Journal of Agriculture, Food Systems, and Community Development
ISSN: 2152-0801 online
https://www.foodsystemsjournal.org

The role of metrics in food policy: Lessons from a decade of experience in New York City

Special JAFSCD Issue
Local Government in Food Systems Work
Sponsored by
GROWING FOOD CONNECTIONS

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Submitted January 4, 2018 / Revised March 19, May 19, and July 18, 2018 / Accepted May 21, 2018 / Published online October 17, 2018

Citation: Freudenberg, N., Willingham, C., & Cohen, N. (2018). 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*(Suppl. 2), 191–209. https://doi.org/10.5304/jafscd.2018.08B.009

Abstract

In the last decade, New York City developed food policies designed to improve access to healthy food, reduce food insecurity, support community development, promote sustainable food systems, and improve conditions for food workers. Since 2012, the New York City Council has mandated the Mayor's Office to prepare annual Food Metrics Reports to present data on selected food system indicators. This article uses these reports to assess how the metrics describe the city's progress in implementing municipal food policies set in the last decade. Our analysis examines: (1) changes in the indicators that the city reports; (2) strengths and weaknesses of the Food Metrics Reports as a tool for monitoring policy enactment and impact; and (3) opportunities for improvements to the indicators and the development and implementation of future metrics. We found that the reports show improvements in 51% of the 37 indicators and sub-indicators, declines in 40% and no change or no assessment in the remaining indicators. While the food metrics process has provided valuable data on the implementation of selected city food policies, it has several limitations. By adding new indicators, tapping into additional data sources, and engaging additional constituencies in the process, New York City food metrics could play a more useful role in helping New York City to set goals

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Funding Disclosure

We thank the New York Community Trust and its Wilhelm Lowenstein Memorial Fund and Food Samaritan Fund for the support of this project.

Author Note

The opinions expressed and the accuracy of the evidence cited in this article are the responsibility of the authors and not our advisers or employer.

and monitor progress towards the development of a more equitable, efficient, and sustainable municipal food system. The experience with food metrics in New York City suggests lessons for the use of food policy monitoring to improve food systems in other cities.

Keywords
Urban Food Policy, Food Metrics, Municipal Food Systems, Food System Assessments

Introduction
In the last decade, New York City has instituted many new food policies and programs designed to improve access to healthy food, reduce food insecurity, support community and economic development, promote a more sustainable food system, and improve pay and conditions for food workers (Freudenberg, Cohen, Poppendieck, & Willingham, 2018; Willingham, Rafalow, Lindstrom, & Freudenberg, 2017). While New York City's food policies have been examined in the academic literature (Freudenberg, Silver, Hirsch, & Cohen, 2016; Isett, Laugesen, & Cloud, 2015; Cohen & Reynolds, 2014; Freudenberg & Atkinson, 2015; Campbell, 2016; Roberto, Swinburn, Hawkes, Huang, Costa, Ashe, & Brownell, 2015; Lederer, Curtis, Silver, & Angell, 2014), the role of metrics in the food policy process, and the strengths and limitations of current food metrics, have been under-studied, despite the close connection between metrics and policy choices.

This paper analyzes six Food Metrics Reports prepared annually by the New York City Mayor's Office of Food policy since 2012 to assess how the metrics describe the city's progress in carrying out various municipal food policies. Our analysis examines: (1) changes in the indicators measured by the metrics the city reports; (2) strengths and weaknesses of the Food Metrics Reports as a tool for monitoring policy implementation and impact; and (3) opportunities for improvements in three domains: the indicators, the process of metrics development, and the implementation of future metrics that would make the metrics more useful for evaluation and planning. Our goal is to identify lessons from the city's experience with food metrics that can inform food policy planning, implementation, and evaluation in other cities. This article is based on a comprehensive study assessing the city's progress since 2008 in achieving five broad food policy goals: improving nutritional well-being, promoting food security, creating food systems that support economic and community development, ensuring a sustainable food system, and supporting food workers (Freudenberg et al., 2018). These policy goals are briefly defined in Table 1.

Metrics and Policy
An assessment of the strengths and weaknesses of New York City's food metrics requires a brief review of recent developments in the application of metrics to food and other policy arenas. Metrics, also known as indicators, are mechanisms that measure the condition of a system or that represent a system's characteristics. They usually do so through a mix of quantitative or qualitative variables (Feenstra, Jaramillo, McGrath, & Grunnell, 2005; Waas et al., 2014). Accurate and reliable metrics are considered important for evidence-based public policy and management. There is also a long history of their use in addressing a wide range of policy issues, from equality and social justice to public health and ecological sustainability (Bell & Morse, 2013). The use of metrics has grown in recent years as the cost of large-scale data collection (i.e., "big data") and the tools to analyze and visualize large quantities of data have dropped and become more accessible to agency staff, advocates, and the public (Kitchin, Lauriault, & McArdle, 2015; Athey, 2017).

Metrics serve several different purposes in the policy process. A common view is that metrics play an instrumental role in the evaluation and assessment of policies (Sébastien & Bauler, 2013) by measuring activities and outcomes, often through a reduced or simplified set of variables that represent more complex systems. Metrics allow policies to be tracked. If data are conveyed in a form that government officials, advocates, businesses, and the public can understand and use, the data can be used to measure impact, cost-effectiveness, comparative costs and benefits, longitudinal change, geospatial differences, and other variables. These are all examples of variables

that can help avert unintended negative consequences and achieve desired outcomes. At best, the development and analysis of metrics can serve as a catalyst for the democratic public discussion of policy goals.

