canada 43–44
- Right to Adequate Food and Nutrition (FIAN) 4, 237

- Right to Food and Nutrition (RTFN) 237
- Rinaldi, L. 236
- Riobamba, Ecuador: responsible consumption study 197, 201, 203, 204, 206, 207–208, 209
- RISE (Response Inducing Sustainability Evaluation) 5–6
- Rittel, H. 70, 71, 73
- river siltation 242
- RNFB (Revised Northern Food Basket), Canada 43–44
- Rocheleau, D.E. 74
- Rotmans, J. 73
- RTFN (Right to Food and Nutrition) 237
- RUAF (International Resource Centre on Food Security) Foundation 12, 21, 113; *see also* CRFS (City Region Food Systems) project
- SAFA (Guidelines for Sustainable Assessment of Food and Agriculture Systems) 23
- SAFA (Sustainability Assessment of Food and Agriculture) 6
- salt, consumption of (Ecuador responsible consumption study) 203, 205–206, 208, 209
- Santini, G. 12, 178–194, 240, 241, 245, 247, 249
- Santo, R. 11, 159–177, 236, 242, 243, 244, 247–248, 249
- Sanyé-Mengual, E. 24, 244–245
- scale 42, 57, 69, 239, 240–242, 248
- Schmidt, I. 106
- school meals provision, New York City 222, 222
- Schreiber, K. 8–9, 19–41, 236, 238, 240, 242, 245, 248
- scientific information: information gathering and diffusion 6–7; *see also* data
- Scotland: food policy 122
- SDF (Spatial Development Framework), Cape Town, South Africa (2012) 102–103
- SDGs (Sustainable Development Goals), United Nations 2, 5, 6, 10, 34, 93, 107, 240, 244, 245, 248
- Sébastien, L. 149
- sense-making 1, 8, 235, 235, 238–239
- SES ('social-ecological system'), food systems as 133–134
- SFCN (Sustainable Food Cities Network) project 5, 8, 10, 111, 115–118, 118, 119, 120–125, 238, 241, 242, 243; limitations and trade-offs 122–124; research design and methodology 116–117; toolbox 117–118, 118, 119
- SFS (sustainable food systems) *see* sustainable food systems
- SFSA (sustainable food systems assessment) *see* sustainable food systems assessments
- shift workers, New York City 227
- Shop Healthy* programme, New York City 223
- Shorten, A. 74
- sick leave for food workers, New York City 226
- Simba, M. 9, 42–65, 239, 242, 247
- Skinner, K. 9, 42–65, 239, 242, 247
- SLF (Sustainable Livelihoods Framework) 239
- Slocum, R. 20
- smallholder farmers' knowledge 4
- SMART indicators 7, 117, 244
- Smith, J. 74
- SNAP (Supplemental Nutrition Assistance Program), New York City 219, 220–222, 222
- social capital 82
- social dimensions of sustainable food systems 2; URBAL (Urban-Driven Innovation for Sustainable Food Systems) 28, 28
- social justice indicators 236
- social memory 81
- 'social-ecological system' (SES), food systems as 133–134
- SOFI (State of Food Insecurity) 7
- Soil Association 115, 120
- soil run-off 242
- South Africa 248; South African Constitution, and food security 96–97; *see also* Cape Town, South Africa; data challenges in South Africa
- Spatial Development Framework (SDF), Cape Town, South Africa (2012) 102–103
- Spence, L.J. 236
- Spring, A. 9, 42–65, 239, 242, 247
- Stachowiak, S. 161
- stakeholders: CRFS (City Region Food Systems) project 179, 181, 191; needs of 24; URBAL (Urban-Driven