Metrics can also drive decision-making processes. The choice of indicators influences our perception of policy problems and shapes our approach to solving them (Barrett, 2010). Metrics are socially constructed, and the social process of metrics development can facilitate shared understandings of problems and desired outcomes, engage actors in the policy process (Innes, 1990), or present a partial or distorted view of reality. By focusing attention on certain outcomes over others, some metrics can serve to exclude people. The recognition that indicators can reinforce existing structures and policies led to the social indicators movement of the 1960s and 1970s. This movement aimed to develop alternative measures of progress and engage citizens in indicator development (Talberth, Cobb, & Slattery, 2007; Meadows, 1998). The importance of locally developed indicators has been embraced by advocacy organizations and global programs like the Local Agenda 21 planning process (Pires, Fidélis, & Ramos, 2014).

The adage, "what gets measured gets managed" over-simplifies the impacts of metrics on policy. The instrumental and social dimensions of metrics enable them to make the policymaking process more or less democratic in several ways: (1) by providing decision-makers and advocates with common evidence; (2) by limiting access to particular sources and types of data; (3) by substituting information for action, thereby delaying change; (4) by framing concerns like equity or health as technocratic issues, thereby limiting political debate; or (5) by strategically communicating metrics to support predetermined positions (Hezri & Dovers, 2006).

The Growth of Urban Food Metrics

Cities have collected data about urban food systems, from food adulteration to urban agriculture, since the emergence of public health and food planning at the turn of the 20th century (Vitiello & Brinkley, 2014). The focus on collecting metrics on the environment and health accelerated in the 1970s as federal and state laws required a wide range of indicators to be measured and reported. But it was not until the early 2000s, as the urban food system became a legitimate focus of urban planners and policymakers, that cities started developing discrete food metrics, initially focused on urban sustainability (Heller & Keoleian, 2003). USDA published guidelines for food security metrics in 2002 (Cohen, 2002), and philanthropic organizations and non-profits launched initiatives like the Vivid Picture Project, an effort in 2004-5 to create indicators of California's food system and benchmarks to gauge the system's sustainability (Feenstra et al., 2005). Though criticized for reinforcing rather than challenging policies and norms (Guthman, 2008), Vivid Picture and other food metrics projects focused attention on the process of food system metrics development, the validity of the measures, and the application of metrics to policy.

Within the past two decades, national and international programs have accelerated the development of local and regional food system indicators to track and compare (or "benchmark") food systems management. Prosperi, Moragues, Sonnino, and Devereux (2015) compared the use of food system metrics in eight such projects. In 2015, the Institute of Medicine and National Research Council published a framework for assessing food systems that included recommended metrics (Institute of Medicine and National Research Council, 2015; Clancy, 2016). Following the adoption of the United Nations Sustainable Development Goals (SDGs) in 2015, scholars have examined how the collection of urban food systems data on hunger, food security, nutrition, and sustainable agriculture, as well as social equity, public health, and ecological sustainability coincide with the indicators required to show attainment of the SDGs (Marmot & Bell, 2018; Ilieva, 2017).

At the city scale, the proliferation of food system plans, strategies, and policy papers over the past decade has been the impetus for municipal governments to develop and collect urban food systems metrics (Coppo, Stempfle, & Reho, 2017; Ilieva, 2017). An analysis of the content of food strategies and plans from five North American

cities (New York, Philadelphia, Los Angeles, Chicago, and Toronto) identified 260 distinct food system indicators in these cities alone (Ilieva, 2017). Food systems strategies sometimes contain definitions of how goals and objectives are to be measured, but the level of specificity and degree to which cities, regional planning agencies, or other entities (e.g., food policy councils) are expected to collect and report data vary significantly. Municipal indicators are typically derived from pre-existing government data, data collected by academic institutions and NGOs, and proprietary data from private sector firms. Different data collection and reporting methods and frequencies, geographic boundaries, definitions, and limited or inconsistent data availability result in inconsistencies in the information collected within and across cities (Ilieva, 2017; Coppo et al., 2017). In another example, the Milan Urban Food Policy Pact plans to release a set of indicators to guide the 132 signatories to the Pact in tracking their progress achieving the commonly agreed-upon goals (Food and Agriculture Organization [FAO] of the United Nations, 2017).

Food Metrics in New York City

Food policy became politically salient in New York City about a decade ago (Freudenberg et al., 2018). Appendix 1 shows some of the policy and programs implemented since 2005 by New York City and New York State, each of which has jurisdiction over several domains of food policy in the city. Yet, despite the reputation of the Bloomberg administration (2001-2013) for having a data-driven government (Kelly, Davies, Greig, & Lee, 2016), food metrics were not systematically collected and disseminated. City departments like Health, Parks, Sanitation, and Environmental Protection published information about the food and agriculture programs under their jurisdictions, yet there was no process for regularizing the data collection and no central repository of the data. Even the city's 2007 sustainability strategy, PlaNYC, which detailed more than 100 initiatives of 25 agencies (Office of the Mayor of New York City, 2007) with measurable milestones, did not include food policies until a 2011 update (Office of the Mayor of NYC, 2011).

FoodWorks

Food metrics in New York City was an outcome of *FoodWorks*, a food systems strategy document launched as an initiative of City Council Speaker Christine Quinn in 2009 (New York City Council Speaker, 2010). *FoodWorks* was designed to be a comprehensive plan that proposed "new policies and investments [that] can encourage positive changes for the food system of future generations." The report described the city's existing food policies and programs and outlined "key legislative changes, public and private investments, infrastructure improvements, and partnerships to improve [the city's] food system" (Brannen, 2010, p. 2), including policy recommendations that extended beyond the jurisdictional and physical boundaries of the city (Campbell, 2016).

During the Council's work on *FoodWorks*, it became apparent that there were gaps in the basic data about the food that the city buys and serves and the impact of various food-related programs (New York City Council, 2011a). The first report, released in 2012, described the document as "a resource for New Yorkers to better understand our food system and how municipal government plays a role" (New York City Mayor's Office of Food Policy, 2012, p. 1).

Food Metrics Legislation

After releasing FoodWorks, the Speaker introduced a "package" of food bills in 2011 to implement several of the initiatives in *FoodWorks* (Cohen, 2011). In response to gaps in available data about the food system, a core aim was to ensure that indicators of food strategies outlined in *FoodWorks* were collected and made available to the Council and advocates to monitor progress in implementing the food strategy. Council staff began by identifying relevant indicators for the strategies proposed in *FoodWorks* and then developed legislation requiring politically feasible metrics that were logistically possible to collect to be reported.

The Council introduced three bills requiring agencies such as the Departments of Health and Mental Hygiene, City Planning, and Education, among others, to produce: (1) a list of all city-owned real estate and the potential for vacant parcels to be used for urban agriculture; (2) an

annual report of New York State food products procured by city agencies for their institutional food programs compared to purchases from outside of New York during the state's growing season; and (3) an "omnibus" metrics bill covering 19 different indicators for activities under the jurisdiction of different agencies. The Mayor's Office opposed these mandates, claiming they imposed unfunded burdens on agencies that had already faced budget cuts after the 2008 global financial crisis (Campbell, 2016). Testimony on the legislation by representatives of the Administration stressed the difficulty (and costs) of collecting data on issues like the provenance of food procured by city agencies or the suitability of city-owned property for food production (New York City Council, 2011b).

In response to these concerns and to ensure the that the legislation was passed by the Council and signed by the Mayor, the Speaker's legislative staff entered negotiations with Administration staff and amended the food metrics legislation to address issues raised by the Administration. The changes included: (1) extending the deadline for the first reporting period; (2) specifying that for metrics requiring information from vendors and other third parties, city agencies were only obligated to request such data and report it to the extent it is available; (3) removed metrics "where it was not possible to ease the burden of collection from third parties;" and (4) revised metrics to allow agencies to report similar information that the agency already collects or could collect within existing budgetary resources (NYC Council, 2011c). Following these changes, the City Council passed, and the Mayor signed, Local Law 52. Appendix 2 shows the indicators included in Local Law 52. While these changes enabled final approval of Local Law 52, they limited the scope of what was monitored and reduced the utility of the reports.

This legislation established annual reporting requirements for the first time for many food-related initiatives (New York City Mayor's Office of Food Policy, 2012). Local Law 52 assigned responsibility for the annual reports to the Mayor's Office of Long Term Planning and Sustainability, the agency also responsible for tracking the city's sustainability strategies and collecting data to assess progress in meeting sustainability goals. In practice, this responsibility was assumed by the Mayor's Office of Food Policy, created in 2007. The data for these indicators are collected by the responsible city agency and submitted to the Office of the Director of Food Policy in the Mayor's Office, whose staff then aggregates the indicators into the annual report, capturing a snapshot of the work agencies are doing within the city's food system. The Food Metrics Report illustrates the intersectoral scope of food policy in New York City through indicators that cut across numerous sectors, including public health, education, food waste, and urban planning. In 2013, the City Council passed a new law requiring additional metrics on levels of food insecurity in New York City (New York City Council, 2013).

Three governance factors shaped Local Law 52. First, New York City's "strong mayor" form of government gives the Mayor sole authority to estimate the city's budget and manage all city agencies (Eichenthal, 1990). While the City Council legislates and must approve the Mayor's budget, it has relatively little authority over agency commissioners; however, the City Council does have the authority to conduct public hearings in which they scrutinize the progress of an agency in carrying out its duties. Requiring the city to submit annual metrics on the outcomes of food policies and programs provides the Council with the opportunity to monitor the progress of new food initiatives and hold commissioners accountable. As a City Council staff report on the Local Law 52 observed, "to adequately monitor and address the challenges facing New York City's food system, policymakers and members of the public must have access to full and accurate information." (New York City Council, 2011a, p. 4).

Second, the food metrics legislation also served to draw attention to elements of *FoodWorks* for which future City Council members and civil society groups could advocate. Thus, it was a more practical and less politically contentious, although perhaps less effective, effort to set policy goals without enacting legislation and authorizing funding for every issue addressed.

Finally, the Food Metrics Reports were a way for the Speaker to solidify support among

advocates for stronger food policies. Requiring comprehensive food metrics was a way to demonstrate her office's commitment to these issues and to provide advocates with annual data that would help them in their efforts to hold agencies accountable, as testimony in support of the legislation from advocates from food justice, environmental and anti-hunger organizations illustrated (New York City Council, 2011b).

Metrics as Assessment Tools

As shown in Table 1, the Food Metrics Report tracks 37 separate indicators in the 19 categories listed in Appendix 2. The main purpose of these indicators is to measure progress in implementing major food policies. We examined the city's Food Metrics Reports between 2012 and 2017 to assess changes in five broad policy goals (shown in the left column of Table 1) that we had identified in another comprehensive study of food policy in New York City (Freudenberg et al., 2018).