- Innovation for Sustainable Food Systems) 26–27, 29, 29–31
- state boundaries, as units of analysis 81–82
- State of Food Insecurity (SOFI) 7
- Stroink, M.L. 69, 70, 71
- subsidiarity 243
- Supplemental Nutrition Assistance Program (SNAP), New York City 219, 220–222, 222
- Sustain 115, 120
- sustainability: definition of 67; meaning of 148
- Sustainability Assessment of Food and Agriculture (SAFA) 6
- sustainable development 133; multidimensional nature of 131–132
- Sustainable Development Goals (SDGs), United Nations 2, 5, 6, 10, 34, 93, 107, 240, 244, 245, 248
- sustainable diets 112, 198; *see also* responsible consumption
- Sustainable Food Cities Network project *see* SFCN (Sustainable Food Cities Network) project
- sustainable food systems 2–3; definition 133; informing policy 148–149; as multidisciplinary concept 131–132; *see also* ‘Metrics of Sustainable Diets and Food Systems Project’ (Bioversity International/ CIHEAM-IAMM)
- sustainable food systems assessments 1; emergence of 3–8; literature review 112–115; thematic approach to 7
- sustainable food systems dimensions 2, 22–23; URBAL (Urban-Driven Innovation for Sustainable Food Systems) 27–28, 28
- sustainable intensification 112
- Sustainable Livelihoods Framework (SLF) 239
- sustainable nutrition security 112
- Swanson, H. 9, 42–65, 239, 242, 247
- SWOT (Strengths, Weaknesses, Opportunities, Threats) framework 80
- systems approaches 2–3, 131–132
- Thinking in Systems* (Meadows) 2–3
- Tiger Brands 106
- time-series data: CAS (complex adaptive systems) approach 75–78, 77
- Timmel, S. 74
- tipped wage theft, New York City 226–227
- Toronto, Canada 246; CRFS (City Region Food Systems) project 179, 189
- Toronto Food Policy Council 189
- Toronto Food Strategy 5, 189
- traditional food systems, Canada 9, 43, 44, 46–47; *see also* Kakisa, Northwest Territories, Canada
- traditional knowledge: and agroecology 56; Environmental Coordinator, Kakisa, Northwest Territories, Canada 52–53
- transport, and CRFS (City Region Food Systems) 190
- Turetsky, M. 9, 42–65, 239, 242, 247
- Turner, B.L. 135
- UFILs (Urban Food Innovation Labs) 9, 20, 31–34, 32, 33, 35
- UN Convention on Biodiversity (CBD) 247
- United Way of New York City 164, 171
- Universal Declaration of Human Rights 42
- URBAL (Urban-Driven Innovation for Sustainable Food Systems) 8–9, 34–35, 236, 238, 240, 242, 245, 248; context of 19–24; impact pathways 24–25, 26, 30; participatory-based methodology 25–27; project objectives 20–21; stakeholder-oriented methodology 29, 29–31; sustainable food systems dimensions 27–28, 28; UFILs (Urban Food Innovation Labs) 9, 20, 31–34, 32, 33, 35
- Urban Agriculture Policy, Cape Town, South Africa 94
- Urban and Regional Planning Act, Zambia 180, 184
- urban areas: populations 19
- Urban Food Innovation Labs (UFILs) 9, 20, 31–34, 32, 33, 35
- Urban Food Strategies: The Rough Guide to Sustainable Food Systems* (Sustainable Food Cities project, UK) 5
- urban food systems sustainability assessment 5, 20–21; political dimension 23–24; quantitative

- methodologies 21–22; sustainability dimensions 22–23
- urban sustainability transition labs (UST) 21
- Urban-Driven Innovation for Sustainable Food Systems *see* URBAL (Urban-Driven Innovation for Sustainable Food Systems)
- US: agriculture time-series data 75–78, 77; Bureau of Economic Analysis (BEA) data 75–76; USDA (US Department of Agriculture) 75
- UST (urban sustainability transition labs) 21
- Utrecht, the Netherlands: CRFS (City Region Food Systems) project 179
- Valero, Y. 12, 195–215, 236, 241, 242, 246, 247, 249
- Valette, E. 8–9, 19–41, 236, 238, 240, 242, 245, 248
- values, in assessment systems 113–114
- Vancouver Food Systems Assessment 5*
- Viljoen, A. 72
- Virginia Food System Council 164
- visibility 235–236
- vision 1, 8, 12, 29, 32, 33, 45, 46, 165, 180, 181, 182, 186, 235–236, 235, 237, 238
- Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security* (FAO) 4
- Voorberg, W.H. 114
- vulnerability in food systems 134–135, 135; ‘Metrics of Sustainable Diets and Food Systems Project’ (Bioversity International/CIHEAM-IAMM) 138–140, 140–141, 141, 142–145, 146, 147, 148, 149
- wages of food workers, New York City 226
- Warde, A. 198
- waste management: CRFS (City Region Food Systems) 190; *see also* food waste
- water depletion (food system vulnerability/resilience driver) 138–139, 141, 142, 147
- Webber, M. 70, 71, 73
- Western Cape Provincial Department of Social Development, South Africa 99
- WIC (Women, Infants and Children) programme, New York City 222, 222
- “wicked problems” 70–71, 72, 217
- Wiek, A. 21
- wildfire, in Canada’s north 49–50
- Wilfrid Laurier University, Canada 20, 21, 113; *see also* LCSFS (Laurier Centre for Sustainable Food Systems)
- wise practitioners: CAS (complex adaptive systems) approach 78–79
- Wiskerke, J.S.C. 72
- Women, Infants and Children (WIC) programme, New York City 222, 222
- working conditions of food workers, New York City 226–228
- World Commission on Environment and Development: *Our Common Future* (Brundtland Report) 2, 22, 131
- World Health Organization: European Action Plan for Food and Nutrition Policy 2007–2012 139
- World Health Survey 247
- World Trade Organization 248
- Zambia 248; *see also* Kitwe, Zambia; Lusaka, Zambia
- Zimbabwe 248
- zoning: and local food environments 223–224



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