For each indicator, we assessed the change between 2012 and 2017. When data were not reported for 2012, we used the earliest subsequent year available for comparison. For each indicator, we determined whether the observed change represented an improvement, decline, no change, or no assessment. We used the intent of the policy instrument that authorized the program or policy to make this classification. When two investigators disagreed about the classification, we discussed the assignment to reach a consensus.

Of the indicators tracked between 2012 and 2017, 51% (19) showed improvements, 40% (15) showed declines (often by small amounts), one showed no change, and two were not assessed. To evaluate progress across policy domains, we assigned each indicator to one of the five policy goals, then assessed the change in this indicator reported between 2012 and 2017. We recognized that some policies may contribute to two or more of these goals. However, we assigned each to the single primary goal that we thought best reflected the policy authorizing that activity.

Table 1. Distribution of Food Metrics Indicators by Goals and Direction of Change

Policy Goals		Number of Indicators	Improvements in indicator	Declines in indicator	No change in indicator	Not reported
1. Improve nutritional well-being. Policies that promote health and reduce diet-related diseases		21	10	8	1	2
2. Promote food security. Policies that reduce hunger and food insecurity and provide the quality and quantity of food needed to maintain health		4	4	0	0	0
3. Create food systems that support economic & community development. Policies that promote community economic development through food and improve food production and distribution in the region		3	1	2	0	0
4. Ensure a sustainable food system. Policies that reduce food waste and food-related pollution and carbon emissions and protect the region's farmland		8	3	5	0	0
5. Support Food Workers. Polices that provide food workers with decent wages and benefits, safe working conditions, and the right to organize		1	1	0	0	0
Total	N (%)	37	19 (51%)	15 (40%)	1 (3%)	2 (5%)

Nutrition and Food Access Goals. The most frequently assigned goal for the policies monitored in the Food Metrics Report was to improve nutritional well-being. This was the primary goal assigned to 21 of the 37 policies (57%). Of these 21 indicators, 10 (48%) showed improvements, 8 (38%) showed declines, one showed no change, and two were not assessed.

Some examples of the activities implemented to achieve this goal include:

- Between 2012 and 2017, the Food Retail Expansion to Support Health (FRESH), a city program to encourage supermarkets to open or expand in low-income neighborhoods, approved 27 new supermarkets, of which 14 had been completed by the end of 2017.
- The number of food stores participating in Shop Healthy, an initiative to expand access to healthy food in bodegas and supermarkets, increased from 161 in 2012 to 1,117 in 2017.
- In both 2012 and 2017, the compliance rate with New York City Food Standards, the rules that mandate less sugar, fat, and salt in the meals and snacks served by 11 city agencies in their institutional food programs, was more than 90%.
- The number of snack and beverage vending machines in NYC public schools declined slightly, and the inclusion of healthier fare that complied with NYC Food Standards led to a 16% decline in revenues from these machines.
- Salad bars were installed in all city schools by 2016, with the number of salad bars increasing by 38% in six years.

On several other nutrition and access indicators, the Food Metrics Reports showed declines:

- The number of meals and snacks served in the city's institutional food programs declined by 11%, from 271 million in 2012 to 242 million in 2017. Of 12 New York City municipal programs serving food in both years, the number of meals and snacks served in 2017 compared to 2012 declined for nine and increased for only three. In some cases, the cause seems clear. For example, reduction in the city's jail population led to the need for fewer meals while an increase in the number served by homeless shelters led to a 48% increase in the number of meals served in shelters, a dramatic indicator of a growing problem. The largest food-serving institution, the New York City school system, reported 800,000 fewer meals were served in 2017 than in 2012, a 4% decline.
- Green Cart vendors sell fruits and vegetables on street corners in low-income neighborhoods. The number of Green Cart permits declined by 37% between 2012 and 2017. The number with Electronic Benefits Transfer (EBT) systems, which allow customers to purchase produce with their SNAP benefits, increased by 14%. However, the number of carts with EBTs fell sharply between 2016 and 2017.
- Greenmarkets and farmers markets provide many New Yorkers with access to fresh, locally grown produce. The number of farmers market and Greenmarket locations fell slightly between 2012 and 2017 although many new ones were in low-income neighborhoods.

Food security. Of the four indicators assessing food security initiatives, all showed some progress:

- The number of older people getting SNAP benefits increased by 25%. However, between 2000 and 2014, the number of people aged 65–74 in New York increased by 24%. This suggests that some of the observed increase in the number of seniors receiving SNAP benefits may be the result of population growth, not increased enrollment rates. In addition, New York City's older adults experienced an increase in poverty from 16.5% in 1990 to 19.3% in 2014. This suggests that more seniors are eligible for SNAP now than in earlier periods (New York City Department for

the Aging, 2016).

- The number of sites providing SNAP enrollment services increased by 45%, and funding for enrollment activities increased by 12%.
- The number of SNAP recipients receiving nutrition education between 2012 and 2015 increased 14-fold and spending on this increased by 10%. No information is available on the procedures used to count participants.

Several measures included in the nutritional well-being section may also contribute to reducing food insecurity, including the number of Green Carts accepting EBTs, the system that allows them to accept SNAP, and the number of FRESH supermarkets opened in under-served neighborhoods.

In 2014, as required by the 2013 City Council addition to the Food Metrics Report, the first Food Metrics report released by the newly elected de Blasio Administration added data on the number of New York City residents reported to be food insecure. In 2012, this report showed that 1.4 million New York City residents, 17.4% of the population, were food insecure. The Meal Gap—that is, the number of meals missing from the homes of families and individuals struggling with food insecurity—was reported to be 250 million meals. The 2017 Report, using self-reported data from the 2015 Feeding America Survey, reported that 1.25 million New Yorkers, 14.9% of the population, were food insecure and the Meal Gap was 224.8 million meals. Between 2012 and 2015, the self-reported rate of food insecurity fell by 14% and the number of missing meals fell by 10%. These were both significant achievements that reduced the pernicious effects of poverty in New York City.

Community and Economic Development. Two indicators assessed the contribution of food programs to community and economic development. The number of community gardens on city-owned property increased by 32% between 2012 and 2017. An estimated 1,200 lots are used as community gardens in New York City (Nir, 2016), suggesting newly registered community gardens account for about 11% of the total. In 2015, NYC's affordable housing plan proposed to build new housing on 14 community gardens (Nir,2016).

Between 2012 and 2017, the New York City Economic Development Corporation and the Industrial Development Agency made 161 awards totaling US$14.3 million to food manufacturers. Funding levels and the number of awards stayed about the same over those years.

Sustainable food systems. Four of the eight indicators that assess progress towards a more sustainable food system showed improvements:

- The number of acres of farmland participating in the New York City's Department of Environmental Protection (DEP) watershed protection program increased by 6% between 2012 and 2017. The number of acres covered ranged from a high of 26,359 in 2014 to a low of 18,735 in 2012.
- There was a 5% decrease in the number of farms participating in the DEP watershed agricultural program in 2017 compared to 2012; there was a 6% increase in the number of acres covered.
- Between 2012 and 2017, New York City increased annual spending on local milk, yogurt, and produce by 9%. In 2016, the Department of Education's spending on local food accounted for 12% of its total Other Than Personnel Services (OTPS) expenditures on food services (New York City Department of Education, 2016).
- An 80% decline was reported in the number of daily truck trips to or through the Hunts Point Food Market, and a 45% decline was reported in daily rail trips. These changes are associated with a reduction in air pollution.

Sustainability indicators that showed negative trends between 2012 and 2017 were a 5% decline in the number of farms participating in the city's watershed protection program; a 59% reduction in city financial support to upstate farms participating in the watershed protection program; and a 65%

decline in city spending on the more environmentally friendly large containers of bottled water for city agencies and a 35% increase in spending on the more wasteful single-serve containers.

Food Workers. The single indicator that assessed support for food workers showed a 24% increase in the number of workers trained by the city's Small Business Services between 2014 and 2017. The 324 trainees who received training in 2017 represented a tiny fraction of the city's 63,000 grocery store workers and the 320,000 who work in food service and drinking establishments.

What are the strengths and weaknesses of the Food Metrics Reports as a tool for monitoring policy implementation and impact?

The Food Metrics Reports provide valuable data for understanding the implementation of city food initiatives. As the only compendium of food data published by the city, they offer evidence for an assessment of progress in implementing selected food policies approved in New York City over the last decade or so. This makes Metrics Reports an important step forward in food policy planning. The fact that the Reports show measurable progress in the implementation of 51% of the indicators provides assurance that a bare majority of implementation measures for food initiatives are moving in the right direction. The findings on the lack of progress in 40% of the indicators show the need for additional efforts.

The production of six annual reports and their findings are a tribute to the determined efforts of two Mayoral Administrations and the City Council to improve food policy in New York City. The reports and the reporting process are also the results of consistent advocacy, education, policy monitoring, and community mobilization for more effective and equitable food policies by a variety of community organizations, civic groups, and the emerging New York City food movement.

But, the Food Metrics reporting process could be more useful to the food planning process in several ways. As our summary indicates, they provide a somewhat scattershot view of city food policy. The lack of geographical analysis precludes their use by community leaders who want to compare their neighborhoods to other city neighborhoods. Most indicators lack denominators for the population to be served, preventing their use to assess the reach of existing programs. The metrics do not include numerous other sources of public data on food, blocking policymakers and advocates from utilizing the full range of data that is collected to inform policymaking. Moreover, by using fixed metrics the profile they draw is of a static system; however, as Meter (2011) has observed, food systems are in fact dynamic and complex, an insight reinforced by our findings.

Most fundamentally, the lack of any organizing framework or articulated food policy goals for New York City and the focus of the selected metrics on implementation rather than outcomes limits their use in assessing progress toward broader food policy goals. While our summary of the Metrics Reports provides tantalizing and useful snapshots of food policy in action in New York City over the last six years, it does not provide meaningful answers to whether New York City is making progress towards achieving the five goals shown in Table 1. In the next section, we suggest how New York and other cities can take steps to address these limitations.

Food Metrics Reports 2.0: Toward a Comprehensive Food Plan for New York City

What changes in the Metrics indicators and process might make the reports more useful for strengthening food policy, improving food governance, and creating a more equitable and efficient municipal food system? Six years of experience with the Food Metrics Reports provides a foundation for considering Food Metrics 2.0, an expanded approach to food planning that builds on the successes and limitations of the last decade of food policy in New York City. Our suggestions are intended to encourage conversation among food planners in other cities, New York City and state policymakers, public officials in the many agencies that have food responsibilities, food advocates, food businesses, and community leaders and residents.

1. *Include denominators as well as numerators for relevant metrics.*

Few of the indicators provide a denominator that allows the reader to interpret the significance of the change reported or to assess the population impact of the results. For example, Indicator 1 reports the number of farms and their acreage participating in the DEP watershed agricultural programs but not the total acreage of farmland in the region or state. Other evidence shows that the acreage protected since 2012 accounts for only a small fraction of the farmland in these watersheds (Watershed Agricultural Council, 2017). Similarly, without knowing the number of children enrolled each year in city schools, the number who are served school lunches has little meaning. Several other indicators would benefit from denominator data and specified targets for achieving policy goals.

2. *Select additional indicators.*

Through the political deliberations we described, in 2011 the City Council somewhat arbitrarily selected several indicators for the Metrics Reports. As the city considers its food policy goals for the next decade, it should identify indicators that will add new insights and guide policy to solve emerging problems. Especially welcome additions would be measures that capture emerging and dynamic dimensions of the food system (Meter, 2011), e.g., the changing patterns of the retail availability of food by neighborhood. Other metrics to consider are the number of individuals or households eligible for public food programs but not enrolled, the number of retailers who accept SNAP or other benefits by community district, the density of fast food establishments, and the number and percent of various sub-populations experiencing food insecurity (e.g., immigrants, college students, and older people). By assessing the feasibility, benefits, and cost of adding such additional indicators, the creators of the reports could select new indicators that could lead to more useful monitoring of food policy in the coming years.

3. *Add other sources of data and create a unified publicly available data platform.*

New York City and State agencies report food data in several other formats, including the Mayor's Management Report, annual city Budget Reports, the New York City Department of Health's annual Community Health Surveys and its restaurant inspection data, the Department of Education's reports on the use of school meals, and the New York State Department of Agriculture and Markets' food retail database. Policy-makers and residents could realize the potential of using Big Data to inform policy by aggregating these multiple sources into a single user-friendly database that could be used to assess municipal and local food environments.

In addition, in the last decade the city has commissioned several reports that have produced point-in-time data on characteristics of the food system that warrant ongoing monitoring. Examples include studies on the special distribution of supermarkets and grocery stores (New York City Department of City Planning, 2008), the sources of New York City's food supply (Barron et al., 2010), and the transportation of food within the city (New York City Economic Development Corporation, 2016). Two major Mayoral strategic plans, Mayor Bloomberg's 2011 Update of PlaNYC (Office of the Mayor of NYC, 2011) and Mayor de Blasio's OneNYC (Office of the Mayor of NYC, 2015) also present goals and data on the city's food system and on other sectors. The first uses a sustainability lens to plan for the city's future, the second an equity lens. Each plan provides a useful framework for intersectoral food planning but has been divorced from the food metrics process.

In 2012, the City Council passed an Open Data Law requiring all city public datasets to be published on the Open Data Portal, which by 2017 included more than 1600 datasets (Hopkins, 2017). By using open access platforms such as New York City Open Data, the site that makes these data more widely available, an expanded food metrics initiative could assist public agencies, community leaders, advocates, and academics to participate more effectively and equitably in food policy governance.

4. *Include more constituencies inside and outside city government in the metrics process.*

Creating, analyzing, and using mutually agreed on

metrics to monitor and inform food policy has the potential to engage diverse constituencies in shaping those policies. Conversely, restricting the process to a few public officials limits the opportunity for public discussion and collective ownership of the process.

Improvements in food policy require an intersectoral perspective in which many municipal agencies work together to enhance their cumulative contributions. The Food Metrics Report already includes data from the Departments of Health, Education, and Environmental Protection, the Human Resources Administration, Small Business Services, Economic Development Corporation, and others. By enlisting these agencies in defining and collecting data on other outcomes that contribute to better food systems, the Mayor's Office of Food Policy could begin to monitor other outcomes that contribute to reductions in food insecurity and diet-related diseases.

For example, increases in the minimum wage or decreases in residential rent puts more money in the pockets of low-income residents, enabling them to spend more on food (Cohen, 2016). Changes in commercial rent influence the profitability of food stores. By expanding its intersectoral focus, the food metrics process could keep track of a wider range of influences on diet and food systems. This would allow food metrics to identify emerging problems and to inform preventive policy measures.

Another group that could contribute to and benefit from more extensive involvement in the food metrics process is academics. They could assist the city to improve the quality and transparency of the data used in the report, identify other useful metrics, and design small-scale studies to inform the metrics process. They could also suggest qualitative methods that would yield evidence that could help to assess *why* policies were succeeding or failing.

Further attention to the knowledge systems by which various constituencies use data such as those in the Food Metrics Reports to influence food policy could also enhance their utility. Asking community leaders, advocates, and policymakers, as Cash et al. (2003) have suggested, about what they need to know might increase the utility of the reports. For example, enabling community leaders to localize data might help to identify, then reduce inequitable access to healthy affordable food. One way to broaden participation in the metrics process may be for the City Council to hold hearings on the food metrics reports. This would provide its authors with an opportunity to answer questions and explain findings and its users an opportunity to make suggestions for improvements.

5. Make equity a priority.

Food policy scholars suggest that promoting more equitable distribution of healthy urban food environments should be a high priority for food planners (Dixon, Omwega, Friel, Burns, Donati, & Carlisle, 2007; Hawkes & Halliday, 2017). Despite more than a decade of attention to food policy, the New York City's progress in reducing the prevalence of inequities in its most serious food problems—food insecurity and hunger, diet-related diseases, the adverse environmental impact of our food system, and the low wages and poor working conditions of food workers—have been at best modest (Freudenberg et al., 2018).

By using metrics to chart progress towards reducing socioeconomic and racial and/or ethnic inequities in the distribution of food insecurity and diet-related diseases, New York City can begin to realize the current Mayor's commitment to making New York City the "fairest big city" in the nation (Office of the Mayor of NYC, 2018). In addition, the city government can use Mayoral equity initiatives in other sectors to increase food equity. For example, expanding the supply of affordable housing in ways that also increase access to affordable healthy food, making food a central component of universal pre-kindergarten programs, and including food workers in workforce development programs to increase the number of good jobs in New York could amplify the equity impact of each of these initiatives (Cohen, 2016; Office of the Mayor of NYC, 2015, 2017). Measuring the success of such efforts could help the food metrics process put equity front and center.

Various strategies have been used to highlight inequities in food-related outcomes across neighborhoods and populations. For example, a

comparison of food environments in neighborhoods with varying Gini coefficients, a common measure of inequality used to represent the income or wealth distribution of an area's residents, can highlight inequitable outcomes and opportunities for action (Raja, Ma, & Yadav, 2008). Another effort established indicators for food outcomes (e.g., the percentage of high school students who eat fruits and vegetables five or more times per day), tracked the outcomes identified by a community coalition across neighborhoods and assessed progress towards achieving five-year goals in reducing inequalities (Healthy Kids Healthy Communities Buffalo, 2013). Engaging community residents and leaders in setting, collecting, and interpreting measures of inequality can increase their capacity to tackle the conditions that produce these disproportionate burdens.

6. Focus on outcomes as well as implementation

The goal of food policy is to improve the well-being of the population and provide more equitable access to healthy food for all sectors of the population. Food metrics can help to achieve this goal by clearly defining the pathways by which implementing programs and policies leads to desired short-term impact and long-term outcomes. For example, improving access to affordable fruits and vegetables seeks to improve diet quality, reduce food insecurity, and shrink inequities in diet-related diseases. To assess progress towards this goal, a metrics process could examine the associations between the implementation of a host of programs and policies (e.g., Green Carts, supermarket expansion incentives, New York Food Standards, fruit and vegetable prescriptions) and the changes in daily fruit and vegetable consumption by community and population group. By looking at the cumulative impact of several policy initiatives related to key outcomes, New York City could begin to track progress towards its broader goals.

7. Present analyses and frameworks for interpreting changes in metrics as well as describing them

The current Food Metrics Reports present data on selected indicators but provide no analyses of progress, no compelling rationale for why New Yorkers want to track such outcomes, and little analysis of the reasons for successes or failures. What entity or entities conducts such analyses, whether it is the Mayor's Office, the City Council, civil society groups, or some combination, deserve public discussion. But collecting and reporting metrics without providing a publicly-accessible rationale or deeper analysis is like a baseball umpire calling balls and strikes but never recording runs or outs. While readers of the reports can make their own determination, this does not provide a solid foundation for policy development.

Conclusion

Our recommendations suggest a few ways in which the metrics process could be developed in the coming years to provide more useful evidence to guide food policy in New York City. Most essential, in our view, New York City needs a comprehensive, intersectoral multi-year food plan. The purpose of monitoring food policy indicators is to track progress in achieving goals; without clearly articulated objectives, food metrics become less useful. While we acknowledge the challenges in deciding who should develop such a plan and finding the resources necessary for its implementation, it seems unlikely that New York City will make progress in reducing its most significant food problems without a clear roadmap to guide who should be doing what.

In our view, the process of developing such a plan should be participatory, time-limited, and guided by the available evidence. One approach might be to first set a few specific 5- to-10-year objectives for each of the five broad policy goals shown in Table 1 and then begin aligning current policies and identifying gaps to fill to achieve those objectives. Many other cities have developed multi-year food plans, including London (Cretella, 2015; London Food Link, 2016), Chicago (City of Chicago, 2013), Los Angeles (Los Angeles Food Policy Council, 2017) and Toronto (Mah & Thang, 2013), and their experiences can help guide New York City. In addition, international partnerships such as the Milan Urban Food Pact (Tegoni & Licomati, 2017) and recent reports on urban food policy governance (Hawkes & Halliday, 2017) have also begun to suggest approaches to using data to

inform municipal food planning.

In the last decade, New York City has made significant progress in creating and implementing new food policies. The annual Food Metrics Reports have been an important part of the process, and they remain the most comprehensive documentation of the city's progress in food policy. In the coming years, New York City—and other big cities—will need to incorporate the lessons learned from the first years of the food metrics process, build on its successes, and minimize its limitations to use the monitoring process to inform the development of a comprehensive food plan. By doing so, New York City and other big cities can increase the likelihood that, five or ten years from now, they will be able to show substantial progress in creating healthier, more efficient, more equitable, and more sustainable urban food systems.

Acknowledgments

We thank Molly Hartman, Kim Kessler, Jan Poppendieck, Charmaine Ruddock, Ben Thomases, and Barbara Turk for their helpful suggestions on an earlier draft. We thank the editors and anonymous reviewers at the *Journal of Agriculture, Food Systems, and Community Development* for their suggestions.

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Appendices

Appendix 1. Selected Major New York City and State Food Policies, 2005–2017

2005..... Shop Healthy and other later initiatives including Healthy Bodegas launched to improve quality and healthfulness of food in bodegas.
2006..... Launch of Health Bucks, a farmers market incentive program; expanded to all NYC farmers markets in 2012.
2007..... NYC Health Code updated to establish limits on sugary drinks served in child care centers; extended to summer camps in 2012.
2007..... Food Stamp Paperless Office System launched, allowing residents to apply for food stamps at partner food pantries and soup kitchens.
2007..... Ban on artificial trans fat in NYC restaurants.
2007..... Water jets installed in many NYC public schools to increase access to safe drinking water.
2007..... First food policy coordinator position established in Mayor's Office.
2008..... Green Carts, a new class of mobile fresh fruit and vegetable produce vendor permits, established for high-need areas.
2008..... NY State expands SNAP eligibility, extends recertification.
2008..... Chain restaurants required to post calorie information on their menus or menu boards.
2008..... Online application for school meals implemented to facilitate enrollment.
2008..... Nutrition standards for all food purchased and served by city programs promulgated.
2008..... Garden to Café pilot in 20 schools, later expanded to "Grow to Learn," a citywide school gardening initiative.
2009..... Food Retail Expansion to Support Health (FRESH) program launched, providing incentives to attract grocery store development in underserved communities.
2009..... "Pouring on the Pounds" media campaign, encouraging New Yorkers to choose beverages with less sugar.
2009..... SNAP call centers opened to increase access to information on program.
2010..... National Salt Reduction Initiative launched by NYC Department of Health to reduce sodium intake through voluntary corporate commitments announced.
2011..... NY State ends requirement for finger imaging for SNAP.
2011..... Vending machine standards for food-dispensing machines in city buildings go into effect.
2012..... Local Procurement Guidelines encouraging agencies to buy New York State food products released.
2013..... Food Waste Challenge announced asking NYC restaurants to commit to diverting 50% of their food waste.
2013..... Fruit and vegetable prescription pilot program launched at two city public hospitals; later expanded.
2013..... New York City Housing Authority launches first large-scale urban farm, later expanded to more sites.
2014..... New York City Food Assistance Collaborative created to increase emergency food availability and increase access to food and income assistance benefits for eligible New Yorkers.
2015..... Breakfast in the classroom programs expanded in NYC schools.

Continued

2015..... Universal free school lunch implemented in most New York City middle schools, expanded to 90% of all New York City public schools in 2017.
2016..... Salt warning labels required on restaurant menus.
2016..... Minimum wage of New York City, New York State, fast food and other workers raised to US$15 per hour to be implemented over three years.
2016..... Zero Waste Challenge (ZWC) invites New York City businesses to support the city's zero waste goals by working to divert at least 50% of their waste from landfill and incineration by the end of the challenge.
2016 and 2017 .... New laws to protect fast-food workers from unpredictable scheduling and payments.
2017..... Approved for Universal Free Lunch in all NYC public schools.

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Appendix 2. Indicators Included in Annual Food Metrics Reports (see abbreviations and explanations below)

1. Number of farms participating in the DEP Watershed Agricultural Program; Annual dollar amount of city financial support received by participating farms
2. Total DOE expenditure on local milk, yogurt, and produce, defined as produced in New York State
3. Registered community gardens on city-owned property
4. Food manufacturers receiving monetary benefits from EDC or IDA
5. Truck and rail trips to or through Hunts Point Market
6. Grocery store SF per capita and the number of grocery stores opened during the past five calendar years
7. Grocery stores receiving FRESH benefits
8. Number of stores participating in Shop Healthy
9. Number of food-related job training programs administered by SBS
10. Number of meals served in city institutional food programs
11. Compliance with food standards
12. Number of DOE vending machines and revenue generated
13. Number of seniors receiving SNAP benefits
14. Funds spent on SNAP enrollment by HRA
15. Funds spent on Nutrition Education by HRA: (a) Funds DOHMH Spends on Nutrition Education: Stellar Farmers' Market Initiative; (b) Funds DOHMH Spends on Nutrition Education: Eat Well Play Hard Program; (c) Funds DOHMH Spends on Nutrition Education: District Public Health Offices
16. (a) Salad bars in schools; (b) Salad bars in NYC Health and Hospitals facilities
17. Funds spent by DCAS on bottled water in 5-gallon containers and in single-serve bottles
18. Number of Green Cart permits, number of violations, locations, and number of operators that accept EBT
19. Number of vendors at GrowNYC farmers markets

Abbreviations and explanations:

DCAS	NYC Department of Citywide Administrative Services
DEP	New York City Department of Environmental Protection
DOE	NYC Department of Education
DOHMH	NYC Department of Health and Mental Hygiene
EBT	Electronic benefits transfer, a device that allows SNAP recipients to use SNAP card to pay for food in stores and farmers markets
EDC	NYC Economic Development Corporation (a nonprofit corporation created by NYC)
FRESH	Food Retail Expansion to Support Health, a city program to encourage supermarkets to open or expand in low-income neighborhoods
Green Carts	NYC program to authorize vendors to sell fruits and vegetables on city streets in low-income communities
GROWNYC	NYC nonprofit that administers many of the city's farmers markets and green markets
HRA	NYC Human Resources Administration, the city's social services agency
Hunts Point Market	NYC's wholesale food market
IDA	Industrial Development Agency
NYC Health + Hospitals	The city's public hospital system
SBS	Small Business Services, a city agency
SF	Square feet
Shop Healthy	NYC Department of Health program to encourage bodegas and grocery stores to sell healthier food
SNAP	Supplemental Nutrition Assistance Program

Source: New York City Food Policy. (Various dates). Food metrics reports. Available at http://www1.nyc.gov/site/foodpolicy/about/food-metrics-report.page